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Contents

EDITORIAL

RUN FOR THE SCIENCE

Rafael Vera Cruz de Carvalho

ORIGINAL ARTICLES

THE FRAILTY SYNDROME IN OLDER ADULTS WITH TYPE 2 DIABETES MELLITUS AND ASSOCIATED FACTORS

Bartolomeu Fagundes de Lima Filho, Antônia Gilvanete Duarte Gama, Vanessa da Nóbrega Dias,
Eliza Mikaele Tavares da Silva, Fabricia Azevedo da Costa Cavalcanti, Juliana Maria Gazzola

A CONTEMPORARY AND INNOVATIVE CARE MODEL FOR OLDER ADULTS

Renato Veras

SATISFACTION OF OCTOGENARIANS WITH PRIMARY HEALTH CARE SERVICES

Luan Augusto Alves Garcia, Giovanna Gaudenci Nardelli, Ana Flávia Machado de Oliveira, Luiza Elena Casaburi,
Fernanda Carolina Camargo, Álvaro da Silva Santos

SOCIODEMOGRAPHIC AND CLINICAL FUNCTIONAL FACTORS IN PRE-FRAIL AND FRAIL OLDER ADULTS WITH TYPE 2 DIABETES MELLITUS IN RELATION TO LOW LEVELS OF PHYSICAL ACTIVITY

Ana Clara Teixeira Fernandes, Bartolomeu Fagundes de Lima Filho, Íkaro Felipe da Silva Patrício,
Vanessa da Nóbrega Dias, Fabrícia Azevêdo da Costa Cavalcanti, Juliana Maria Gazzola

MOBILE CARE SYSTEM FOR OLDER ADULTS: PERCEPTIONS ABOUT ITS USE IN CARING FOR PEOPLE WITH DEMENTIA

André da Silva Brites, Celia Pereira Caldas, Luciana Branco da Motta, Danielli Santos do Carmo,
Alexandre Sztajnberg, Matheus Costa Stutzel

BIOPSYCHOSOCIAL FACTORS ASSOCIATED WITH COMPLAINTS OF DIZZINESS IN OLDER ADULTS WITH TYPE 2 DIABETES MELLITUS

Eliza Mikaele Tavares da Silva, Bartolomeu Fagundes de Lima Filho, Vanessa da Nóbrega Dias, José Diniz Júnior,
André Gustavo Pires de Sousa, Juliana Maria Gazzola

SITUATIONAL DIAGNOSIS OF OLDER ADULTS WITH DIABETES MELLITUS IN A CITY IN THE STATE OF CEARÁ, BRAZIL

Marcionília de Araújo Lima Neta, Maristela Inês Osawa Vasconcelos

THE BRAZILIAN VERSION OF THE HOME FALLS AND ACCIDENTS SCREENING TOOL (HOME FAST): TRANSLATION, CROSS-CULTURAL ADAPTATION, VALIDATION AND RELIABILITY

Jarbas Melo Filho, Silvia Valderramas, Audrin Said Vojciechowski, lynette Mackenzie, Anna Raquel Silveira Gomes

INCIDENCE OF AND MORTALITY FROM COVID-19 IN THE OLDER BRAZILIAN POPULATION AND ITS RELATIONSHIP WITH CONTEXTUAL INDICATORS: AN ECOLOGICAL STUDY

Isabelle Ribeiro Barbosa, Maria Helena Rodrigues Galvão, Talita Araújo de Souza, Sávio Marcelino Gomes,
Arthur de Almeida Medeiros, Kenio Costa de Lima

UTILITARIAN WALKING AND WALKING AS EXERCISE AMONG COMMUNITY-DWELLING OLDER ADULTS: WHAT FACTORS INFLUENCE IT?

Waléria Paixão de Lima, Camila Astolphi Lima, Renato Barbosa dos Santos, Wuber Jefferson de Souza Soares,
Monica Rodrigues Perracini

Run For The Science

To begin, best wishes for the new year to you, dear RBGG reader! We are delighted to present the first issue of 2020 and, in this editorial, will consider a highly contemporary topic: the role of science in our lives.

In the same year that our first thematic issue is published (in N6, although, as RBGG operates a continuous publication system, the first articles published are already available), tackling public policies related to aging, I would like to offer here some reflections on the value given to scientific information today.

Recently, certain attention grabbing phrases on the internet have set the tone for Brazilian researchers, stating that "only science can stop a pandemic" and "the research institutes, universities, national health service (or SUS), the health regulatory agency (or Anvisa) and thousands of civil servants will save us". We can take the current scenario, of this most recent pandemic to threaten us, as an example.

When faced with Covid-19, which continues to spread throughout the world in early 2020, people have an opportunity to more concretely visualize the importance of science in their daily lives. Despite all the access to information that the internet allows, we are well aware of the volume of incorrect or inaccurate findings that are dispersed. In "neo-medieval" times, it seems we need a "neo-enlightenment" movement. Fighting the infamous fake news is vital for all of us, but access to the right information can sometimes be difficult. Meanwhile, several publishers of scientific journals, even those large organizations which aim to profit due to their high publication and access rates, have temporarily made articles describing studies of the disease available via open access. In view of the huge profits of these large publishers, the ethical importance of publicizing research in an open manner is clear. And not just at this critical moment for humanity.

In Brazil, despite so many negative headlines – often due to a lack of knowledge – we play an important leadership role in world science. SciELO (the Scientific Library Online) is at the forefront of the open science movement, and has been the largest collection of open access journals in the world since 2007, according to the most recent report from Science Metrix (2018)[1]. One way of measuring the importance of SciELO is to consider how it was attacked in 2015 by a representative of the same large commercial publishers[2], in an attempt to reduce the weighting of the Brazilian library, as well as the Mexican Redalyc (the *Red de Revistas Científicas de América Latina y el Caribe, España y Portugal*, or the Network of Scientific Journals from Latin America and the Caribbean, Spain and Portugal). In Latin America, just like in in political-economic issues, there is strength in the union of nations and, specifically in academic cases, the joint defense that has led to open access has been fundamental in allowing our researchers to publish and follow what is being studied.

Here these words may seem like a defense of an idealistic banner of open science in Latin America. This remains the case – even for all the merit in adversity – but that is not the main focus of this text. In fact,

the aim is to illustrate the importance of these initiatives, supported by public money, so that the knowledge produced can also become what is inherent to its nature: public. The librarian responsible for the standardization of RBGG references and keywords, Gisele de Fátima Nunes da Silva, has a phrase that sums this up nicely: "knowledge has to circulate, has to be disseminated: it should not be lying on a shelf or trapped under a high access fee" Making the full content of articles available for the broader knowledge of researchers and professionals who work most directly with the population is essential to improving knowledge and practices.

In Brazil the Capes (the Coordination for the Improvement of Higher Education Personnel) Portal of Journals has also been a fundamental tool among researchers in Brazil for searching and accessing articles. The funding that supports it and guarantees access to so many journals is also public. Outside the institutional route, when accessing from home, for example, users must pay (and handsomely) to access these same articles. I would venture to say that without the broad access that the Capes Journal Portal allows, it would be almost impossible to carry out research today, given the volume of articles published daily in each area. When accessing texts of interest to his or her institution, a researcher keeps up to date with literature in the area, which few could do if required to pay the expensive access fees for the articles. It is one more way that relates our population and the science it funds.

In addition to publications aimed at academics and professionals, scientific dissemination aimed at the general public is also very important and, at the same time, one of our greatest challenges. Since the beginning of the last decade, selections for research grants from state funding agencies (FAPS, or foundations for research support) have included the requirement of at least one annual activity of scientific dissemination in public schools in the relevant state. In the case of the Rio de Janeiro state agency, or FAPERJ, a fair was also set up to present the results of studies financed to the general public. Also, in 2012, the Lattes Platform, one of the few initiatives in the world that standardizes and allows the matching of curriculums of researchers with their scientific production, began to include fields to identify content that focuses on the general public. More than merely part of institutional obligations, scientific dissemination should be a commitment of the researcher to their financiers, the people – as the vast majority of research funding comes from the taxes of the population.

Even in countries where the public higher education system is not free, such as the United States, most research funding comes through public funds. This seems somewhat counterintuitive, given that the words "public" and "free" are synonymous. In Brazil, until very recently, almost all such financing was provided by public resources, through federal (Capes and CNPq) and state (FAPS) development agencies. The Serrapilheira Institute was a pioneer in the systematic financial support of the private sector for Brazilian research. However, despite this great weight of public funding, there is often a gap between those who produce (researchers) and those who finance (the people). The need to bring these two groups together is clear.

It is the researcher's obligation to give back to the population for two reasons: an ethical requirement, a commitment to repay the taxes that have been invested in science; and an issue of responsibility, due to the valuation of research as a whole by the general population. The ethical commitment goes into the question of why we have science. The sums raised from the population and, it is hoped, properly managed by our government, being distributed across the budget for science and technology, can and should be the main driver for the development of society. In terms of valuation, the logic is simple: you cannot value what you do not know. It is vital to help develop scientific awareness. A society that values science provides more support for research initiatives, participates more in studies that require voluntary participation and, with such greater interaction, can expand its knowledge (including as fertile ground for future scientists). It is not a question of placing the researcher in the role of "knowledge holder", on a pedestal to be idolized. Quite the opposite! Valuing what science says means understanding, as a minimum, what science is about, and why it can bring us more reliable solutions and answers to our daily lives than unsubstantiated opinions.

But how can we demand that a population which, like ours, still has a low level of education, "understands, as a minimum, what science is about"? As an initial step in breaking this vicious cycle, the scientist needs to

possess the awareness that we discuss here, of the importance of disseminating their works. Thus, we begin a virtuous cycle, from the researcher who presents their results to society, to a society that starts to listen to what systematic and organized studies can tell us about phenomena and values, and supports them.

And what is the main challenge in this regard? To use precise and accessible language. Part of the gap that exists between scientists and the general public is precisely due to communication, whether direct or through disseminators such as scientific journalists. There are two serious errors in scientific dissemination: emphasizing aspects that may not be the center of the information provided by the study (a researcher often aims to stir up controversy or attract attention in a sensationalist manner); or using too many technical terms, concepts or too much jargon, making the information inaccessible to the general public. Unfortunately, scientific dissemination is not part of the systematic training of researchers, at least in the vast majority of Brazilian graduate courses. Consequently, the second error becomes common on the part of researchers. At the same time, often in an attempt to facilitate understanding, information is broken up in such a way that much is lost, even running the risk of becoming inaccurate or so imprecise that incorrect conclusions are drawn. It is vital to achieve a balance: technical terms, jargon and concepts should be avoided, except where necessary, and when included should be combined with definitions and descriptions and accompanied by examples and metaphors. The researcher should develop this ability to comply with the commitments already mentioned in this text. Knowing how to communicate their findings to the academic world is as important as explaining them to the population that funds their work.

RBGG has encouraged its authors in this regard. Everyone who an article approved for publication receives an invitation to send a video summary of their study, which is posted on the magazine's YouTube channel. The instructions for the video are simple, so that the authors, in around five minutes, can present the main findings and directions of their study in a clear and objective manner, avoiding jargon and technical terms. We have seen how studies with summary videos attract more attention, especially as the process provides more material about the article to be published on our social networks. This is the reason behind our suggestion for our authors to send their videos; so that our readers can access and appreciate the work of colleagues through another visual approach; and also for other scientific journals, which can use this or other ideas in order to stimulate effective scientific dissemination.

We hope that the reflections presented here may be seeds for thinking about the role of scientific knowledge in our lives. That we researchers strive to spread our science further, both in academia and among the general public. That, as a society, we listen more to scientific information and not to unsubstantiated opinions. That our governments give due value to science too, even in response to our demands as a society. There is no doubt that the best leverage for a country's development is investment in education, science and technology. To paraphrase the popular expression, we should not be thinking of "run for the hills" in the current scenario of this pandemic, but "run for the science". May we all stay well in these times, especially our older adults, to whom RBGG is dedicated!

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REFERENCES

1. Science-Metrix. Analytical Support for bibliometrics Indicators. Open Access Availability of Scientific Publications: Final Report [Internet]. 2018 [acesso em 23 mar. 2019]. Disponível em: https://www.science-metrix.com/sites/default/files/science-metrix/publications/science-metrix_open_access_availability_scientific_publications_report.pdf

2. Beall J. Is SciELO a Publication Favela? Scholarly Open Access [Internet]. 2015 [acesso em 23 mar. 2019]:1-1. Disponível em: http://scholarlyoa.com/2015/07/30/is-scielo-a-publication-favela/

The frailty syndrome in older adults with type 2 diabetes *mellitus* and associated factors

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Abstract

Objective: To compare clinical-functional factors among groups in relation to the frailty syndrome (pre-frail and frail) phenotype profile in older adults with type 2 diabetes *mellitus* (DM 2). *Methods:* A descriptive, analytical, cross-sectional study with a quantitative approach was performed. A total of 113 diabetic older adults of both sexes were evaluated in terms of their personal, socio-demographic, clinical-functional, mental, cognitive and fragility phenotype data. The Chi-square test and a logistic regression model were used. *Results:* The mean age was 68.66±6.62 years, and the sample was mostly female (61.9%), illiterate or with an incomplete primary education (60.2%), pre-frail (52.2%), sedentary (79.6%), and had been diagnosed with DM2 for more than 5 years (58.3%). There was a significant association between "pre-frail and frail" individuals and schooling ($p=0.004$), social participation ($p=0.004$), a subjective perception of vision ($p=0.004$), glycated hemoglobin ($p=0.036$), limb pain ($p=0.012$), depressive symptoms ($p=0.002$) and mobility ($p=0.004$). The logistic regression model showed an accuracy of 93.6% and the significant variables were education ($p=0.039$), pain in the lower limbs ($p=0.025$) and risk of falls ($p=0.033$). *Conclusion:* among all the factors related to the "pre-frail" and "frail" phenotype, schooling, pain in the lower limbs and mobility were most related to the worsening of the syndrome and its progress.

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INTRODUCTION

The Frailty Syndrome (FS) among older adults is a complex condition leading to a decline in the body's homeostatic reserve capacity and also in the resistance of stressors[1]. In this sense, the alterations in the body of a frail older adult generate a gradual decline in all biological systems in a pathological manner, causing vulnerability and varied clinical problems[2].

There are many consequences of the emergence of the FS in this population, since its characteristics encompass all organic systems and cause globalized damage to the body of the older adult[3]. Among these consequences, the decrease in homeostatic reserves stands out. In this context, sarcopenia (loss of muscle mass) has a significant influence on FS and is directly associated with other chronic diseases, such as type 2 Diabetes Mellitus (DM2)[4].

DM2 is a metabolic disease evidenced by blood hyperglycemia, which negatively affects the cardiac, visual, renal and nervous systems, causing insulin resistance. Furthermore, it is associated with dyslipidemia and possible hypertension[5]. Its prevalence can reach up to 30% in those over 65 years of age in certain populations while, in the United States, it is estimated that more than half of diabetic individuals are older adults[6]. Brazil is fourth in the global diabetes ranking, with about 11.9 million cases registered in recent years[7]. The projection for 2025 is that 300 million people will have diabetes worldwide[8].

DM2 generates a decline in functional capacities and reserves[9] and frequent hospitalizations, culminating in a tendency of the onset of symptoms that result in the frailty syndrome, demanding more services from the health system[10].

The association of two chronic conditions makes treatment more difficult due to the sum of their comorbidities. In this sense, the adequate treatment of one condition is not necessarily effective for the other, hindering the desired response. A correct and accurate diagnosis is necessary, since the measurement of these diseases can be carried out in a simple, low-cost and tangible manner in any health system.

Therefore, the aim of the present study was to compare the clinical-functional factors between groups in relation to the frailty syndrome phenotype profile (pre-frail and frail) in older adults with DM2 and, from this, to discover which of these variables most influence the frailty phenotype.

METHOD

A descriptive, analytical, cross-sectional study with a quantitative approach was performed. Data collection took place at the Laboratory of Technological Innovations in Health, at the Onofre Lopes University Hospital (the Hospital Universitário Onofre Lopes, or HUOL) of the Federal University of Rio Grande do Norte (UFRN), in Natal (Rio Grande do Norte), Brazil. The study took place between February and December 2017, after approval by the Research Ethics Committee under number 1.808.219, and was financed by Universal Public Notice MCTI/CNPq no. 14/2014.

The research participants were taken from the endocrinology and geriatrics sectors of HUOL, at the invitation of the doctors responsible for the sector. Older individuals with a clinical diagnosis of DM2 were indicated to go to the sector to make appointments for evaluation. After the first survey, the evaluation was scheduled on specific days and times and lasted for about 1h30min, alternating tests with and without physical effort, so as not to exhaust the individual. The complete evaluation took place on the same day, and was performed by a previously trained evaluator in the presence of the researcher, to provide support for the tests and minimize the risk of falls.

Older individuals aged over 60 years of age, who were diagnosed with DM2 in accordance with the criteria of the American Diabetes Association[11], whether male or female, who were able to walk independently and who agreed to participate by signing an Informed Consent Term (ICF) were included in the study. Older adults who did not complete the entire assessment were excluded from the study.

To perform the sample calculation, 80% power and 5% significance level were used for the two-

tailed hypothesis tests. Among the variables with the greatest statistical significance for the sample (income, marital status, glycated hemoglobin, use of insulin and MMSE), the largest sample size was for "income", totaling 123 individuals, avoiding possible β error in the variables close to significance. In this sense, a sample size of 125 individuals was adopted as it is a multiple of 5 and facilitates the presentation of data.

After sample selection, an interview was conducted with personal, sociodemographic, clinical-functional and cognitive screening data, assessment of depressive symptoms, assessment of functional mobility and frailty phenotype.

Personal data were assessed using a semi-structured questionnaire containing identification, contact details (cell phone of the older adult or a family member living in the same household, or home phone), date and address. In addition, the sociodemographic data included a list with demarcation of the following items: sex, age, skin color, marital status, education, living arrangement, income, occupation and social participation.

The clinical-functional data were: subjective perception of vision of excellent, very good, good, poor and very poor; height, in meters; weight in kilograms, measured by scale, and Body Mass Index (BMI); number of diseases and medications used, time since diagnosis of DM2, laboratory tests of fasting glycemia and glycated hemoglobin in the last six months (from the date of the evaluation) for the control of DM2; use of antidiabetic drugs and/or insulin; presence of leg pain and intensity, using the Visual Analogue Scale (VAS); falls in the last year.

Cognitive screening was assessed by the Mini-Mental State Examination (MMSE), which assesses spatial and temporal orientation, immediate memory, ability to calculate, evocation of words with their meanings, repetition, command, reading with interpretation, writing and drawing (graphic ability to reproduce an image). The cut-off points were

as follows: illiterate individuals should score ≥20 points; schooling of 1-4 years ≥25 points; schooling of 5-8 years ≥26.5 points; schooling of 9-11 years ≥28 points and schooling over 11 years ≥29 points[12].

The Geriatric Depression Scale (GDS) was used in its reduced (or short) version to screen for depressive symptoms. A total of 15 questions were asked with yes or no answers. An individual has depressive symptoms if reaching a score ≥5 points and an "absence of depressive symptoms" in individuals with a score ≤4 points[13].

Functional mobility was assessed using the Timed Up and Go (TUG) test. This consists of measuring the time spent getting up from a chair, walking 3 meters then returning and sitting with the back completely supported in the chair. Individuals with a time greater than 13.5 seconds have impaired mobility[14].

In accordance with the frailty phenotype, the following were evaluated:

Unintentional weight loss: it was asked whether the individual had lost 4.5 kg or more in the year until the date of the assessment and whether this loss was unintentional. If the answers to both questions were positive, 1 point was awarded;

Decrease in handgrip strength assessed by the SH5002 Smedley - Saehaen® Hand Dynamometer. Measured with the individual sitting in a comfortable chair, supporting both feet on the floor and placing their dominant hand on the assessment table, holding the dynamometer grip three times to obtain an average, adjusted according to Table 1[15].

Older adults who measured below the expected value above met the criterion for frailty syndrome, with 1 point.

Decrease in gait speed was calculated through the time spent in seconds to cover 4.6 meters in three tests, to take an average of the value, adjusted by sex and height according to Table 2[16].

Table 1. Adjustment of sex and BMI for handgrip strength, São Paulo, 2014.

Male		Female	
BMI	Cut off point	BMI	Cut off point
0 < BMI ≤ 23	≤ 27.00 kgf	0 < BMI ≤ 23	≤ 16.33 kgf
23 < BMI < 28	≤ 28.67 kgf	23 < BMI < 28	≤ 16.67 kgf
28 ≤ BMI < 30	≤ 29.50 kgf	28 ≤ BMI < 30	≤ 17.33 kgf
≥ 30	≤ 28.67 kgf	≥ 30	≤ 16.67 kgf

Source: Macedo, Freitas and Scheicher, 2014[15].

Table 2. Adjustment of weight and sex for gait speed, São Paulo, 2011.

Male		Female	
Weight	Cut off point	Weight	Cut off point
0< Weight ≤168	≤5.49 sec	0< Weight ≤155	≤6.61 sec
Weight >168	≤5.54 sec	Weight >155	≤5.92 sec

Source: Costa, Neri, 2011[16].

For exhaustion, the self-reporting of fatigue was carried out through two questions from the Center for Epidemiological Studies - Depression CES-D17: "I felt that I had to make an effort to do my usual tasks" and "I was unable to carry on doing my things". The score was given as (1) never / rarely, (2) a few times, (3) most of the time, (4) always. The older adults who chose options 3 or 4 in any of the questions met the criterion, with 1 point.

Low level of physical activity was assessed by the IPAQ (International Physical Activity Questionnaire) in its short version, adapted from the long version[18] that allowed the duration of physical activity the older adult performed in the previous week to be estimated. After its application, the older adults were classified as very active, active, irregularly active and sedentary. Those who were classified as irregularly active and sedentary met the criterion with 1 point.

The sum of the positive items generated the classification of the Phenotype of Frailty as follows: frail (3 or more positive items); pre-frail (1 or 2 positive items); not frail (no positive items)[19].

For data analysis, SPSS software version 20.0 was used and the significance level was set at 5%. For descriptive analysis, a simple case count was performed according to frailty phenotype group. To compare these groups with the sociodemographic, clinical-functional categorical variables, cognitive screening, depressive symptoms and functional mobility, Pearson's chi-square test was used and the intergroup percentages were analyzed.

A multiple logistic regression analysis was performed, using the Stepwise Forward Selection Procedure method with the dichotomous categorical dependent variable "frailty phenotype" with the variables that exhibited statistical significance ($p<0.05$) in the previously mentioned test. The permanence of the variable in the multiple analysis occurred through the likelihood ratio test (Likelihood Ratio Test), absence of multicollinearity, as well as its ability to improve the model through the Hosmer-Lemeshow test without interfering in the confidence intervals. In all analyzes, a significance level of 5% was considered.

RESULTS

In total, 125 older adults participated in this research. However, only 12 of these individuals belonged to the non-frail group (9.6%) which made the comparison between this group and the others unfeasible due to the limited number of subjects. These individuals were therefore excluded, giving a total sample of 113 older adults.

The descriptive analysis of the sample is shown in table 3. The average age was 68.66 (±6.62) years and the majority were female (61.9%), with an average of 6.6 (±5.11) years of schooling and a level of education considered low, at the level of "illiterate or incomplete elementary I" (60.2%).

The inferential analysis of the pre-frail and frail groups with the other study variables is shown in table 4. Significant differences were found between the pre-frail and frail groups for the variables: education (p=0.004), social participation (p=0.004), subjective perception of vision (p=0.004), glycated hemoglobin (p=0.036), pain in lower limbs (p<0.001), falls (p=0.012), depressive symptoms (p=0.002) and mobility by TUGT (p=0.004). These variables were designed as a binary logistic regression model.

For the logistic regression analysis (Stepwise Forward Selection Procedure method), the variables schooling, glycated hemoglobin, pain in lower limbs and TUGT remained until the end of the model, as shown in table 5. The model showed an accuracy of 93.6%.

Table 3. Descriptive analysis of sociodemographic, clinical-functional, cognitive screening, depressive symptoms, functional mobility and frailty phenotype data. Natal, Rio Grande do Norte, 2018.

Characteristic (n)	n (%)
Sex (n=113)	
Male	43 (38.1%)
Female	70 (61.9%)
Age group in years (n=113)	
60-69	70 (61.9%)
70 or more	43 (38.1%)
Married (n=113)	
Married	40 (35.4%)
Unmarried	73 (64.6%)
Schooling (n=113)	
Illiterate or incomplete elementary I	68 (60.2%)
Complete Elementary or Post-Elementary I	45 (39.8%)
Income (minimum wage) (n=113)	
Up to two	62 (54.9%)
Three or more	51 (45.1%)
Social participation (n=113)	
Participates in community activities	64 (56.6%)
Does not participate in community activities	49 (43.4%)
Subjective perception of vision (n=113)	
Excellent, very good or good	60 (53.1%)
Poor or very poor	53 (46.9%)
Body Mass Index (n=113)	
Malnourished or normal weight	44 (38.9%)
Overweight	69 (61.1%)
Number of diseases (n=113)	
1 to 4	39 (34.5%)
5 or more	74 (65.5%)
Number of medicines (n=110)	
1 to 4	42 (38.2%)
5 or more	68 (61.8%)

to be continued

Continuation of Table 3

Time since diagnosed with DM2 in years (n=108)	
0 to 5	45 (41.7%)
6 or more	63 (58.3%)
Glycated hemoglobin (n=81)	
Up to 8% (normal)	43 (53.1%)
Above 8,1% (altered)	38 (46.9%)
Fasting blood glucose (n=108)	
Up to 130mg/dL (normal)	55 (50.9%)
131mg/dL or more (altered)	53 (49.1%)
Use of insulin (n=113)	
Yes	33 (29.2%)
No	80 (70.8%)
Pain in lower limbs (n=113)	
Yes	61 (54.0%)
No	52 (46.0%)
Falls in the last year (n=113)	
No	72 (63.7%)
Yes	41 (36.3%)
Mini Mental State Examination (n=113)	
Cognitive deficit	46 (40.7%)
No cognitive deficit	67 (59.3%)
Geriatric Depression Scale (n=113)	
Depressive Symptoms	65 (57.5%)
No Depressive Symptoms	48 (42.5%)
Timed Up and Go Test (n=106)	
Low risk of falls	86 (81.1%)
High risk of falls	20 (18.9%)
Unintentional weight loss	
Yes	21 (18.6%)
No	92 (81.4%)
Decreased handgrip strength	
Yes	53 (46.9%)
No	60 (53.1%)
Exhaustion	
Yes	69 (61.1%)
No	44 (38.9%)
Low level of physical activity	
Yes	90 (79.6%)
No	23 (20.4%)
Decrease in walking speed	
Yes	53 (46.9%)
No	60 (53.1%)

Source: author.

Table 4. Chi-square test between the frailty phenotype (pre-frail and frail) and the sociodemographic and clinical-functional variables of the sample. Natal, 2018.

Variable	Pre-frail	Frail	*p*-value
Sex			
Male	23 (20.4%)	20 (17.7%)	0.831
Female	36 (31.9%)	34 (30.1%)	
Age group in years			
60-69	41 (36.6%)	29 (25.7%)	0.084
70 or more	18 (15.9%)	25 (22.1%)	
Married			
Married	18 (15.9%)	22 (19.5%)	0.256
Unmarried	41 (36.3%)	32 (28.3%)	
Schooling			
Illiterate or fund. Incomplete I	28 (24.8%)	40 (35.4%)	0.004*
Fund I complete or post fund I	31 (27.4%)	14 (12.4%)	
Income (minimum wage)			
Up to two	28 (24.8%)	34 (30.1%)	0.098
Above three	31 (27.4%)	20 (17.7%)	
Social participation			
Yes	41 (36.3%)	23 (20.4%)	0.004*
No	18 (15.9%)	31 (27.4%)	
Subjective perception of vision			
Excellent, very good or good	39 (34.5%)	21 (18.6%)	0.004*
Poor or very poor	20 (17.7%)	33 (29.2%)	
Body Mass Index			
Malnourished or normal weight	27 (23.9%)	17 (15.0%)	0.120
Overweight	32 (28.3%)	37 (32.7%)	
N° of diseases			
1 to 4	22 (19.5%)	17 (15.0%)	0.517
5 or more	37 (32.7%)	37 (32.7%)	
N° of medicines			
1 to 4	23 (20.9%)	19 (17.3%)	0.525
5 or more	33 (30.0%)	35 (31.8%)	
Time since diagnosis			
0 to 5 years	26 (24.1%)	19 (17.6%)	0.229
6 years or more	29 (26.9%)	34 (31.5%)	
Glycated hemoglobin			
Normal (up to 8%)	27 (33.3%)	16 (19.8%)	0.036*
Altered (8,1% or more)	15 (18.5%)	23 (28.4%)	
Fasting blood glucose			
Normal (0-130)	34 (31.5%)	21 (19.4%)	0.085
Altered (131 or more)	24 (22.5%)	29 (26.9%)	
Use of Insulin			
Yes	14 (12.4%)	19 (16.8%)	0.181
No	45 (39.8%)	35 (31.0%)	

to be continued

Continuation of Table 4

Variable	Pre-frail	Frail	p-value
Pain in lower limbs			
Yes	21 (18.6%)	40 (35.4%)	<0.001*
No	38 (33.6%)	14 (12.4%)	
Falls in the last year			
Yes	15 (13.3%)	26 (23.0%)	0.012*
No	44 (38.9%)	28 (24.8%)	
Mini Mental State Examination			
Cognitive deficit	24 (21.2%)	22 (19.5%)	0.995
No cognitive deficit	35 (31.0%)	32 (28.3%)	
Geriatric Depression Scale			
Depressive symptoms	26 (23.0%)	39 (34.5%)	0.002*
Normal	33 (29.2%)	15 (13.3%)	
Timed Up and Go Test			
Lower risk of falling	52 (49.1%)	34 (32.1%)	0.004*
Higher risk of falling	05 (04.7%)	15 (14.2%)	

*Statistical significance ($p \leq 0,05$); Test used: chi-square.

Source: author.

Table 5. Binary logistic regression with variables that showed statistical significance with the frailty phenotype. Natal, 2018.

Variable	PR	PR adjusted	p	CI (95%)
Schooling	1.89	1.91	0.039	1.03-3.52
Pain in lower limbs	2.44	2.10	0.025	1.10-4.03
Risk of falls	0.53	0.38	0.033	0.16-0.93

PR: prevalence ratio; CI: confidence interval.

Source: author.

DISCUSSION

The finding of a majority of women (61.9%) was similar to the study by Silva, Pureza and Landre[10], in which 70.0% of the sample of older adults evaluated at the outpatient clinic were female.

The majority (60.2%) of the sample had a level of schooling of illiterate or incomplete elementary education I, data which is similar to the study by Ribeiro et al.[20], in which in the majority of a sample of 60 older diabetics participating in an outpatient center in Minas Gerais (59.58%) were also classified as having a low level of education. The lack of access to education for this population can therefore be highlighted. This value is notable due to the strong impact that schooling has on the frailty phenotype. From the regression model shown above, illiterate pre-frail diabetic older adults or those with incomplete elementary education I have a 1.91 times higher prevalence of becoming frail than those with complete elementary or post-elementary education I.

As education is an indicator of the socioeconomic conditions of a population, it is essential that it is discussed and contrasted, as in the case of the study by Beltrame[21], with a sample of 50 diabetic and 50 non-diabetic older adults, in which 84.0% were literate. This average is well above that of the present study, but it is worth mentioning that the municipal region studied (Concórdia, Santa Catarina) has one of the highest Human Development Indexes in Brazil, unlike Natal (Rio Grande do Norte), a city in one of the least developed regions of the country.

The average income of the sample in question was R$2.367.74 (±1.385.90). In a cohort study conducted with 202 older community members in Lafaiete Coutinho (Bahia), the sample's per capita income was less than one minimum wage[22]. A study in a hospital environment includes older people who are, at least, able to walk and eat on consultation days; a study with community-dwelling older people, on the other hand, may include low-income older people as there is no need for mobility on their part.

Most of the sample was overweight, with an average BMI value of 28.58 (±4.45). This data is confirmed when an analysis of the sedentary lifestyle of the sample in this study is made. Among the respondents, 79.6% of the older adults claimed they did not perform any type of physical activity, highlighting the absence of one of the most controlling factors of the metabolic indexes. Another study, carried out in Campinas (Sao Paulo) with older community members, showed that 54.73% of 689 older people were sedentary[16].

Although visual problems are common in a diabetic population, the majority of the sample classified their vision as excellent, very good or good (53.1%). The impact of visual impairment on diabetics may even involve self-administration of medication. Harada and Schor[23] described the medication problems of older diabetics with blindness or low vision, and the reported problems were diverse, such as errors in quantity, lack of perception of which medication they are taking and even problems receiving the medication, while not knowing which one is correct. Almeida et al.[24] also reported that impaired vision makes adherence to adequate treatment difficult and provides an effect of marked blood hyperglycemia.

Another worrying fact was the number of diseases present in the sample, as the majority had five or more illnesses (65.5%), showing the overlap of NCDs and the need for effective care with this sample group. This fact could also be expected by the sample profile, as it is taken from a reference hospital with several modalities of care. According to Confortin et al.[25], the overlap of chronic diseases directly implies the loss of manual muscle strength and even quality of life as a final outcome. Still, Silva et al.[26], in their study with 1391 older people registered in the Family Health Strategy in Rio Grande do Sul, showed that the association of chronic diseases is directly linked to depression, a fact that was also investigated in the present study.

The sample showed uncontrolled mean values of the indices that permeate DM2, for example, the mean glycated hemoglobin in the sample was 8.26% (± 2.49) and the mean fasting blood glucose was 156.32mg / dL, both of which were above the average expected for older adults. Most of the older people in question were sedentary, and it is known that a sedentary lifestyle is a favorable condition for the lack of glycemic control. The mean fasting glycemia and glycated hemoglobin in this study were higher than those in the study by Heubel et al.[27] in which the older adults were treated by the Physiotherapy Clinic at the Sagrado Coração University, in Buaru (Sao Paulo). In the aforementioned study, the mean fasting blood glucose was 126.3mg/dL and the glycated hemoglobin was 7.2%. This contrasting difference can be justified by the regular practice of physical activity by the older adults in the study mentioned.

Insulin therapy is essential for when there is a partial or total decrease in insulin by the body itself. In this sense, insulin is administered in advanced and more severe cases of the disease[28]. In the present study, the majority of the sample did not use insulin (70.8%). As the older adults in the study were already in outpatient care and were referred by the professionals who care for them, it is understandable that the vast majority do not use insulin because they may already have the disease in a controlled manner.

More than half of the sample (54.0%) reported pain in their lower limbs, which is a very important factor in predicting falls and functional mobility. This variable remained in the regression model, in order to infer that pre-frail diabetic older people with lower limb pain have a 2.10 times higher prevalence of becoming frail than those who do not have lower limb pain.

Pain generates discomfort, limits the quality of life of the older adults in general, implies an increased dependence on the use of medications to control it, decreases energy and generates fatigue, hinders sleep and rest for the diabetic older and worsens

performance at work[21]. Based on this, pain was the characteristic most related to the presence of DM2 in the study mentioned and may be directly related to diabetic neuropathy.

Linked to this, 41 older (36.3%) reported one or more falls in the last year. This data raises a serious concern as the consequences of falls may be due to fear of falling and death. Groups with greater susceptibility, such as those with diabetes, have more dangerous consequences[29].

According to the MMSE analysis, the majority of the sample (59.3%) did not show cognitive decline, with an average of 23.79 (±4.22) points. This data contrasts with current literature, which has already verified the association between diabetes mellitus and the presence of cognitive decline[30,31].

The service linked to the sample covers several medical areas in the state reference hospital. As these older people already have specialized medical care, another variable may also have been an influence, which was mobility. Most of the sample did not show any change in mobility (81.1%), analyzed using the TUGT. It is important to understand that the mobility data do not specify whether the older adults have any other associated comorbidity, which may generate certain incorrect implications of the study[14].

Mobility was a strong variable for the present study, since, from the regression model, pre-frail diabetic older people who have less impairment of mobility assessed by the TUGT have 38% more chances of not becoming frail. This high percentage suggests that functional mobility is directly linked to the frailty syndrome. Therefore, as the loss of strength is a predictor of the frailty syndrome, older adults who lose strength may become frail and will have functional mobility problems[32].

The GDS identified that the predominance of the sample had depressive symptoms (57.5%). Some national studies reveal the high prevalence of depressive symptoms in older people with DM2. Exemplifying this finding, Moreira et al.[33] identified the high prevalence of depressive symptoms and reduced quality of life in a study with older diabetics. In this sense, the presence of DM2 in the older

adults generates dissatisfaction with life, decreased mobility and social isolation, factors closely related to depressive symptoms.

Based on the phenotype indexes, the low level of physical activity measured by IPAQ was the most evident, affecting 79.6% of the studied population. Unintentional weight loss was the least mentioned, affecting only 18.6% of the sample. These data demonstrate important characteristics as sarcopenia is a potential predictor of FS in older adults and is a common characteristic in patients with DM2, in other words, there is a direct link between these two conditions[34].

An older adult with less muscle mass will also have a tendency to maintain poorer blood glucose control. This characteristic occurs due to the difficulty in capturing muscle glucose. In this sense, insulin will be secreted inefficiently and insulin resistance may be one of the outcomes, implying a characteristic condition of DM2[9].

The presence of DM2 can contribute to creating an environment conducive to DES as its characteristics increase the incidence of frailty components. In this sense, weakness, exhaustion, slowness, weight loss, physical inactivity and even other comorbidities, such as cognitive deficit, are related[6].

In relation to the pre-frail group, there was a higher occurrence of women, aged between 60-69 years, who were married, had a complete elementary I or post-elementary I education, an income above three minimum wages, who participated in community activities, had a subjective perception of vision of excellent, very good or good, who were overweight, had five or more diseases, took five or more medications, had normal glycated hemoglobin, normal blood glucose, did not use insulin, had no pain in the lower limbs, had not fallen in the previous year, did not have cognitive deficit according to the MMSE, , experienced less change in mobility according to the TUGT, had no unintentional weight loss, no loss of strength, no exhaustion, a low level of physical activity and no decrease in gait speed.

In relation to the frail group, the prevalence was similar to the pre-frail group, except for the

prevalence of illiteracy or an incomplete elementary education, an income of up to two minimum wages, no participation in community activities, a perception of their vision as poor or very poor, altered glycated hemoglobin and fasting glucose, with lower limb pain and depressive symptoms.

While it is not possible to elaborate a cause and effect analysis due to the methodological approach of the study, it is known that these data are related. This relationship allows the creation of specific research on the theme which addresses the causal meaning of these factors to serve as a basis for future therapies. It is therefore inferred that the limitations of the lives of diabetic older adults that make them frail permeate social factors relating to the context in which they are inserted together with their clinical conditions. Longitudinal studies are also suggested in order to verify causality among the variables studied.

The limitations of the present study were related to the scarcity of works in literature that compare the frailty syndrome in older adults with the presence of DM2. Perhaps, because it is the sum of two chronic diseases with high morbidity, these data rarely appear in Brazilian literature. In addition, the recruitment of older adults and the difficulty in accessing the HUOL were limiting factors for carrying out the assessment.

CONCLUSIONS

In terms of the clinical-functional factors related to the frailty phenotype profile, the variables education, social participation, subjective perception of vision, glycated hemoglobin, pain in the lower limbs, falls in the previous year, depressive symptoms and risk of falls were those that presented statistical difference between the groups studied. Among all the variables, schooling, pain in the lower limbs and risk of falls were those most related to the worsening of the syndrome and its progress.

These data show the characteristics that can be further focused on in rehabilitation and care/management programs with older diabetics. All these findings reinforce the need to explain the common characteristics of DM2 and the Frailty Syndrome, strengthening geriatrics and gerontology at all levels.

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REFERENCES

1. Fhon JRS, Rodrigues RAP, Santos JLF, Diniz MA, Santos EB, Almeida VC, et al. Factors associated with frailty in older adults: a longitudinal study. Rev Saúde Pública [Internet]. 2018 [acesso em 10 mar. 2020];52:1-8. Disponível em: https://www.scielosp.org/article/rsp/2018.v52/74/en/

2. Marty E, Liu Y, Samuel A, Or O, Lane J. A review of sarcopenia: enhancing awareness of an increasingly prevalent disease. Bone [Internet]. 2017 [acesso em 12 ago. 2019];105:276-86. Disponível em: https://www.sciencedirect.com/science/article/pii/S8756328217303459?casa_token=XrLmYcPdclkAAAAA:B-RRoMo_sWvHbP2-XHD-F_PuljA_Ak2nFQ8xxDBS3ENaPnngT-wAtan0yX-ziFd36VnM8m9r0gs

3. Freitas CV, Sarges ESNF, Moreira KECS, Carneiro SR. Evaluation of frailty, functional capacity and quality of life of the elderly in geriatric outpatient clinic of a university hospital. Rev Bras Geriatr Gerontol [Internet].2016 [acesso em 12 ago. 2019];19(1):119-28. Disponível em: http://www.scielo.br/scielo.php?pid=S1809-98232016000100119&script=sci_arttext&tlng=pt

4. Yanase Y, Yanagita I, Muta K, Nawata H. Frailty in elderly diabetes patients. Endocr J [Internet]. 2017[acesso em 12 ago. 2019];65:1-11. Disponível em: https://www.jstage.jst.go.jp/article/endocrj/advpub/0/advpub_EJ17-0390/_article/-char/ja/

5. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes 2017-2018 [Internet]. de Oliveira JEP, Montenegro Junior RM, Vencio Sérgio, organizadores. São Paulo: Editora Clannad; 2017 [acesso em 12 ago. 2019]. Disponível em: https://www.diabetes.org.br/profissionais/images/2017/diretrizes/diretrizes-sbd-2017-2018.pdf

6. Sinclair AJ, Rodriguez-Manas L. Diabetes and frailty: two converging conditions? Can J Diabetes [Internet]. 2016 [acesso em 12 ago. 2019];40(1):77-83. Disponível em: https://www.sciencedirect.com/science/article/pii/S1499267115006322?casa_token=BffMdnUar3sAAAAA:fFz-O_wOjOBjg4vHfp0BBA-H-O0f0herOYTVgqOKipDuYnHP2gOnybGHF94DB4LJWFn4Jmss4NU

7. Costa AF, Flor LS, Campos MR, Oliveira AF, Costa MFS, Silva RS, et al. Carga do diabetes mellitus tipo 2 no Brasil. Cad Saúde Pública [Internet]. 2017 [acesso em 12 ago. 2019];33(2): e00197915 [14 p.]. Disponível em: https://www.scielosp.org/article/csp/2017.v33n2/e00197915/

8. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care [Internet.]2004 [acesso em 12 ago 2019];27(5):1047-53. Disponível em: https://care.diabetesjournals.org/content/27/5/1047

9. Perkisas S, Vandewoude M. Where frailty meets diabetes. Diabetes Metab Res Rev [Internet]. 2016 [acesso em 12 ago. 2019];32(Supp 1):261-7. Disponível em: https://onlinelibrary.wiley.com/doi/full/10.1002/dmrr.2743

10. Silva AP, Pureza DY, Landre CB. Frailty syndrome in elderly patients with type 2 diabetes mellitus. Acta Paul Enferm [Internet]. 2015 [acesso em 12 ago. 2019];28(6):503-9. Disponível em: http://www.scielo.br/scielo.php?pid=S0103-21002015000600503&script=sci_arttext&tlng=pt

11. American Diabetes Association: Classification and Diagnosis of Diabetes. Diabetes Care [Internet]. 2017 [acesso em 12 ago. 2019];40:11-24. Disponível em: https://care.diabetesjournals.org/content/38/Supplement_1/S8

12. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr [Internet]. 2003 [acesso em 12 ago. 2019];61(3b):777-81. Disponível em: http://www.scielo.br/scielo.php?pid=S0004-282X2003000500014&script=sci_arttext

13. Paradela EMP, Lourenço RA, Veras RP. Validation of geriatric depression scale in a general outpatient clinic. Rev Saúde Pública [Internet]. 2005 [acesso em 12 ago. 2019];39(6):918-23. Disponível em: https://www.scielosp.org/article/rsp/2005.v39n6/918-923/en/

14. Aveiro MC, Driusso P, Barham EJ, Pavarini SCI, Oish J. Mobilidade e risco de quedas de população idosa da comunidade de São Carlos. Ciênc Saúde Coletiva. 2012 [acesso em 12 ago. 2019];17(9):2481-88. Disponível em: http://www.scielo.br/scielo.php?pid=S1413-81232012000900028&script=sci_arttext

15. Macedo DO, Freitas LM, Scheicher ME. Handgrip and functional mobility in elderly with different levels of physical activity. Fisioter Pesqui [Internet]. 2014 [acesso em 12 ago. 2019];21(2):151-5. Disponível em: http://www.scielo.br/scielo.php?pid=S1809-29502014000200151&script=sci_arttext

16. Costa TB, Neri AL. Medidas de atividade física e fragilidade em idosos: dados do FIBRA Campinas, São Paulo, Brasil. Cad Saúde Pública [Internet]. 2011 [acesso em 12 ago. 2019];27(8):1537-50. Disponível em: http://www.scielo.br/scielo.php?pid=S0102-311X2011000800009&script=sci_arttext

17. Batistoni SST, Neri AL, Cupertino APFB. Validity of the Center for Epidemiological Studies – Depression Scale (CES-D) among Brazilian elderly. Rev Saúde Pública [Internet]. 2007 [acesso em 12 ago. 2019];41:598-605. Disponível em: https://www.scielosp.org/article/rsp/2007.v41n4/598-605/en/

18. Hagströmer M, Oja P, Sjöström M. The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. Public Health Nutr [Internet]. 2006 [acesso em 12 ago. 2019];9(6):755-62. Disponível em: https://www.cambridge.org/core/journals/public-health-nutrition/article/international-physical-activity-questionnaire-ipaq-a-study-of-concurrent-and-construct-validity/A78914A4CFE41987A40C122FDF8BE229

19. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in Older Adults: Evidence of a Phenotype. J Gerontol Ser A Biol Sci Med Sci [Internet]. 2001 [acesso em 12 ago. 2019];56(3):146-56. Disponível em: https://academic.oup.com/biomedgerontology/article/56/3/M146/545770

20. Ribeiro WFP, Carvalho MRF, Moura AP, Cássia TC. Conhecendo o grau de risco para o desenvolvimento do pé diabético em pessoas idosas com diabetes mellitus tipo 2. Enferm Brasil [Internet]. 2017 [acesso em 12 ago. 2019];16(2):80-8. Disponível em: http://portalatlanticaeditora.com.br/index.php/enfermagembrasil/article/view/995

21. Beltrame V. Qualidade de vida de idosos diabéticos [tese na Internet]. Porto Alegre: Pontifícia Universidade Católica do Rio Grande do Sul; 2008 [acesso em 12 ago. 2019]. Disponível em: http://tede2.pucrs.br/tede2/handle/tede/2581

22. Matos FS, Jesus CS, Carneiro JAO, Coqueiro RS, Fernandes MH, Brito TA. Redução da capacidade funcional de idosos residentes em comunidade: estudo longitudinal. Ciênc Saúde Colet [Internet]. 2018 [acesso em 10 mar. 2020];23(10):3393-3401. Disponível em: https://www.scielosp.org/article/csc/2018.v23n10/3393-3401/pt/

23. Harada FJB, Schor P. O problema da autoadministração de medicamentos por idosos com baixa visão e cegueira sob a ótica do design centrado no humano. Blucher Design Proceedings [Internet]. 2016 [acesso em 12 ago. 2019];2(9):1267-79. Disponível em: http://pdf.blucher.com.br/designproceedings/ped2016/0108.pdf

24. Almeida A, Oliveira H, Pimentel L, Mendonça MC, Santos M. Hiperglicemia crônica e o seu comprometimento na visão. Cad Med UNIFESO [Internet]. 2019 [acesso em 10 mar. 2020];2(2):134-42. Disponível em: http://www.revista.unifeso.edu.br/index.php/cadernosdemedicinaunifeso/article/view/1399/600

25. Confortin SC, Danielewicz AL, Antes DL, Ono LM, D'Orsi E, Barbosa AR. Associação entre doenças crônicas e força de preensão manual de idosos residentes em Florianópolis–SC, Brasil. Ciênc Saúde Colet [Internet]. 2018 [acesso em 10 mar. 2020];23(5):1675-85. Disponível em: https://www.scielosp.org/article/csc/2018.v23n5/1675-1685/pt/

26. Silva AR, Sgnaolin V, Nogueira EL, Loureiro F, Engroff P, Gomes I. Doenças crônicas não transmissíveis e fatores sociodemográficos associados a sintomas de depressão em idosos. J Bras Psiquiatr [Internet]. 2017 [acesso em 10 mar. 2020];66(1):45-51. Disponível em: http://www.scielo.br/scielo.php?pid=S0047-20852017000100045&script=sci_abstract&tlng=pt

27. Heubel AD, Gimenes C, Marques TS, Arca EA, Martinelli B, Barrile SR. Treinamento multicomponente melhora a aptidão funcional e controle glicêmico de idosos com diabetes tipo 2. J Phys Educ [Internet]. 2018 [acesso em 10 mar. 2020];29(1):1-9. Disponível em: http://186.233.154.236/ojs/index.php/RevEducFis/article/view/32996/21933

28. Almeida DA, Santos MS, Rosa WAG, Zeferino MGM, Oliveira ISB, Lenza NFB. Conhecimento dos cuidadores intradomiciliares de idosos com DM tipo 2 em insulinoterapia, na atenção primária. Saúde (Santa Maria) [Internet.] 2018 [acesso em 10 mar. 2020];44(2):1-13. Disponível em: https://periodicos.ufsm.br/revistasaude/article/view/31014

29. Vieira LS, Gomes AP, Bierhals IO, Farías-Antúnez S, Ribeiro CG, Miranda VIA, et al. Quedas em idosos no Sul do Brasil: prevalência e determinantes. Rev Saúde Pública [Internet]. 2018 [acesso em 10 mar. 2020];52:1-13. Disponível em: https://www.scielosp.org/article/rsp/2018.v52/22/pt/

30. Ferreira MC, Tozatti J, Fachin SM, Oliveira PP, Santos RF, Silva MER. Reduction of functional mobility and cognitive capacity in type 2 diabetes mellitus. Arq Bras Endocrinol Metab [Internet]. 2014 [acesso em 12 ago. 2019];58(9):946-52. Disponível em: http://observatorio.fm.usp.br/handle/OPI/9598

31. Vargas LS, Lara MVS, Mello-Carpes PB. Influence of diabetes and physical exercise, mental and recreational activities practice on the cognitive function and emotionality in aging groups. Rev Bras Geriatr Gerontol [Internet]. 2014 [acesso em 12 ago. 2019];17(4):867-78. Disponível em: http://www.scielo.br/scielo.php?pid=S1809-98232014000400867&script=sci_arttext&tlng=pt

32. Soares AV, Marcelino E, Maia KC, Borges Júnior NG. Relação entre mobilidade funcional e dinapenia em idosos com fragilidade. [Internet]. 2017 [acesso em 10 mar. 2020];15(3):278-82. Disponível em: http://www.scielo.br/scielo.php?pid=S1679-45082017000300278&script=sci_arttext&tlng=pt

33. Moreira RO, Amâncio APRL, Brum HR, Vasconcelos DL, Nascimento GF. Depressive symptoms and quality of life in type 2 diabetic patients with diabetic distal polyneuropathy. Arq Bras Endocrinol Metab [Internet]. 2009 [acesso em 12 ago. 2019];53(9):1103-11. Disponível em: https://europepmc.org/article/med/20126868

34. Cleasby ME, Jamieson PM, Atherton PJ. Insulin resistance and sarcopenia: mechanistic links between common co-morbidities. J Endocrinol [Internet]. 2016 [acesso em 10 mar. 2020];229(2):67-81. Disponível em: http://www.research.ed.ac.uk/portal/files/24385316/Cleasby_et_al_Review_JoE.pdf

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Original Articles

1 of 12

A contemporary and innovative care model for older adults

Renato Veras¹ ⓘD

Abstract

The population aging that has arisen from Brazil's new demographic and epidemiological reality, a relatively recent phenomenon, requires innovative and efficient responses. This article presents a care model for the older population with the most contemporary comprehensive care and an excellent cost-benefit ratio. The proposal is aimed at health promotion, disease prevention and the coordination of care, with an emphasis on low complexity instances of care. The integrated models seek to solve the problem of fragmented and poorly coordinated care in current health systems. For this reason, we propose a low complexity care unit, an epidemiological assessment, a social center and a team formed by a pair of medical and nursing professionals, with the support of gerontologists. There will also be medical records that cover clinical and social aspects, as well as a quality information system - all involving advanced technology, accessible by doctors and clients at any time via cloud technology and a cell phone app. The more the healthcare professional knows their patient's history, the better the results. The concepts and structure that underlie this model, which aims to reduce waste, offering greater quality at reduced cost, are set out. It is our contribution to benefit - be it in the public or supplementary sector - health care aimed at the fastest growing age group in Brazil.

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INTRODUCTION

One of humanity's greatest achievements has been the growth of life expectancy. Reaching old age - once the privilege of a few - has become the norm in even the poorest countries, and has been accompanied by a substantial improvement in populational health parameters, although the distribution of these achievements across different countries and socioeconomic contexts has been far from equal. The challenge, therefore, is to add quality to these additional years of life[1].

The demographic transition and improvement in social and economic indicators in Brazil, in comparison with previous decades, has brought an increase in the older population and greater financial pressure on public and private health systems. If this sector of the population increases, so chronic diseases and costs will grow[1]. One result is a growing demand for health services, which at the same time, can generate shortages or restrictions in medical resources. The diseases that affect older adults are mainly chronic and multiple, requiring constant monitoring and permanent care[2]. They involve an excess of appointments by specialists, more frequent hospitalizations, and longer bed occupancies than other age groups[3].

The current provision of health services fragments care for this age group, with a multiplication of specialist consultations, a lack of information sharing, and the use of countless drugs, clinical and imaging exams, among other procedures that burden the system, causing a serious financial impact at all levels, and which fail to generate significant benefits for health or quality of life[3]. A great burden caused by disease can be avoided, in both social and economic terms.

In their book *Rethinking Health: strategies to improve quality and reduce costs,* M. Porter and E. Teisberg argue that health precedes care. According to the authors, there is a latent need to measure and minimize the risk of illness, offer comprehensive disease management and guarantee prevention services for all older adults, including healthy individuals. They argue that health must include a prepared health service (increasing the efficiency of the value chain), intervention,

recovery, the monitoring and management of the clinical condition of the patient, the guarantee of access, the measuring of results and, finally, the dissemination of information[4].

There are still disagreements about the ideal percentage to be invested in health promotion, when compared to the volume allocated to care. While it is a complex and flexible calculation, one thing is certain: investment must be increased to prevent people from becoming ill[4]. Prevention is not a cost, but an investment with a guaranteed profit, provided it is done effectively. By encouraging prevention and delaying the occurrence of illnesses, we help to preserve the so-called "functional capacity". With the rapid and intense aging of the Brazilian population, this has become the new paradigm and the main strategic indicator in health.

AGING AND HEALTH

Health is defined as the measure of an individual's ability to fulfill their aspirations and meet their needs, regardless of age or the presence of diseases[5]. Thus, an efficient and complete geriatric assessment, at reasonable cost, is ever more urgent. Its objectives are the early diagnosis of diseases and the guidance of support services where necessary, in order to avoid hospitalizations. A medical history, physical examination and individual diagnosis are not sufficient for an extensive survey of the various functions required in the daily life of an older adult[6].

Well-being and functionality are complementary. They represent the presence of autonomy – the individual capacity to make decisions and have command over actions, establishing and following one's own convictions – and independence – the ability to accomplish something through one's own means – allowing the individual to take care of themselves and their life[5]. Although independence and autonomy are closely related, they are different concepts. There are those who are physically dependent, but who can decide on the activities that interest them. In contrast, there are those who have the physical capacity to perform certain daily tasks, but who are unable to safely decide how, when and where to perform them[5].

Determining the health conditions of the older population must consider overall health status, that is, it should take into account a satisfactory level of functional independence, and not just the absence of disease. Thus, the idea of functionality is considered to be a paradigm of the health of older adults, and becomes one of the most important attributes of human aging, as it deals with the interaction between the physical and psycho-cognitive capacity for carrying out activities of daily living[5].

Monitoring the health conditions of a given population, as well as its associated factors, is a key tool for guiding prevention strategies, which should aim to: positively influence the natural history of the disease, anticipate the onset of complications, prevent exacerbations and complications of chronic illnesses, increase patient involvement in self-care and build a database of chronic patients (mostly older adults).It is possible to prevent most public health problems affecting the population - not only those related to communicable diseases, but also to noncommunicable illnesses. This finding is evidenced by the significant decrease in mortality from coronary and cerebrovascular diseases, the reduction in the incidence of and mortality from cervical cancer, as well as a reduction in the prevalence of smoking and the incidence of lung cancer in men[7].

Chronic diseases have one or more of the following characteristics[8]: they are permanent, result in disability or deficiencies, are caused by irreversible pathological changes and require long periods of supervision, observation or care. In general, they start slowly, and have no single cause. Treatment involves lifestyle changes and continuous care that does not usually lead to a cure, but allows the disease to be controlled and the quality of life of the patient to improve, in order to prevent or mitigate functional decline[5]. Most chronic diseases are related to age, poor eating habits, physical inactivity and stress, so most can be prevented and/or delayed. This means that, despite the disease, it is possible to live a fuller life for longer[9].

A contemporary healthcare model for older adults should be built around a flux of educational and health promotion actions, the prevention of preventable diseases and the delay, early treatment and rehabilitation of illnesses. In other words, a line of care - strategies for establishing the care path, with the objective of organizing the flow of individuals according to their needs - for older adults that hopes to achieve efficacy and efficiency must presuppose an interconnected network, based on the integrality of care, with the reference health professional and their team managing the individual instead of the disease, using all available technologies, based on the information obtained from quality medical records and frequent monitoring[8].

It is not logical to make hospitals the gateway to this health system, when the most contemporary medical thinking shows that this level of care, in addition to being more expensive, should be restricted to specific recommendations. Homecare is a more contemporary modality. In fact, the "invention" of the modern hospital is itself recent. Until quite recently, care was provided in the home[10].

One example is the prospective evaluation of the disease management[10] offered to beneficiaries of Medicare (the US government-run health insurance system), which demonstrated that actions failed to reduce expenses and that doctors resented the decision of the insurance companies to pay the costs of disease management, possibly reducing their earnings and interfering with the doctor-patient relationship.

Disease management programs for older adults, which are more complex, have a low cost-benefit ratio, as treating a disease reduces only morbidity rates. As older patients are affected by several chronic diseases, prioritizing a single disease over others is not the best choice of action. The best alternative is to structure integrated models that care for all the needs of these patients. If not, the problem is unlikely to be solved, as other diseases and their frailty will be maintained. In addition, resources will be used improperly[10].

THE PROPOSED MODEL

This model is structured around a treatment system that favors integrated care and prevention through the continuous monitoring of health conditions and the coordination of care at all levels. In this way, it is possible to stabilize chronic diseases

and avoid overburdening the system[10,11]. The training and knowledge of healthcare professionals involved in the model must be continually refreshed, to ensure they are as qualified as possible. Geriatricians must have fundamental training in Family and Community Medicine, focusing on the provision of primary care. In this way, a service focused on the needs of each beneficiary is guaranteed, recognizing clients as the subject of the process, and through effective communication with their families, respecting their interactions.

An important space in health units is the social center, which plays an essential role as a place for the integration of various health education, promotion and prevention actions.

Functional assessment determines the allocation of older patients into the correct line of care, in addition to allowing their care behaviors to be anticipated. There are a series of assessment tools for risk tracking validated and translated into Portuguese. Functional autonomy is an important predictor of the health of older patients, but systematically assessing the entire older population using long and comprehensive scales is not ideal. The two-phase approach, concentrating the complete assessment only on older people at risk, identified by a screening process, is more effective and less costly.

For this first contact, we opted for the tool known as Prisma-7, a questionnaire developed in Canada and composed of seven items. Its cross-cultural validation and adaptation for Brazil indicated a score of four or more positive responses as the ideal cutoff point. The application of the instrument, which can be carried out in three minutes, does not require expensive technology, personnel with special qualifications or long training programs. The respondents' socio-cultural and educational levels do not influence the understanding of the questions and if necessary, the questionnaire can be self-administered[11]. Prisma-7 has been used as a screening tool for functional loss and frailty at the entry point to Canada's healthcare system, as well as by the British Geriatrics Society and the Royal College of General Practitioners, in England[12,13]. In this proposal, some of the main protocols previously translated and validated in Brazil will be used.

INTERDISCIPLINARY TEAM

The proposed program is based on a partnership comprising a geriatrician doctor and a gerontologist nurse. The doctor performs clinical management, while the nurse coordinates care, monitoring the health conditions of users and consolidating the reference role of the model through client intake and strengthening the bond with patients.

The team is also composed of physiotherapy, psychology, social care and nutrition professionals, in addition to workshop staff (who develop dynamic integrative activities linked to the program). Whenever the care needs of users require other levels of care, they can be referred, but always by the client's doctor (geriatrician, general practitioner or family doctor). The same procedure is used for hospitalization. The doctor and nurse are responsible for contacting the hospital physicians, in order to obtain information about the case and, preferably, acting to ensure the best care and the shortest hospital stay.

The model has a care manager, a nursing professional with a specialization in gerontology who accompanies the older adult and their family throughout the process. This professional is responsible for the transition of care between services and annually - or when required – assesses the individual's functional capacity, encouraging their participation in the process. Its role is extremely important for the proposed model and follows the same logic as the North American navigator, created to guide the most frail patients. It is also the responsibility of this professional to manage the user's care through the different complexity levels of the health system, checking if the prescriptions and guidelines are being fulfilled[15]. This is not always possible, but it is important to emphasize that keeping patients in the initial levels of the model does not mean preventing their progression to higher complexity instances of care. An example is the hospital, which should be used as an exception, rather than the rule, and for as short a time as possible. To this end, the strategy of integrated care and intense monitoring is organized, as the differentiation between low and high complexity levels of care is marked.

In addition to the interdisciplinary team that provides face-to-face care, the model has a team of doctors and nurses working in virtual mode through the GerontoLine, a direct telephone line that guarantees full-time care, either passively (assisting and guiding) or actively (making contact to keep the individual on the care radar).

The quality of care demands greater awareness from health managers and society. It is argued that applying instruments to provide more qualified care and increased accreditation and certification is expensive, but good services are more cost-effective, involve less waste and provide better care results for patients. In some countries, the accreditation and evaluation of quality indicators are mandatory requirements. In Brazil, however, a policy of encouraging quality is lacking as both public and private health systems consider it an additional cost.

Although these assumptions are accepted by most health managers, little is ever done. For this reason, for a properly structured care model,[16] some elements cannot be overlooked. Briefly and concisely, the items considered essential for a contemporary and innovative health care model[17,18] are presented in Chart 1, below:

Chart 1. Key items for a contemporary and innovative health care model. Rio de Janeiro, 2018.

Competency	Professionals trained to the specifics related to aging, with postgraduate degrees in Geriatrics/Gerontology and regular training.
Diagnostic reliability	Obtained through second opinions from qualified professionals.
Qualified information	The medical records must be designed to cover all the items described, feature the latest technology and be accessible via cell phone.
Portability	The patient is the owner of information about their health.
Compensation and bonuses	Health professionals should receive a financial incentive (extra remuneration) related to their performance, while beneficiaries who adhere to the service should receive discounts on their monthly fees.
	Bonus - operators can offer beneficiaries who adhere to this care product a bonus, that is, as the operator believes that the model is efficient and reduces costs, it can and should encourage the participation of beneficiaries by granting a bonus. This is a discount on the health plan monthly fee, in accordance with article 4, paragraph 1, of RN nº 265, dated August 19, 2011.
	Remuneration - the awarding of extra remuneration for the service provider pairing (doctor and nurse) who look after a client portfolio is a form of encouragement for these professionals to meet the goals and results prepared in accordance with results in health. It works as a stimulus and reward for those who provide higher quality care to their clients, and who indirectly contribute to the reduction of the operator's costs.
Prevention	Monitor health, not disease; intervene before the injury or illness occurs; postpone the disease so that the older adults can enjoy their quality of life for longer.
Integrated processes	Working processes designed to avoid waste and maximize resources.
Technology	Modern and innovative resources ensure an easy, efficient information flow.
Transdisciplinarity	Diverse technical knowledge, acting in an integrated way, considering the patient as a whole.

Source: the author.

CRITERIA FOR PARTICIPATION IN THE MODEL

For inclusion in the program, the individual must be 60 years or older. The number of comorbidities is not used as an inclusion or exclusion factor. After admission, the interested parties are seen by a nurse, who will be their monitoring manager. Initially, this professional will explain the objectives of the program, before carrying out a Comprehensive Geriatric Assessment (CGA), establishing the monitoring protocol based on the risk identified following the assessment (robust, at risk of frailty or frail). The patient is then referred for medical evaluation by the professional who will be their reference for health monitoring.

For robust patients, medical consultations are held every six months. Those at risk of frailty or who are already frail consult with their attending physician every three months. The follow-up manager performs monthly telephone monitoring, as well as arranging periodic nursing consultations and urgent emergency visits, according to the client's needs. In situations where there is a need for multidisciplinary follow-up, the nurse or the medical team refers the older patient to the social center, a facility with a fundamental role in the system as a location where various integrated actions necessary for maintaining functional capacity are carried out.

The unique electronic medical record organizes the health information of the client, allowing the planning of individual and collective action strategies focused on prevention. Computerization and the integration of management systems contribute to more effective financial control, ensuring programmed receipts are not charged, allowing analysis of data and those registered and acting as a tool for preventive actions.

A structured care program for older patients does not only benefit the quality of life of the patients monitored; it allows the health care provider to better manage the use of its financial resources.

INTAKE

The older adults and their family must feel protected and supported when entering the health system. Intake is fundamental for those joining the program and a stimulus for the development of trust.

Intake takes place in two stages. The first is administrative and institutional in nature. Ample explanation of the proposed actions is provided, emphasizing health promotion and disease prevention above all. The user is didactically informed about all the differentiated care dynamics that will be offered to improve their health and quality of life. In the second stage, the service itself begins.

As a way of organizing access to the levels of the model, the Prisma-7 risk identification questionnaire is applied. The patient then undergoes evaluation through the other instruments that make up this functional assessment[14,19-21]: the Lachs Scale, the Katz Scale, the Lawton Scale, Mini Nutritional Assessment, Tinetti Scale, the Jaeguer Chart, the Mini-Mental State Examination and the Yesavage Scale, detailed in Chart 2.

In addition to risk identification and screening protocols, the other epidemiological instruments are used annually. Physician and monitoring manager, in addition to the geriatric interprofessional team, carry out more detailed assessments in order to propose an intervention plan. This information will appear in the patient's medical record and will be kept until the end of the care journey[12]. An individual therapeutic plan is then defined with periodic consultations, referral to a multidisciplinary team and a social center - and, if applicable, evaluation by medical specialists. A single, longitudinal and multiprofessional electronic medical record is then opened, where information from all instances of care in the care model will be stored, from the first contact to palliative care in the final phase of life. This chart should contain information about the clinical history and physical exams of the older patient, but it is essential that you have information about your daily life, your family and your social support, among others. Your medical record should also have the records of other professionals of the interdisciplinary team, such as physiotherapists, nutritionists and psychologists. Family participation, explanation of activities and epidemiological *screenings* resulting from assistance in the services offered are other important differentials. Information on all procedures is essential for monitoring older adults.

Chart 2. Instruments used in the functional assessment of older adults. Rio de Janeiro, 2018.

Lachs Scale	Composed of 11 items (questions, anthropometric measurements and performance tests) to assess the areas most commonly affected in older adults (vision, hearing, upper and lower limbs, urinary continence, nutrition, cognition and affect, activities of daily living, environment and social support). The application of this instrument makes it possible, quickly and systematically, to identify the functional domains that will later be evaluated in more detail for the establishment of diagnosis and planning of interventions.
Katz Scale	Evaluates self-care activities in daily life
Lawton scale	Evaluates instrumental activities of daily living
Mini Nutritional Assessment	Nutritional assessment
Tinetti scale	Balance and gait test
Jaeguer Card	Evaluates visual acuity
Mini-Mental State Examination	Folstein test
Yesavage scale	Geriatric depression scale

Source: the author

CARE COORDINATION

There are several models of lines of care, but what is most important is that each health institution understands its client portfolio, profile and needs, and organizes its services as effectively as possible[11,16].

One of the main factors for controlling the costs of users of the program is monitoring in all instances of care, so that there is no gap in the patient's care when they are referred to the healthcare network or need tertiary or hospital care[22]. The transition between the instances of care is monitored by the team, which values the fluidity of the flow of information, bringing together the healthcare professionals and seeking to preserve the principles of the predominant guidance of the geriatrician and nurse pairing. The control of hospitalizations takes place through a determined flow, ensuring that those responsible for care know the clinical and treatment history of the patient, in addition to the understanding that they receive frequent monitoring and should return to their health team when the period of clinical aggravation is over[23].

In the case of hospitalization, the patient is monitored on a daily basis, in two forms. In one the nurse maintains contact with the family to provide support, clarification or identify needs (of the patient or the family itself). The other involves the prevention manager, who acts as a link between outpatient clinic and hospital, carrying out daily monitoring with the attending hospital doctor. In hospitals where there is an internist, this contact is facilitated and direct. In the others, there is support from the medical auditors or the care team.

The entry point to the health system cannot be the hospital. A model should be designed with several instances of prior care. Seeing the hospital as a privileged place for healing is a conceptual error. In the case of older adults, hospitalization should occur only at the acute stage of the chronic disease and for the shortest possible time, or in cases of emergency[11,16]. Equally important is the emphasis that older adults participate in the activities of the social center, a place for the integration and reinforcement of integrated care policies. Research has shown a positive effect in reducing referral to specialist doctors[3,10,11]. Furthermore, the professionals who organize the activities are identified as team members, giving them credibility. Social centers promote meetings and interactions mediated by pedagogical plans aimed at older adults, such as health workshops, therapeutic groups, yoga, ballroom dancing, cognitive stimulation, psychology groups, nutrition, singing, postural guidance, pelvic and muscle strengthening. The objective is to reduce the problems of loneliness for older adults, improve their social contact and develop new skills at an older

age, making it a stimulating space for exchanging experiences, mediated by a pedagogical body.

TECHNOLOGY AS A DIFFERENTIATING FACTOR

Upon arriving at the health center, the client is identified through facial recognition, which instantly opens their medical records on the receptionist's desk. When greeting the client, the receptionist can now address them by name, ask about their family and check the list of medications that the older person is taking. These are simple actions, but they add enormous trust to the relationship, making older adults feel protected and welcomed from the outset.

Registering patient care paths is another major differentiating factor. A high quality information system that is broad in scope can document not only the clinical evolution of the older person, but also their participation in individual or collective prevention actions, and provide the support of nursing professionals and telephone contacts, which must be resolutive, carried out by qualified personnel and involve complete sharing of information with the team, for the benefit of a comprehensive assessment of the individual.

The information system, which begins with the registration of the client, is one of the pillars of the program. Through the process, the entire care pathway will be monitored at every level, verifying the effectiveness of actions and contributing to decision making and monitoring. It is a single, longitudinal and multi-professional electronic record, which will accompany the patient from intake onwards, and which differs from existing records in that it records their life history and health events.

Another efficient differentiating factor is the availability of a mobile phone app with individualized information and reminders of appointments and prescribed actions. The app may, among other actions, request that the client takes a photo of their breakfast and sends it to the nutritionist, who will observe if the food is balanced, or contains adequate quantities of fiber, etc. Every effort will be made to keep users within the units of the program, with the minimum use of specialists.

ACTIONS AND METRICS

The duties of the geriatrician are: to manage the health history of their client portfolio, establishing individualized care plans; define the clinical risk of each patient and manage their care demands, together with the nurse; monitor hospitalizations; assess and process referrals to specialists; and coordinate the discussion of the most relevant clinical cases, in order to keep the team integrated and aligned with the most suitable conduct for each case.

Considering a workload of 20 hours per week, each doctor will have four shifts of five hours per week. Each shift will have slots for 12 patients, with 20 minutes per consultation, in addition to three "wildcard" slots (60 minutes) to be used for extra tasks, such as inter-consultations with the nurse, case reviews or contact with hospitalized patients. Thus, each month, the doctor will have performed an average of 200 consultations, which allows the entire user portfolio to be consulted every quarter.

NURSING ACTIONS AND MEASURES

The nurse will be responsible for four distinct and integrated actions throughout the process.

Brief functional assessment –the patient's first consultation, in which screening tests are applied and the clinical history is obtained.

Nursing consultation – the frequency of nursing consultations will be established according to the degree of frailty, classified as follows: Risk 1 – every four months; Risk 2 – every three months; and Risk 3 – every two months.

During consultations, the nurse must: monitor the most complex cases; assess compliance with the proposed targets; reestablish new goals when necessary and track possible medical needs; engage with clients to develop an individualized care plan that distinguishes their needs and meets their priorities; and ensure that beneficiaries and their families understand their role in promoting care and feel safe to carry out their joint responsibilities.

Concomitantly, the nurse can: identify the psychological, social, financial and environmental barriers that affect the beneficiary's ability to adhere to treatments or health promotion, establishing a strategy that resolves or minimizes the problem; and oversee collective care, known as therapeutic groups, which bring together patients with the same comorbidity, in order to provide a dynamic of information and awareness of healthy practices.

Brief nursing care (BNC) - this is an ad-hoc service, performed in person and when required, in which the nurse, in a special role and without prior appointment, treats patients who, via GerontoLine, request face-to-face assistance. Considering that most complications presented by telephone or via the call-center will be managed virtually or referred to an emergency service, the time set aside in the professional's schedule for this action represents 10% of each work shift.

Monitoring - its main objective is to keep the patient in the radar of the pairing responsible for managing their health. Depending on the degree of frailty, the older adult will receive more frequent contact. The entire portfolio will be monitored at least once a month. Contacts will be via telephone or the app and will follow a structured protocol to ensure the effectiveness of the approach and the updating of the beneficiaries' health information and electronic data history. The health service professionals will be available to users 24 hours a day via virtual care.

PERFORMANCE BASED REMUNERATION

The hegemonic model of remuneration for health services in many countries, both in public systems and in those oriented to the private health plan market, is still that of fee-for-service, which remunerates the quantity of services produced (volume) and encourages competition for users.

Changing the remuneration model without changing the care model, or vice versa, is not enough, considering that both are interdependent. Some of the problems of the Brazilian health system, especially the supplementary system, and which primarily affect older adults, are a consequence of the model adopted decades ago. To cope with the new and urgent demands of society, alternative remuneration models must be implemented to break the vicious circle of a succession of fragmented consultations, decontextualized from the social and health reality of older adults, in addition to the production of procedures disconnected from the expected outcome[24].

Performance based pay is a reward system based on the results obtained. As the technical and behavioral requirements required of professionals are of a high standard, it is therefore intended that the remuneration is of equivalent value.

Performance based pay, for example, establishes bonus levels that can reach 30% in compensation in the quarter. Every three months, an assessment of the health professional's performance is made based on predetermined indicators. Considering that there is a need for four medical consultations/year as a premise of the program, one consultation per quarter is required for all clients linked to doctors. In other words: everyone will be seen by their doctor four times a year.

The prerequisites of the award are attendance and punctuality, which are fundamental to guaranteeing the number of consultations, which is an essential factor for ensuring the quality of the service. There is also a requirement to participate in the scoring program for the payment of the bonus: the proper registering of information in the electronic medical records of the participants, as well as their potential hospitalizations. As these are the main cost factor, strict control by the team determines the economic and financial success of any initiative or project.

Another basic principle is the resolutive capacity of the geriatrician. According to international studies,[25] general practitioners can resolve 85% to 95% of clinical situations. Referrals to specialist clinics should be an exception. If the doctor refers up to 15% of clients in their portfolio per quarter, a good resolutive capacity, worthy of additional points, will have been demonstrated.

The engagement between users of the program and the multidisciplinary team and social center determines the client's bond and resolvability. An item is therefore included that assesses the participation

of members of each portfolio in consultations with the gerontologists of the team and in the collective activities of the social center, which earns points towards a bonus[26].

The loss ratio is the main economic and financial indicator established for the evaluation of the program, which is why this item is given greater weight, and doctors can earn up to two points in their performance evaluation. This assessment requires excellence of care, and the incentive for health professionals within the win-win premise is fair.

Bonus point scoring

The items in the portfolio of each doctor, evaluated quarterly, are shown in Table 3.

Chart 3. Items from each doctor's portfolio, evaluated quarterly. Rio de Janeiro, 2018.

Percentage of clients seen	a. 100% of portfolio seen in quarter (1 point). b. From 90% to 99% seen (no points). c. Below 90% seen (minus 1 point).
Client Satisfaction Survey	over 90% = 1 point
Doctor's resolutive capacity	a. Use of healthcare network for less than 15% of cases (1 point). b. Use of healthcare network from 80% to 85% of cases (no points). c. Use of healthcare network in 80% of cases (minus 1 point).
Participation in the activities of the social center, workshops or multidisciplinary team.	a. Over 20% of clients (1 point). b. 10 to 19% (no score). c. Below 10% (minus 1 point).
Portfolio loss ratio	a. Below 70% (2 points). b. From 70% to 79% (1 point). c. 10 to 19% (no score). d. 100% (minus 1 point).

Source: the author.

There is no doubt that performance based pay models will become a reality in Brazil. Healthcare professionals must realize that the implementation of performance-based pay is not a question of when or if, but how[12,17].

LOSS RATIO

The loss ration calculated from the relationship between the costs arising from losses and the premium, which corresponds to the revenue received by the health plan operator. In this way, a percentage is calculated from the amount spent divided by how much is earned.

According to the National Supplementary Health Agency (or ANS), the loss ratio is defined as the ratio, expressed as a percentage, between the health care expenses and the revenue of the operators. In a health care provider following this care model,[12,17] their loss ratio data for the period from June 2014 to July 2018 were analyzed. The average age of the population participating in this program in 2019 was 71 years, and the loss ratio over time is shown in figure 1, below.
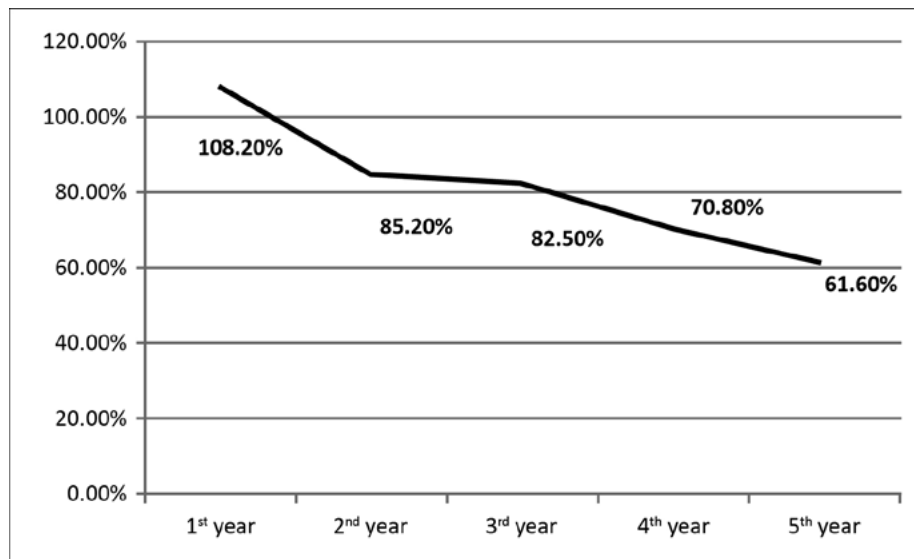
Figure 1. Loss ratio in a care model for older adults. Rio de Janeiro, 2014-2018.

As the program was implemented in July 2014, the first year was taken as July 2014 to June 2015; the second year from July 2015 to June 2016, and so on.

Source: the author.

There is a constant decline in the loss ratio, which suggests that the actions proposed by the model yield highly positive results. It is expected that the loss ratio of an older population will be greater than that of younger people due to the greater demand for exams, consultations, treatment and hospitalizations. But the opposite occurred here, and the results were excellent.

CONCLUSION

Transforming the logic of health care in Brazil is both a major challenge and a necessity. It becomes even more relevant when it comes to health care for people in situations of greater vulnerability, such as older adults.

This model is structured based on a treatment system that favors integrated care and prevention through the continuous monitoring of health conditions and the coordination of care at all levels. In this way, it is possible to stabilize chronic diseases and avoid overburdening the system. The training and knowledge of healthcare professionals involved in the model must be continually kept up to date, to ensure they are as qualified as possible.

This type of change and innovation needs to be built into the daily reality of health services, into the training of health professionals, into the way the health system is managed and organized for care, and into its financing. It is impossible to talk about reorganizing the provision of services without considering remuneration models, as one determines the other. This debate must be tackled in order to move towards a higher quality of health care, and so that adequate remuneration can be provided.

It is possible to grow old with health and quality of life, as long as all those acting in the sector take responsibility and allow themselves to innovate. It is worth remembering that, often, innovating means salvaging the simpler care and values that have been lost within our health system. It is necessary to start constructing this new form of caring for older adults as soon as possible.

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REFERENCES

1. Veras RP, Estevam AA. Modelo de atenção à saúde do idoso: a ênfase sobre o primeiro nível de atenção. In: Lozer AC, Leles FAG, Coelho KSC, organizadores. Conhecimento técnico-científico para qualificação da saúde suplementar. Brasília, DF: OPAS; 2015. p. 73-84.

2. Szwarcwald CL, Damacena GN, de Souza Júnior PRB, Almeida WS, Malta DC. Percepção da população brasileira sobre a assistência prestada pelo médico. Ciênc Saúde Colet. 2016;21(2):339-50.

3. Veras RP, Oliveira MR. Linha de cuidado para o idoso: detalhando o modelo. Rev Bras Geriatr Gerontol. 2016;19(6):887-905.

4. Porter ME, Teisberg EO. Repensando a saúde: estratégias para melhorar a qualidade e reduzir os custos. Porto Alegre: Artmed; 2009.

5. de Moraes EM, de Moraes Fl. Avaliação multidimensional do idoso. Belo Horizonte: Folium; 2014.

6. Silva AMM, Mambrini JVM, Peixoto SV, Malta DC, Lima-Costa MF. Uso de serviços de saúde por idosos brasileiros com e sem limitação funcional. Rev Saúde Pública. 2017;51(supl.):1-10.

7. Carvalho VKS, Marques CP, Silva EN. A contribuição do Programa Mais Médicos: análise a partir das recomendações da OMS para provimento de médicos. Ciênc Saúde Colet. 2016;21(9):2773-84.

8. Veras RP, Oliveira M. Envelhecer no Brasil: a construção de um modelo de cuidado. Ciênc Saúde Colet. 2018;23(6):1929-36.

9. Veras RP, Caldas CP, Cordeiro HA. Modelos de atenção à saúde do idoso: pensando o sentido da prevenção. Physis. 2013;23(4):1189-1213.

10. Veras RP. Caring Senior: um modelo brasileiro de saúde com ênfase nas instâncias leves de cuidado. Rev Bras Geriatr Gerontol. 2018;21(3):1-7.

11. Veras RP, Gomes JAC, Macedo ST. A coordenação de cuidados amplia a qualidade assistencial e reduz custos. Rev Bras Geriatr Gerontol. 2019;22(2):e1900073 [12 p.].

12. Saenger ALF, Caldas CP, Motta LB. Adaptação transcultural para o Brasil do instrumento PRISMA-7: avaliação das equivalências conceitual, de item e semântica. Cad Saúde Pública. 2016;32(9):e00072015 [17 p.]

13. Turner G, Clegg A. Best practice guidelines for the management of frailty: a British Geriatrics Society, Age UK and Royal College of General Practitioners, report. Age Ageing. 2014;43:744-7.

14. Veras RP. Guia dos Instrumentos de Avaliação Geriátrica [Internet]. Rio de Janeiro: UnATI/UERJ; 2019 [acesso em 10 abr. 2020]. Disponível em: http://www.unatiuerj.com.br/Guia%20dos%20instrumentos%20Avaliacao%20Geriatrica.pdf

15. Veras R. Bem Cuidado: um modelo integrado com ênfase nas instâncias leves de cuidado. Rio de Janeiro: ANS; 2018.

16. Veras PR, Gomes JAC, Macedo ST. A coordenação de cuidados amplia a qualidade assistencial e reduz custos. Rev Bras Geriatr Gerontol. 2019;22(2):e1900073 [12 p.].

17. Veras RP, Caldas CP, da Motta LB, de Lima KC, Siqueira RC, Rodrigues RTSV, et al. Integração e continuidade do cuidado em modelos de rede de atenção à saúde para idosos frágeis. Rev Saúde Pública. 2014;48(2):357-65.

18. Oliveira MR, Veras RP, Cordeiro HA. Supplementary Health and aging after 19 years of regulation: where are we now? Rev Bras Geriatr Gerontol. 2017;20(5):624-33.

19. Costa ALFA, dos Santos VR. Da visão à cidadania: tipos de tabelas de avaliação funcional da leitura na educação especial. Rev Bras Oftalmol.2018;77(5):296-302.

20. Lourenço RA, Veras RP. Mini-Exame do Estado Mental: características psicométricas em idosos ambulatoriais. Rev Saúde Pública. 2006;40:712-9.

21. Machado RSP, Coelho MASC, Veras RP. Validity of the Portuguese version of the mini nutritional assessment in Brazilian elderly. BMC Geriatrics. 2015;15:1-10.

22. Nunes BP, Soares UM, Wachs LS, Volz PM, Saes MO, Duro MSS, et al. Hospitalização em idosos: associação com multimorbidade, atenção básica e plano de saúde. Rev Saúde Pública. 2017;51:1-10.

23. Caldas CP, Veras RP, da Motta LB, Guerra ACLC, Trocado CVM. Atendimento de emergência e suas interfaces: o cuidado de curta duração a idosos. J Bras Econ Saúde. 2015;7(1):62-9.

24. Oliveira MR, Veras RP, Cordeiro HA. O modelo de remuneração definindo a forma de cuidar. J Bras Econ Saúde. 2018;10(2):198-202.

25. Tanaka OU, Oliveira VE. Reforma(s) e estruturação do Sistema de Saúde Britânico: lições para o SUS. Saúde Soc. 2007;16(1):7-17.

26. Veras R. The Current Challenges of Health Care for the Elderly. J Gerontol Geriatr Res. 2015;4:1-1.

Satisfaction of octogenarians with Primary Health Care services

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Abstract

Objective: To evaluate the satisfaction of octogenarians with Primary Health Care services. *Method*: a descriptive study, with a quantitative approach, was carried out with 30 older users of the Family Health Strategy, selected by a non-probabilistic sample. Data were collected at home, using the following questionnaires: the mini-mental state exam, a questionnaire on sociodemographic factors, health conditions and access to services, and a questionnaire on satisfaction with Primary Health Care. Data were analyzed using descriptive statistics. *Results*: The satisfaction analysis showed that the elderly octogenarians are satisfied in terms of care ($\hat{X} = 6{,}0; \pm 1{,}5$) and the interest that community agents demonstrate in them ($\hat{X} = 5{,}9; \pm 1{,}6$) and the availability of nurses for their treatment ($\hat{X} = 5{,}9; \pm 1{,}1$). Aspects related to the waiting time for nurses ($\hat{X} = 4{,}6; \pm 1{,}6$) and doctors ($\hat{X} = 4{,}9; \pm 1{,}6$), facilities for the disabled ($\hat{X} = 4{,}6; \pm 1{,}4$) and the perception that the unit is close to a perfect health unit ($\hat{X} = 4{,}6; \pm 1{,}8$). *Conclusion*: The services were positively evaluated, reflecting the importance of considering the perspective of octogenarian users in the planning of healthcare actions, since the evaluation of the quality of these services can lead to changes and guide actions in a way that is coherent with the lives of users, increasing their effectiveness, especially regarding actions aimed at the octogenarian population.

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INTRODUCTION

Population aging is a worldwide phenomenon[1]. Data from the 2010 census show that this process is occurring in Brazil at a highly accelerated rate[2], with octogenarians (the age group equal to or over 80 years) the fastest growing group, representing about 14.4% of the total number of older adults, or 1.5% of the entire Brazilian population[1].

An important issue related to this scenario is that the increase in longevity is accompanied by higher levels of diseases that can cause disability and dependence, impacting the functional capacity of these older adults, in both physical and mental aspects, as well as their independence in carrying out basic and instrumental activities of daily living. Such impairments may result in complications such as physical disability, frailty, institutionalization and early death[3].

This scenario presents challenges for care in terms of safety and quality, as octogenarians can be affected by multiple diseases and make intense use of health services. Thus, the provision of health care to this population must occur at the right time, in the appropriate place, and is crucial for the maintenance of the health conditions of these people[4].

In this context, Primary Health Care (PHC) services should be the preferential contact of users with health systems[5], especially for octogenarians, due to the greater proximity of access and greater bond created with the professionals from these services[6]. Above all, regular and effective monitoring of PHC services can avoid complications among this population, so that they can live, even with health problems, with quality of life[5,7-9].

In this perspective, the evaluation of health services is an essential initiative to diagnose and institute actions that bring the population's expectations closer to the reorganization of the care model. As a result, it must be able to support decision making to promote the effectiveness of programs and efficient use of resources[10].

Thematic health assessment has received increasing interest from managers and researchers. Health assessment comprises a participatory process in which the user is a provider of important information, essential for completing and balancing the quality of services.

Most service evaluation studies consider only the perception of care offered to users, with those that address the organization of actions in a more comprehensive manner, related to the work performed by health teams, still incipient[6,10,11]. Thus, there are several instruments[11] used to measure the satisfaction of PHC services, such as the Primary Care Assessment Tool (PCATool), the external evaluation instrument of the Primary Care Access and Quality Improvement Program and the Satisfaction with Primary Health Care questionnaire used in this study.

In this sense, due to population aging and the increasing proportion of octogenarians and their specific demands, it is crucial to include this age group in the processes of evaluating satisfaction with the health care provided. In addition, the evaluation of PHC services by these users is also relevant because it is the point of the Health Care Network (HCN) closest to this population[6].

Thus, the challenge emerges when conceiving the evaluation of services, through the participation of long-lived older adults. Despite the limitations that these older adults may have, especially those related to the aging process, there is an urgent need to carry out research that includes the perception of this population regarding the standard of health services. Including the perspective of long-lived older users in the evaluation of PHC services represents a quality indicator, allowing the tailoring of actions that address the health needs of this age group[7,11]. Therefore, the following question emerges: *How do octogenarians assess their satisfaction with primary care?*

The present study aimed to analyze the satisfaction of octogenarians with Primary Health Care services.

METHOD

This is a descriptive study, with a cross-sectional design, of the household survey type. This research is part of a larger project entitled "Knowledge of HIV/AIDS and satisfaction with the health service of older users of the Family Health Strategy", carried

out in the urban area of a city in the state of Minas Gerais, Brazil, in 2017.

The place of study is a hub municipality in the Health Macro-Region of the Triângulo Sul, in the state of Minas Gerais, Brazil, with an estimated population of 333,783 inhabitants in 2020, presenting specificity in relation to the proportion of octogenarians, considering that the state of Minas Gerais has a prevalence of 14.3% and the municipality of this study a proportion of 14.2%[12].

The selection of participants for the present study came from the database of the larger project, composed of 238 older adults[13]. From this database, an intentional, non-probabilistic sample was selected, by inviting older adults who fit the following inclusion criteria: octogenarians (80 years of age or older) who had been registered with the PHC service of the Family Health Strategy type (or ESF), for at least six months, and who had had at least one appointment at the registered health unit and did not exhibit cognitive decline. Thirty older adults who met the inclusion criteria were identified.

Subsequently, visits were made to the homes of these octogenarians, with direct interviews being carried out by a previously trained team, composed of four students from the research group, between January and April 2017. The visits with the interviews lasted an average of 60 minutes and took place between May and December 2017, in the presence of family members and/or caregivers if the older adult so desired, helping the participants if they had any questions.

Initially, the older adults were assessed for cognitive decline by means of the Mini Mental State Examination (MMSE), which performs screening for the presence of cognitive decline. The following were considered cutoff points, based on the education of the older adults, namely: 13 points for illiterates, 18 points for from schooling from 1 to 11 years and 26 points for schooling for over 11 years[14].

A questionnaire prepared by the researchers (tested in a pilot study) was used for the sociodemographic variables (age, sex, marital status, self-declared race/skin color, religion, education, retirement, professional occupation, individual income, family income, number of children, number of people living in the participant's home and household arrangements), health conditions (alcohol and tobacco consumption, physical activity, type of physical activity and self-reported morbidities) and access to services (health services that the individual uses, medical insurance, frequency of visits by the Community Health Agent (CHA) and frequency of use of the health center in the year prior to the interview).

To assess the satisfaction of the octogenarians, the Satisfaction with Primary Health Care Questionnaire, validated in Brazil, was applied[15]. This is composed of 33 items divided into five dimensions (Facilities of Unit; Reception at Unit by Community Health Agent; Treatment by nurse; Medical Treatment; Perceptions and General Needs). The responses to the items were organized on a *Likert* type scale based on agreement, divided into seven points, namely: 1-totally disagree; 2-strongly disagree; 3-disagree a little; 4-neither agree nor disagree; 5-I agree a little; 6-strongly agree and 7-totally agree.

Descriptive analysis of the variables was carried out. The values of the *Likert* scale were treated numerically (there was no reverse question scoring as the *Likert* gradation relates the highest value to the best scenario).

Regarding ethical aspects, the study complied with Resolution 466/2012 of the National Health Council, and the research was approved by the Research Ethics Committee of the Universidade Federal do Triângulo Mineiro, in 2017, under approval number 2,041,624. The objectives of the research were explained and any doubts were resolved. The interviews were carried out after the participant signed an Informed Consent Form.

RESULTS

Thirty octogenarians participated in the study. The mean age was 83.7 years, the minimum age was 80 and the maximum age was 91. None of the older participants showed signs of cognitive decline.

Regarding the sociodemographic profile of the octogenarians, 56.7% were female, most were widowed (53.3%), white (43.3%), Catholic (66.6%), with between one to four full years of schooling (53.5%), retired and without a professional occupation (93.3%), with an individual income of one minimum wage (73.3%) and a family income of one to three minimum wages (60.0%), with a household arrangement mainly composed of new forms of arrangements (56.6%), representing older adults who lived only with their grandchildren and those who lived with other people with whom they did not have family ties.

Regarding the health conditions of the elderly, most did not use tobacco or alcohol (70.0% for both) and did not participate in physical activities (66.7%). Among the elderly who practiced physical activity (33.3%), walking (56.3%), water aerobics (18.8%) and guided aerobic activities (12.5%) were preferred.

As for access to health services, almost all respondents reported using the public health service (93.3%) and not having private health insurance (56.7%). More than half received at least one visit per month from the CHA (53.3%) and attended the health service to which they were registered at least once a month (53.3%) (Table 1).

In the analysis of the items that make up the Primary Care Satisfaction assessment instrument, based on the average values shown in Table 2, the most positively assessed items were: *Community agents are attentive* (Average=6.0; ±1.5); *Community agents are interested in the user's problems and in resolving such problems* (Average=5.9; ±1.6); *Community Health Agents clearly explain what user should do* (Average=5.9; ±1.6). In addition to *Nurse is usually available to treat the user* (Average=5.9; ±1.1), *Nurses are competent in the treatment they provide* (Average=5.9; ± 1.4) and *Nurses are attentive* (Average=5.9; ±1.3).

The items with the lowest scores were: *user normally does not have to wait long for treatment - Nurse* (Average=4.6; ±1.6); *user normally does not have to wait long for treatment - Doctor* (Average=4.9; ±1.6); *the clinic has adequate facilities for people with disabilities* (Average=4.9; ±1.4) *and this health unit is very close to a perfect health unit* (Average=4.9; ±1.8).

Table 1. Distribution of clinical aspects and access to health services of octogenarians registered in the Family Health Service (N=30). Uberaba, Minas Gerais, 2017.

Clinical aspects and access to health services	n (%)
Smoker	
Yes	1 (3.3)
No	21 (70.0)
Ex-smoker	8 (26.7)
Alcohol intake	
Yes	6 (20.0)
No	21 (70.0)
Ex-alcoholic	3 (10.0)
Physical activity	
Yes	10 (33.3)
No	20 (66.7)
Type of physical activity*	
Walking	9 (56.3)
Water aerobics	3 (18.8)
Guided aerobic activities (health service)	2 (12.5)
Other	2 (12.5)
Morbidities*	
Diabetes *Mellitus* type II	14 (14.9)
Systemic Arterial Hypertension	24 (25.5)
Osteoporosis	12 (12.8)
Varicose Veins	15 (16.0)
Heart problems	12 (12.8)
Obesity	1 (1.1)
Parkinson's Disease	2 (2.1)
Alzheimer's Disease	1 (1.1)
Urinary incontinence	6 (6.4)
Fecal incontinence	3 (3.2)
Constipation	4 (4.3)
Type of health service used	
Public	21 (70.0)
Private	2 (6.7)
Both	7 (23.2)
Possesses medical insurance	
Yes	13 (43.3)
No	17 (56.7)
Frequency of Community Health Agent visits	
Less than once a month	16 (53.3)
Once per month	14 (46.7)
Frequency of use of health services (FHS)	
Less than once a month	14 (46.7)
Once per month	16 (53.3)

*Each participant could choose more than one alternative.

Table 2. Scores for satisfaction with Primary Health Care for octogenarians according to satisfaction groups (N=30). Uberaba, Minas Gerais, 2017.

Items and domains of the Satisfaction with Primary Health Care instrument	Average (±sd)	Median (95% CI)
Facilities of unit		
The facilities look good	5.3 (1.5)	6.0 (4.8; 5.9)
The facilities have a pleasant temperature	5.2 (1.6)	5.0 (4.6; 5.8)
The facilities are comfortable	5.5 (1.5)	6.0 (4.9; 6.1)
The facilities are clean	5.5 (1.3)	6.0 (5.0; 6.0)
Bathrooms are hygienic	5.5 (1.3)	6.0 (5.0; 6.0)
The consulting rooms have enough space	5.5 (1.2)	6.0 (5.0; 5.9)
The clinic has facilities suitable for the disabled	4.9 (1.4)	5.0 (4.4; 5.5)
Services are well signposted	5.4 (1.3)	6.0 (4.9; 5.9)
Opening hours are tailored to the user's needs	5.3 (1.8)	6.0 (4.6; 6.0)
In this clinic there is information about health care	5.6 (1.5)	6.0 (5.1; 6.2)
Reception at the unit is carried out by the Community Health Agent (CHA)		
The CHAs are attentive	6.0 (1.5)	7.0 (5.4; 6.6)
CHAs are interested in the user's problems and resolving them	5.9 (1.6)	7.0 (5.3; 6.5)
CHAs clearly explain what the user should do	5.8 (1.6)	6.0 (5.2; 6.4)
User does not normally have to wait long for treatment	5.2 (1.5)	5.0 (4.6; 5.7)
Nursing Treatment		
Nurses are attentive	5.8 (1.3)	6.0 (5.4; 6.3)
Nurses are interested in the user's problems and resolving them	5.7 (1.2)	6.0 (5.2; 6.2)
Nurses do everything they can to solve the user's problem	5.7 (1.3)	6.0 (5.2; 6.2)
Nurses clearly explain the treatment they will perform	5.6 (1.7)	6.0 (4.9; 6.2)
Nurses are competent in the treatments they perform	5.8 (1.4)	6.0 (5.3; 6.3)
Usually the Nurse is available to treat the user	5.9 (1.1)	6.0 (5.4; 6.2)
Nurses are respectful of appointment times	5.7 (1.3)	6.0 (5.2; 6.2)
User does not normally have to wait long for treatment	4.6 (1.6)	5.0 (4.0; 5.2)
Treatment by Doctor		
Doctors are attentive	5.6 (1.5)	6.0 (5.0; 6.1)
CHAs are interested in the user's problems and resolving them	5.6 (1.5)	6.0 (5.0; 6.2)
Doctors clearly explain the treatment they will perform	5.6 (1.3)	6.0 (5.1; 6.1)
Doctors do everything they can to solve the user's problem	5.6 (1.4)	6.0 (5.0; 6.1)
Doctors are competent in the treatments they perform	5.6 (1.7)	6.0 (4.9; 6.2)
Doctors are respectful of appointment times	5.2 (1.7)	6.0 (4.5; 5.8)
User does not normally have to wait long for treatment	4.9 (1.6)	5.0 (4.3; 5.5)
Overall		
In general, the user is satisfied with the services of this Health Unit (HU)	5.2 (1.5)	5.5 (4.7; 5.8)
This HU meets the user's needs	5.3 (1.7)	6.0 (4.7; 5.9)
This HU meets the user's expectations	5.1 (1.6)	5.5 (4.5; 5.7)
This Health Unit is very close to a perfect Health Unit	4.9 (1.8)	5.5 (4.2; 5.5)

Sd: Standard deviation; 95% CI - 95% confidence interval.

DISCUSSION

The results of the present study are consistent with other studies with octogenarians, in terms of sociodemographic profile: there was a higher frequency of women, aged between 80 and 84 years, who were widows, had low levels of education, an individual income below the minimum wage, were retirees and had a large number of morbidities[2,16,17].

The predominance of octogenarian women corroborates the fact that men have higher mortality rates and women higher survival rates[16]. The low levels of education may be related to cultural aspects. In addition to access to schools, this situation may be the result of cultural and generational factors, which results from the non-stimulus for these individuals to attend school, as well as labor activities being related to low schooling, which ends up affecting financial conditions[17,18].

The Brazilian National Health Service (SUS) is important to the population studied, 93.3% of which reported using it. As the population of the study is a group of octogenarians with specific characteristics related to the aging process, recognizing the importance of this health system, as a social protection policy, becomes crucial if it is to continue to be strengthened. The results confirm the constant use of health services by octogenarians, as all the respondents used the services of the FHS (Family Health Strategy) at least once a month[4,6,11,19].

Despite their multimorbidities, one third of the group interviewed were regular practitioners of physical activity. Walking was the most frequent activity, coinciding with the findings of the healthy aging profile of elderly Brazilian octogenarians[2].

However, octogenarians evaluated their satisfaction with primary healthcare services as *favorable* (all Md≥5), representing satisfaction. The information obtained shows that satisfaction with the work of the Nursing team and CHAs is greater. Literature shows that such a situation may be related to the care that these professionals provide to long-lived older adults, listening to their problems and giving them clear guidance on how to manage the health service[6,8,11,19].

This fact can be related to the specificity of the work process in the FHS, which puts these workers, nursing staff and CHAs in constant contact with the population and on the front lines of care[20]. It is these workers who usually carry out the screening of care needs and intake, and who make the most use of home visits in their work. This explains the importance of understanding the satisfaction expressed by octogenarians in relation to these workers[21,22].

Satisfaction with services can result from interpersonal relationships between professionals and patients, from the users' own social representations in relation to the health-disease process, as well as aspects related to the infrastructure of services. When attempting to understand the satisfaction of older adults with the FHS in the city of Fortaleza (Ceará), it was found that a large part of the participants (82.1%) were satisfied with aspects related to the care provided by these professionals, with good service and a bond with the professionals of the unit[2].

A study that evaluated the degree of satisfaction of older adults with CHAs identified that the greatest satisfaction with these professionals was related to the domain of trust[23], which corroborates the findings of the present study in relation to the greater satisfaction of the octogenarians with these healthcare workers, as a result of the care undertaken in their work.

It is essential that the professional practices of those inserted in the PHC is humanized, with a welcoming manner that creates bonds[4,9,17]. A good relationship between users and health professionals is associated with the likelihood of generating greater satisfaction with the service, including the care of professionals who work in the reception of the units, a flexible waiting system with short waits for consultations and good relationships with professionals[24]. The interactions between professional and patient can contribute to long-term affective approximation, which can be a facilitator with regard to the users' perception of the effectiveness of the FHS.

The point of greatest dissatisfaction revealed by the group of octogenarians was the time spent waiting for care, represented by the time of arrival at the unit until the appointment with the scheduled

health professional (Nursing Md = 4.6 Q25-Q75 = 4-6; Doctors Md = 4.9 Q25-Q75 = 4-6). The delay in being seen, whether for a spontaneous health service or a previously scheduled appointment, has been identified as a constraining factor with other primary care teams, as noted in João Pessoa (Paraíba)[25].

It is recommended by the national primary care policy that the work process of the FHS teams be carried out in accordance with the population's health needs, based on humanized intake, active listening and responsibility for resolving spontaneous needs and the priority provision of emergency care. Thus, it is expected that in addition to the activities previously scheduled by the services, PHC will be able to meet the spontaneous demands of its users in order to guarantee its role as the organizer of the actions and services that are part of the HCN (Healthcare Network, or RAS)[26]. Evidence[26-28] has shown that the lengthy wait for consultations and the dissatisfaction with how reception for spontaneous needs for PHC services is handled are aspects of fragility and dissatisfaction with the service, which may lead users to seek care at other HCN points.

Another weak point is related to the unit's facilities and its suitability for the disabled. In Recife (Pernambuco), a similar reality was identified, with older adults in this location demonstrating reduced satisfaction with the physical and infrastructure conditions of the units. Poor accessibility, limitations in comfort and hygiene conditions are the most critical aspects pointed out by the group of older adults in Recife[29].

When assessing the expectations and experiences of older users of PHC services in the province of KwaZulu-Natal, in South Africa, aspects of dissatisfaction were identified as the delay in waiting for appointments, a model of care based on diseases, the absence of a bond with health professionals and the need to create priority access for this group[30].

One of the benefits of this study is for health professionals, especially those inserted in the PHC context, who must take into account the perspective of users when planning their actions. The evaluation of the quality of health services, from the perspective of users, is capable of instituting changes and overcoming the hegemonic biomedical model, in addition to directing actions to make sense of the unique realities of life of long-lived older users.

A study undertaken with older users of PHC services in João Pessoa (Paraíba) identified as aspects of dissatisfaction of older adults with PHC services, the speed and completion of scheduling appointments, lack of comfort in the facilities of the unit, the commitment of the healthcare team to solving their problems and the team's knowledge about their health problems and needs, findings that corroborate those of this study[31].

Although PHC services should consider health actions for the elderly population in a comprehensive manner, there is a greater concentration of activities related to chronic non-communicable diseases. When assessing the performance of comprehensive care for the elderly in PHC services in health regions in the center-west region of São Paulo, a predominance of actions based on the hegemonic biomedical model was identified and health promotion and prevention actions are implemented in a scarce and inefficient manner. When such actions are undertaken, they are aimed at controlling systemic arterial hypertension and diabetes *mellitus*[11].

In this context, there is a disconnect between what the service provided to the older population as recommended by the National Policy for Older Adults and the actions implemented in practice, since it is expected that the service provided to this group goes beyond the process of the treatment of pathologies, and towards the development of healthy aging with quality of life[2,5,9,11].

Another contribution is related to the guidelines for local health management in the city where the study is being carried out, so that organization strategies are continuously improved in order to generate more purposeful responses from health services to the long-lived population[29]. Furthermore the FHS teams themselves, through the findings of this study, can realign their work strategies to provide a better intake process and resolve the demands of the age group of long-lived older adults.

Studies involving octogenarians are scarce - given the difficulties in accessing this population caused by the aging process itself. This makes the findings of the present study relevant in contributing to the understanding of the phenomenon studied.

Furthermore, although the results of the analyzes undertaken are descriptive, without the establishment of causal relationships, they can contribute to future studies, in particular by supporting sample calculations in population-based studies with octogenarians. The fact that non-probabilistic sampling was used, as well as the possibility of memory bias, must also be highlighted.

It is expected that future research will recognize whether there is a common pattern between satisfaction with PHC services among long-lived older adults in population-based studies, in addition to establishing relationships between sociodemographic and clinical aspects and service satisfaction. There should also be an analysis of what actions have been carried out by the health teams and the initiatives offered to long-lived older adults, that address their satisfaction with health services.

CONCLUSION

In general, the octogenarians favorably evaluated the primary care services with which they had contact, with the aspects of dissatisfaction related to the delay in receiving care and the infrastructure of the unit. The aspects of satisfaction were related to the fact that the team of Community Health Agents are attentive, explain what should be done, are interested in their problems and are available.

The results contribute in a purposeful way to the management, improvement and training of health services, as well as supporting the working process, reaffirming the importance of the participation of octogenarians in the evaluation of health services.

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REFERENCES

1. Instituto Brasileiro de Geografia e Estatística. Projeção da população do Brasil por sexo e idade 2000-2060 [Internet]. Rio de Janeiro: IBGE; 2013 [acesso em 05 jul. 2019].Disponível em: ftp://ftp.ibge.gov.br/Projecao_da_Populacao/Projecao_da_Populacao_2013/nota_metodologica_2013.pdf

2. Campos ACV, Ferreira EF, Vargas AMD, Gonçalves LHT. Perfil do envelhecimento saudável de idosos brasileiros octogenários. Rev Latinoam Enferm [Internet]. 2016 [acesso em 10 jul. 2019];24:e2724 [11]. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692016000100398&lng=pt&nrm=iso&tlng=pt

3. Fernandes DS, Gonçalves LHT, Ferreira AMR, Santos MIPO. Avaliação da capacidade funcional de idosos longevos amazônidas. Rev Bras Enferm [Internet]. 2019 [acesso em 17 abr 2020];72(Suppl 2):55-61. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672019000800049&lng=pt&tlng=pt

4. Rêgo AS, Rissardo LK, Scolari GAS, Sanches RCN, Carreira L, Radovanovic CAT. Fatores associados ao atendimento a idosos por condições sensíveis à Atenção Primária à Saúde. Rev Bras Geriatr Gerontol [Internet]. 2017 [aceso em 10 jul. 2019];20(6):778-89. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1809-98232017000600773&lng=en&tlng=pt

5. Brasil. Ministério da Saúde, Departamento de Atenção Básica, Secretaria de Atenção à Saúde. Envelhecimento e saúde da pessoa idosa. Brasília, DF: MS; 2006. (Cadernos de atenção básica, nº 19)

6. Sória GS, Nunes BP, Bavaresco CS, Vieira LS, Facchini LA. Acesso e utilização dos serviços de saúde bucal por idosos de Pelotas, Rio Grande do Sul, Brasil. Cad Saúde Pública [Internet]. 2019 [acesso em 17 abr. 2020];35(4):e00191718 [12 p.]. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2019000405011

7. Veras RP, Oliveira M. Envelhecer no Brasil: a construção de um modelo de cuidado. Ciênc Saúde Colet [Internet]. 2018 [aceso em 10 jul. 2019];23(6):1929-38. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232018000601929

8. Lima JG, Giovanella L, Fausto MCR, Bousquat A, Silva EV. Atributos essenciais da Atenção Primária à Saúde: resultados nacionais do PMAQ-AB. Saúde Debate [Internet]. 2018 [acesso em 29 jun. 2019];42(esp.):52-6. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-11042018000500052

9. Camargo FC, Garcia LAA, Walsh IAP, Emílio MM, Coelho VHM, Pereira GA. Formação para o trabalho na estratégia saúde da família: experiência da residência multiprofissional em saúde. Rev Enferm Atenção Saúde [Internet]. 2018 [acesso em 11 set. 2019];7(1):190-9. Disponível em: http://seer.uftm.edu.br/revistaeletronica/index.php/enfer/article/view/2127

10. Navathe AS, Emanuel EJ, Bond A, Linn K, Caldarella K, Troxel A. Association between the implementation of a population-based Primary Care Payment System and achievement on quality measures in Hawaii. JAMA. 2019;322(1):57-68.

11. Placideli N, Castanheira ERL, Dias A, Silva PA, Carrapato JLF, Sanine PR, et al. Avaliação da atenção integral ao idoso em serviços de atenção primária. Rev Saúde Pública [Internet]. 2020 [acesso em 17 abr. 2020];54:1-13. Disponível em: http://www.rsp.fsp.usp.br/artigo/avaliacao-da-atencao-integral-ao-idoso-em-servicos-de-atencao-primaria/

12. Brasil. Ministério da Saúde. DATASUS. Informações de Saúde, Informações demográficas e socioeconômicas. Brasília,DF: MS; 2019.

13. Nardelli GG, Gaudenci EM, Silveira RE, Garcia LAA, Malaquias BSS, Santos ASS. Knowledge about HIV/AIDS in older adults using the services of Family Health Strategy. Rev Soc Bras Med Trop [Internet]. 2019 [acesso em 11 set. 2019];52:e20180355 [5 p.]. Disponível em: https://rsbmt.org.br/2019/07/11/knowledge-about-hiv-aids-in-older-adults-using-the-services-of-family-health-strategy/

14. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Suggestions for utilization of the mini-mental state examination in Brazil. Arq Neuropsiquiatr. 2003;61:777-81.

15. Paz EPA, Parreira PMSD, Lobo AJS, Palasson RR, Farias SNP. Adaptação transcultural do questionário de satisfação com os cuidados primários de saúde. Acta Paul Enferm [Internet]. 2014 [acesso em 13 mar. 2016];27(5):419-26. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002014000500006&lng=en&nrm=iso&tlng=pt

16. Tavares DMS, Ribeiro AG, Ferreira PCS, Martins NPF, Pegorari MS. Idosos octogenários nos contextos urbano e rural: comparação socioeconômica, morbidades e qualidade de vida. Rev Enferm UERJ [Internet]. 2015 [acesso em 29 ago. 2019];23(2):156-63. Disponível em: https://www.e-publicacoes.uerj.br/index.php/enfermagemuerj/article/view/5961

17. Augusto DK, Lima-Costa MF, Macinko J, Peixoto SV. Fatores associados à avaliação da qualidade da atenção primária à saúde por idosos residentes na Região Metropolitana de Belo Horizonte, Minas Gerais, 2010. Epidemiol Serv Saúde [Internet]. 2019 [acesso em 24 jul. 2019];28(1):e2018128 [11 p.]. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S2237-96222019000100316

18. Tavares DMS, Ferreira PCS, Dias FA, Oliveira PB. Caracterização e distribuição espacial de homens octogenários. Rev Enferm UERJ [Internet]. 2014 [acesso em 12 set. 2019]; 22(4):558-64. Disponível em: https://www.e-publicacoes.uerj.br/index.php/enfermagemuerj/article/view/15425

19. Pilger C, Menon UM, Mathias TAF. Utilização de serviços de saúde por idosos vivendo na comunidade. Rev Esc Enferm USP [Internet]. 2013 [acesso em 11 set. 2019];47(1):213-20. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0080-62342013000100027&lng=pt&tlng=pt

20. Ferreira SRS, Périco LAD, Dias VRFG. A complexidade do trabalho do enfermeiro na Atenção Primária à Saúde. Rev Bras Enferm [Internet]. 2018 [acesso em 22 ago. 2019];71(supl1):752-7. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672018000700704&lng=en&tlng=pt

21. Galavote HS, Zandonade E, Garcia ACP, Freitas PSS, Seidl H, Contarato PC. O trabalho do enfermeiro na atenção primária à saúde. Esc Anna Nery [Internet]. 2016 [acesso 13 mar. 2019];20(1):90-8. Disponível em: http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1414-81452016000100090&lng=en&tlng=pt

22. Kahl C, Meirelles BHS, Lanzoni GMM, Koerich C, Cunha KS. Actions and interactions in clinical nursing practice in Primary Health Care. Rev Esc Enferm USP [Internet]. 2018 [acesso em 12 set. 2019];52:e03327 [7 p.]. Disponível em: http://www.scielo.br/scielo.php?script=sci_abstract&pid=S0080-62342018000100415&lng=en&tlng=en

23. Bordin D, Fadel CB, Moimaz SAS, Garbin CAS, Saliba NA. Estudo comparativo da satisfação de usuários e profissionais da saúde com o serviço público odontológico. Ciênc Saúde Colet [Internet]. 2017 [acesso em 18 abr. 2020];22(1):151-60. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232017000100151

24. Arruda CAM, Bosi MLM. User's satisfaction of primary health care: a qualitative study in the Northeast of Brazil. Interface (Botucatu) [online]. 2017 [acesso em 29 dez. 2017];21(61):321-32. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-32832017000200321&lng=pt&tlng=pt

25. Santiago RF, Mendes ACG, Miranda GMD, Duarte PO, Furtado BMASM, Souza WV. Qualidade do atendimento nas Unidades de Saúde da Família no município de Recife: a percepção do usuários. Ciênc Saúde Colet [Internet]. 2013 [acesso em 29 dez. 2018];18(1):35-44. Disponível em: https://www.scielosp.org/article/csc/2013.v18n1/35-44/

26. Dias OV, Araújo FF, Oliveira RM, Chagas RB, Costa SM. Acesso às consultas médicas nos serviços públicos de saúde. Rev Bras Med Fam Comunidade [Internet]. 2016 [acesso em 01 maio 2020];11(38):1-13. Disponível em: https://rbmfc.emnuvens.com.br/rbmfc/article/view/1185

27. Souza ROA, Machado CV, Noronha MF. Desafios da gestão municipal da atenção básica em saúde no Brasil: um estudo de caso. Rev APS [Internet]. 2015 [acesso em 01 maio 2020];18(2):166-79. Disponível em: https://periodicos.ufjf.br/index.php/aps/article/view/15584

28. Gomide MFS, Pinto IC, Bulgarelli AF, Santos ALP, Gallardo MPS. User satisfaction with primary health care: an analysis of access and care. Interface (Botucatu) [Internet] 2018 [acesso em 01 maio 2020];22(65):387-98. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-32832018000200387

29. Ravioli AF, Soárez PC, Scheffer MC. Modalidades de gestão de serviços no Sistema Único de Saúde: revisão narrativa da produção científica da Saúde Coletiva no Brasil (2005-2016). Cad Saúde Pública [Internet]. 2018 [acesso em 23 jun. 2019];34(3):e00114217 [16 p.]. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2018000402001

30. Naidoo K, Wyk J. What the elderly experience and expect from primary care services in KwaZulu-Natal, South Africa. Afr J Prim Health Care Fam Med (Online) [Internet]. 2019 [acesso em 18 abr. 2020];11(1):1-10. Disponível em: https://phcfm.org/index.php/phcfm/article/view/2100/3413

31. Andrade LAF, Salazar PEL, Leopoldino KDM, Montenegro CB. Avaliação da qualidade da atenção primária à saúde segundo o nível de satisfação dos idosos. Rev Gaúcha Enferm [Internet]. 2019 [acesso em 18 ab.r 2020];40:e20180389 [10 p.]. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1983-14472019000100428

Sociodemographic and clinical functional factors in pre-frail and frail older adults with type 2 Diabetes Mellitus in relation to low levels of physical activity

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Abstract

Objective: To determine the sociodemographic and clinical-functional factors related to low levels of physical activity in pre-frail and frail older adults with type 2 diabetes mellitus (DM2). *Method:* an observational, analytical, cross-sectional study was performed. The sample consisted of older adults aged 60 years or over with a clinical diagnosis of DM2 who were treated at the Onofre Lopes University Hospital (or HUOL). Sociodemographic and clinical-functional data were evaluated with the following instruments: the Timed Up and Go (TUG) test, the Mini Mental State Examination (MMSE), the 15-item Geriatric Depression Scale (GDS), the International Physical Activity Questionnaire (IPAQ) and the frailty phenotype. The Chi-square and Mann Whitney tests were used for data analysis. *Results:* the study sample consisted of 113 individuals classified as pre-frail (52.2%) and frail (47.8%). Low levels of physical activity were verified in 79.6% of the sample. The most closely related variables that showed a statistically significant difference with low levels of physical activity were: years of schooling (p=0.02), social participation (p=0.005), insulin therapy (p=0.02), pain in the lower limbs (p=0.03) and depressive symptoms (p=0.04). Also, significant differences were found between low levels of physical activity and age (p=0.04) and years of schooling (p=0.05). *Conclusions:* Low levels of physical activity are associated with certain sociodemographic and clinical-functional factors, some of which are modifiable. Identifying these is important for the development of appropriate health interventions for the prevention and treatment of both DM2 and the Frailty Syndrome (FS).

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INTRODUCTION

Diabetes Mellitus (DM) is a chronic non-communicable diseases (NCDs), a group of illnesses which represent a significant global cause of morbidity and mortality. In 1990, according to data from the Global Disease Burden Study, NCDs accounted for 43% of disability adjusted life years (DALY), with this level rising to 54% in 2010[1].

With population aging, the increased prevalences of obesity, sedentary lifestyles and the urbanization process are considered factors responsible for the global increase in the incidence and prevalence of DM[2].

Type 2 Diabetes Mellitus (DM2) is one of the most prevalent NCDs, corresponding to approximately 90% of all cases of diabetes[1]. It is a metabolic, chronic and non-communicable disease that acts in a deleterious manner, generating blood hyperglycemia and causing damage to organs and systems, especially in the cardiac, visual, renal and nervous systems, which leads to morbidity and increased mortality[3].

In addition to DM2, Frailty Syndrome (FS) is a notable chronic disease that occurs with the decline in homeostatic reserve capacity and deficits in resistance to stressors[3]. This culminates in susceptibility and the decline of multiple physiological systems[4], which leads to a reduction in the muscle mass of older adults and a chronic inflammatory state, which, when associated with diseases and other extrinsic factors, leads to a reduction in energy reserves and increased physical vulnerability[5].

FS is a condition that generates multimorbidities, and is related to sociodemographic factors (the female sex, increased age) and functional clinical factors (reduction of cognitive status, polypharmacy, sarcopenia, falls, among others)[6]. The most common way of measuring its characteristics is based on the frailty phenotype (genetic characteristics associated with interaction with the environment), which describes the main findings about the disease to classify older adults as non-frail, pre-frail and frail[7].

A pathophysiological mechanism common to FS and DM2, which permeates the limits of effective functionality, is sarcopenia. Muscle decline is the main cause of weakness and slowness, culminating in loss of mobility until falls occur[8]. Sarcopenia forms a FS tripod with neuroendocrine deregulation and immune dysfunction[9], and may be present in individuals with more advanced diabetes, in which there is an increase in insulin resistance with aging, decreased physical activity, increased visceral fat and, consequently, a reduction of muscle mass[10].

As the two diseases mentioned above have similar risk factors in several aspects, the treatment of one effects the containment of the other[4]. FS combined with DM2 may result in malnutrition, immobility, balance deficit, dependence in activities of daily living, contractures, deformities, incontinence, hospitalization with an outcome of institutionalization, cognitive deficit and depressive symptoms[7].

When an individual is diagnosed with FS, they can control their activities and care to improve the symptoms presented. A reduction in the regular practice of physical activity is a potentiating factor of the problems caused by DM2[10] and is considered one of the predictors of the frailty phenotype[7]. Therefore, verifying modifiable related factors associated with these chronic diseases, such as a low level of physical activity (LLPA), may guide therapies that prevent and/or contain their progress among this population.

In addition, there is a scarcity of Brazilian studies that investigate the relationship between DM2 and FS and the specific characteristics of the two diseases. Furthermore, the participants of the present study were outpatients, a fact that allows the control of variables in a more reliable manner, with the manipulation of variables of various categories that care in a high complexity hospital can have.

The aim of the present study was therefore to determine the sociodemographic and clinical-functional factors related to LLPA in pre-frail and frail older adults with DM2.

METHOD

An observational, cross-sectional and analytical study was carried out at the Laboratory of Technological Innovation in Health (or LAIS) of

the Onofre Lopes University Hospital (or HUOL). The data were collected from February 2016 to February 2018.

The study population consisted of older adults living in the metropolitan region of the city of Natal (Rio Grande do Norte), Brazil, aged 60 years or older with a clinical diagnosis of DM2 according to criteria of the American Diabetes Association (ADA), of both sexes, referred by the Endocrinology and Geriatrics sectors of the HUOL.

The study was approved by the Ethics Committee on Research with Human Beings of the institution and approved under opinion number 1.808.219.

A power of 80% and a significance level of 5% were used to perform the sample calculation for the two-tailed hypothesis tests. Of the variables with the greatest statistical significance for the sample (schooling, social participation, insulin use, lower limb pain, depressive symptoms, age), the largest sample size was for "income", with 123 individuals, avoiding possible β errors in variables that are close to significance. Therefore, the sample consisted of 125 older adults (n=125), based on the sample calculation.

The present study included subjects aged 60 years or older, of both sexes, who could walk freely without an auxiliary device, without amputation of the lower limbs or upper limbs above the level of the metatarsophalangeal and metacarpophalangeal joints, with a clinical diagnosis of DM2 according to the ADA criteria[11], and who fit the phenotype of frail or pre-frail[7].

Older adults who could not perform all the tests proposed in the evaluation or who exhibited discomfort that made the tests unfeasible were excluded.

After routine consultations of the older adults in the endocrinology and geriatric outpatient clinics and the clinical diagnosis of DM2, the physician responsible for the consultation advised their patients of the need for an evaluation focusing on this disorder, and invited them to seek evaluation through the Medical and Statistical Archive Service (or SAME) or directly at the LAIS.

This evaluation was performed by a team of six previously trained researchers. Participants were instructed to attend the LAIS on a previously arranged date and time, with the name of the medications used in the week of evaluation and their most recent blood tests. Participants who met the eligibility criteria signed an informed consent form (ICF) after the objectives, protocols and possible risks of the research were explained.

An interview was conducted to obtain the sociodemographic and clinical-functional data. The evaluations lasted about an hour, and included physical and cognitive tests to minimize the tiredness of the participants.

The sociodemographic data were composed of the following variables: sex (female/male), age, age group (60-69 years/70 years or more), marital status (married or not married), years of schooling (up to four years (incomplete) and equal to or greater than four years), income (reference values of the salary floor of the northeast region of Brazil updated for 2017, of up to two minimum wages/three or more minimum wages) and social participation (participates/does not participate in community activities).

The clinical-functional factors evaluated were body mass index (BMI), number of associated diseases, number of medications, time since diagnosis of DM2, previous six months' laboratory tests for the control of DM2 (fasting glycemia and glycated hemoglobin), use of insulin, presence of lower limb pain (LL), falls in the previous year. We also used the Timed Up And Go (TUG) test, the Mini Mental State Examination (MMSE), the 15-item Geriatric Depression Scale (GDS) and the International Physical Activity Questionnaire - short version (IPAQ).

The TUG is a practical and quick test that aims to evaluate the mobility and functional balance of older adults. The test consists of the individual getting up from a chair with armrests (46 cm high), walking for three meters, turning around a cone, returning to the chair and their initial position, where the task finishes. The older adult only starts the test following a positive sign from the instructor and is instructed not to talk during the test and to walk at their usual speed. If necessary an auxiliary walking device can be used, however no physical assistance

is given. The test analyzes the time in seconds that the older adult needs to perform the proposed task. Individuals at a higher risk of falls take longer to perform the test (higher risk of falls - time equal to or greater than 13 seconds)[12,13].

The MMSE was used to track cognitive impairment that may cause difficulties for the participants' understanding of commands. This evaluates temporal/spatial orientation, immediate memory, calculation, word recall, naming, repetition, commands, reading, sentence writing, and drawing copies. The median scores based on schooling are: illiterate 20; one-four years of schooling 25; five-eight years of schooling 26.5; nine-eleven years of schooling 28 and over eleven years of schooling 29 [14,15].

The GDS-15 was used to track symptoms of depression in participants, and contains 15 different items. A score from zero to four points indicates that the participant does not have depressive symptoms; five to ten points means there are indications of mild or moderate depression; and from eleven to fifteen points, evidence of severe or severe depression. It is important to emphasize that this instrument is not capable of generating a diagnosis of depression[16].

The IPAQ – short version assesses level of physical activity and contains three questions regarding the weekly frequency and duration in minutes, per day, of physical activity, and the intensity level (vigorous, moderate or walking). It also evaluates the time the individual spends sitting. This questionnaire was validated for the Brazilian population by Matsudo et al.[17]. The IPAQ classified the older adults as follows: very active; active; irregularly active; irregularly active A; irregularly active B; sedentary.

The older adults who were considered as irregularly active or sedentary presented a phenotype of low level of physical activity as positive[17].

The frailty phenotype was evaluated according to the study by Fried, Tangen and Walston[7], to classify the elderly as "non-frail", "pre-frail" and "frail". The evaluation criteria are described below: unintentional weight loss (≥4.5 kg or ≥5% of weight in the previous year); decrease in grip strength using the SH5002 Smedley-Saehaen Manual Dynamometer

(dominant hand), with cut-off points adjusted for sex and BMI; exhaustion through self-reporting of fatigue, measured by two questions from the Center for Epidemiological Studies (CES-D), described by Batistoni, Neri and Cupertino[18]: "I felt that I had to make an effort to do my usual tasks" and "I could not carry out my activities". Older adults who obtained a score of three or four in any of the questions met the criterion.

LLPA was measured by the short version of the International Physical Activity Questionnaire (IPAQ); and a decrease in gait speed calculated through the time in seconds needed to travel 4.6 meters, adjusted for sex and height.

With the phenotype, the older adults are considered frail if they present three or more positive criteria, pre-frail if they present one or two positive criteria and non-frail if they present no positive criteria[7].

Analysis of the normality of data distribution was performed by the Kolmogorov-Smirnov test, and nonparametric distribution was found.

Descriptive analysis of the data was performed. The inferential analysis was carried out through associations between the dependent qualitative variable (level of physical activity) and the independent dichotomous variables using the Chi-square test. The association between the level of physical activity with the quantitative variables was performed by the Mann-Whitney test. A significance level of 5% was adopted.

RESULTS

A total of 125 individuals were evaluated, of whom 12 were excluded for not having the frailty phenotype. The study had a sample of 113 subjects, of whom 59 (52,2%) were characterized as pre-frail and 54 (47.8%) as frail, and 90 of whom had LLPA. The mean age of the sample was 68.6 (±6.62 years); the predominant sex was female (61.9%); the mean schooling was 6.65 years (±5.11 years of schooling) and the average income of the sample was R$2,367.74 reais/month. A total of 79.6% (n=90) of the total population had LLPA.

Table 1 presents the sociodemographic and clinical-functional characterization of the sample. Most of the participants were sedentary women (63.3%), with a low level of schooling (65.6%), who were overweight (60.0%), had five or more associated diseases (58.9%), used five or more medications (58.9%), did not use insulin (75,6%), felt pain in lower limbs (58.9%) and had depressive symptoms (62.2%).

Table 2 shows the relationship between LLPA and sociodemographic and clinical-functional variables. The results showed that LLPA is present in older adults with low levels of schooling, who do not participate in community activities, do not use insulin, have lower limb pain and depressive symptoms.

Table 3 shows the values found in the relationship between LLPA and the quantitative sociodemographic and clinical-functional variables (Mann-Whitney test). The results show that age and years of schooling are related to LLPA.

Table 1. Sociodemographic and clinical-functional characterization of the sample of pre-frail and frail older adults with type 2 Diabetes Mellitus, according to Low Level of Physical Activity (n=113). Natal, Rio Grande do Norte, 2019.

Variables	Low level of physical activity	
	Yes n=90 (79.6%)	No n=23 (20.4%)
Sex (n=113)		
Female	57 (63.3%)	13 (56.5%)
Male	33 (36.7%)	10 (43.5%)
Age group (n=113)		
60-69 years	51 (61.1%)	16 (69.9%)
70 years or more	35 (38.9%)	07 (30.4%)
Marital status (n=113)		
Married	56 (62.2%)	18 (78.3%)
Not married	34 (37.8%)	05 (21.7%)
Years of schooling (n=113)		
Up to 4 years (incomplete)	59 (65.6%)	09 (39.1%)
4 years or more	31 (34.4%)	14 (60.9%)
Income		
Up to 2 minimum wages	53 (58.9%)	09 (39.1%)
3 or more minimum wages	37 (41.1%)	14 (60.9%)
Social participation		
Participates in community activities	45 (50.0%)	19 (82.6%)
Does not participate in community activities	45 (50.0%)	04 (17.4%)
Body mass index		
Undernourished or normal weight	36 (40.0%)	08 (34.8%)
Overweight	54 (60.0%)	15 (65.2%)
Number of diseases		
1 to 4	33 (36.7%)	06 (26.1%)
5 or more	57 (63.3%)	17 (73.9%)
Number of medicines (n=110)		
1 to 4	35 (38.9%)	07 (31.8%)
5 or more	53 (58.9%)	15 (68.2%)

to be continued

Continuation of Table 1

Variables	Low level of physical activity	
	Yes n=90 (79.6%)	No n=23 (20.4%)
Time since diagnosis (n=108)		
0 to 5 years	36 (41.9%)	05 (22.7%)
6 or more years	50 (55.6%)	17 (77.3%)
Glycated hemoglobin (n=82)		
Normal (up to 8%)	33 (50.0%)	11 (68.8%)
Alter (8.1% or more)	33 (50.0%)	05 (31.3%)
Fasting glycemia (n=108)		
Normal (0-130mg/dL)	43 (50.0%)	12 (54.5%)
Altered (131 mg/dL or more)	43 (50.0%)	10 (45.5%)
Insulin use		
Yes	22 (24.4%)	11 (47.8%)
No	68 (75.6%)	12 (52.2%)
Pain in lower limbs (n=113)		
Yes	53 (58.9%)	08 (34.8%)
No	37 (41.1%)	15 (65.2%)
Falls in the last year (n=113)		
Yes	33 (36.7%)	08 (34.8%)
No	57 (63.3%)	15 (65.2%)
Mini Mental State Examination (n=113)		
Presents cognitive deficit	35 (38.9%)	11 (47.8%)
Does not present cognitive deficit	55 (61.1%)	12 (52.2%)
Depressive symptoms (n=113)		
Presents depressive symptoms	56 (62.2%)	09 (39.1%)
Does not have depressive symptoms	34 (37.8%)	14 (60.9%)
Risk of falls (n=106)		
Lower risk of falls	67 (78.8%)	19 (90.5%)
Increased risk of falls	18 (21.2%)	02 (09.5%)

Source: Study data, 2019.

Table 2. Analysis of low level of physical activity with sociodemographic and clinical-functional variables categorical dichotomous of the sample of older adults with Type 2 Diabetes Mellitus. Natal, Rio Grande do Norte, 2019.

Variables	Low level of physical activity			
	Yes n (%)	No n (%)	p-value	OR (CI: 95%)
Sex				
Female	57 (50.4%)	13 (11.5%)	0.54	0.75 (0.29-1.90)
Male	33 (29.2%)	10 (8.8%)		
Age group (in years)				
60-69	55 (48.7%)	16 (14.2%)	0.45	0.68 (0.25-1.83)
70 or more	35 (31.0%)	07 (6.2%)		

to be continued

Continuation of Table 2

| Variables | Low level of physical activity | | | |
| | Yes | No | | |
	n (%)	n (%)	p-value	OR (CI: 95%)
Marital status				
Not married	34 (30.1%)	05 (4.4%)	0.14	2.18 (0.74-6.42)
Married	56 (49.6%)	18 (15.9%)		
Years of schooling				
Up to 4 (incomplete)	59 (52.2%)	09 (8.0%)	**0.02***	2.96 (1.15-7.60)
4 years or older	31 (27.4%)	14 (12.4%)		
Income (minimum wages)				
0-2	53 (43.9%)	09 (8.0%)	0.08	2.22 (0.87-5.68)
3 or more	37(32.7%)	14 (12.4%)		
Social participation				
Participates in community activities	45 (39.8%)	19 (16.8%)	**0.005***	0.21 (0.06-0.66)
Does not participate in community activities	45 (39.8%)	04 (3.5%)		
Body mass index				
Undernourished or normal weight	36 (31.9%)	08 (7.1%)	0.64	1.25 (0.48-3.25)
Overweight	54 (47.8%)	15 (13.3%)		
Number of diseases				
1 to 4	33 (29.2%)	06 (5.3%)	0.34	1.64 (0.58-4.57)
5 or more	57 (50.4%)	17 (15.0%)		
Number of medicines				
1 to 4	35 (31.8%)	07 (6.4%)	0.49	1.41 (0.52-3.82)
5 or more	53 (48.2%)	15 (13.6%)		
Time since diagnosis				
0 to 5 years	36 (33.3%)	05 (4.6%)	0.09	2.44 (0.82-7.24)
6 or more years	50 (46.3%	17 (15.7%)		
Glycated hemoglobin				
Normal (up to 8%)	33 (40.2%)	11 (13.4%)	0.17	0.45 (0.14-1.45)
Altered (8.1% or more)	33 (40.2%)	05 (6.1%)		
Fasting glycemia				
Normal (0-130mg/dL)	43 (39.8%)	12 (11.1%)	0.70	0.83 (0.32-2.13)
Altered (131 mg/dL or more)	43 (39.8%)	10 (9.3%)		
Insulin use				
Yes	22 (19.5%)	11 (9.7%)	**0.02***	0.35 (0.13-0.91)
No	68 (60.2%)	12 (10.6%)		
Pain in lower limbs				
Yes	53 (46.9%)	08 (7.1%)	**0.03***	2.68 (1.03-6.98)
No	37 (32.7%)	15 (13.3%)		
Falls in recent years				
Yes	33 (29.2%)	08 (7.1%)	0.86	0.92 (0.35-2.40)
No	57 (50.4%)	15 (13.3%)		

to be continued

Continuation of Table 2

| Variables | Low level of physical activity | | | |
| | Yes | No | | |
	n (%)	n (%)	*p*-value	OR (CI: 95%)
Mini Mental State Examination				
Presents cognitive deficit	35 (31.0%)	11 (9.7%)	0.43	0.69 (0.27-1.74)
Does not present cognitive deficit	55 (48.7%)	12 (10.6%)		
Depressive symptoms				
Presents depressive symptoms	56 (49.6%)	09 (8.0%)	**0.04***	2.56 (1.00-6.55)
Does not have depressive symptoms	34 (30.1%)	14 (12.4%)		
Risk of falls				
Lower risk of falls	67 (63.2%)	19 (17.9%)	0.22	0.39 (0.08-1.84)
Increased risk of falls	18 (17.0%)	2 (1.9%)		

*statistically significant values ($p \leq 0.05$).

Source: Study data, 2019.

Table 3. Relationship between low level of physical activity and quantitative sociodemographic and clinical-functional variables of a sample of older adults with type 2 Diabetes Mellitus. Natal, Rio Grande do Norte, 2019.

Variables	Low level of physical activity	N	Median (±sd)	Variation	*p*-value
Age	Yes	90	68 (6.62)	60-86	0.04
	No	23			
Years of schooling	Yes	90	6 (5.11)	0-21	0.05
	No	23			
Income	Yes	90	1874 (1385.90)	700-7000	0.36
	No	23			
Body mass index	Yes	90	28.4 (4.45)	16.8-41.6	0.53
	No	23			
Number of medicines	Yes	90	5 (2.94)	0-14	0.70
	No	23			
Time since diagnosis	Yes	86	10 (10.67)	1-50	0.45
	No	22			
Glycated hemoglobin	Yes	66	7.6 (10.69)	5.0-10.6	0.38
	No	16			
Fasting glycemia	Yes	86	129 (76.39)	66-532	0.29
	No	22			
Mini Mental State Examination	Yes	90	25 (4.22)	14-30	0.68
	No	23			
Geriatric Depression Scale of 15 items	Yes	90	5 (2.92)	0-14	0.10
	No	23			
Timed Up And Go Test	Yes	85	10.06 (9.67)	6.11-29.0	0.45
	No	22			

Source: Study data, 2019.

DISCUSSION

In the present study, it was identified that 47.8% of the sample was considered frail and 79.6% had LLPA. LLPA contributes to an increased risk of being frail and older adults considered frail suffer a decline in muscle strength, reduced gait speed and low tolerance to exercise[3]. This confirms the importance of emphasizing the adoption of healthy life habits among this population[19], such as the regular practice of physical exercise, especially resistance training (RT), which is essential for the maintenance, gain or reduction of loss of muscle mass and strength, mobility and functional capacity of older adults[20]. A healthy lifestyle can help control and protect against NCDs and it is essential that health professionals provide guidance at both primary and secondary levels of health care through strategies such as health education groups and interventions that can introduce physical exercise into the daily life of this population[21].

A total of 63.6% of the sample with LLPA were women. It has been observed that women seek health services more frequently and this fact may have influenced such predominance, as the sample is from a specialized health unit. In a study that verified the difficulties and motivations involved in physical exercise among older women, it was found that women in this age group have a poor perception of their health status and perceive that they have limitations, so there is a greater distrust of performing physical exercise. In addition, they consider themselves "caregivers" of the family, so self-care is not a priority[22]. On the other hand, if educational actions are carried out that can explain the health and disease process, and how physical exercise can bring benefits by reducing these limitations, stimulating socialization, and improving and/or maintaining autonomy, there is a change in perception[22].

Regarding the years of schooling of the sample, there was statistical significance between years of schooling and a LLPA (p=0.02). In addition, 52.2% of the sample had up to four years of schooling. This low level of education was considered a risk factor for the development of LLPA. The data on schooling found in the present study are equivalent to that of older Brazilians. These findings reinforce that the lower the education of the older adult, the lower their adherence to physical activity, which may contribute to a worsening of health conditions[23].

It is up to health professionals to guide older adults on the importance of regular physical activity, as this is paramount for maintaining their functional capacity. It is related to a better perception of quality of life, since the functional limitations of elderly people interfere in their autonomy for performing activities of daily living[24].

In a study conducted in Brazil with data from the National Health Survey (2013), it was observed that illiterate older adults tend to have poor self-perception of their health. In addition, schooling acts as a protective factor in relation to the health of the individual, with regard to obtaining knowledge and access to information, which also leads to the understanding of one's own health and disease process[25].

Furthermore, the association found between social participation and LLPA was statistically significant (p=0.005) and the former was considered a protective factor for LLPA. Social behavior is modified as people age and is influenced by personal aspects such as health, sex, education and income. Studies have identified a reduction in social participation associated with age[26]. Based on this premise, influencing older adults to adhere to social activities such as participation in clubs, sports academies, charitable organizations or church reduces the chance of a sedentary lifestyle[27].

In addition, 70.8% of the sample reported not using insulin, that is, it is likely there was no lack of control of glycemic levels. The non-use of insulin was considered a positive factor for physical activity.

Studies have found that DM2 causes neuromuscular deterioration and aerobic and resistance training are used as non-pharmacological treatments that lead to the adaptation of skeletal muscle, avoiding functional limitations in this population[28], as well as reducing the chance of using insulin as a form of treatment of DM2 in older adults[29].

The prevalence of lower limb pain complaints was 46.9% in older adults who had LLPA, and this characteristic behaved as a risk factor for physical activity. Pain is related to the biological and psychosocial changes associated with aging, intrinsic and inherent to the individual themselves and may favor or be possible risk factors for the occurrence of falls[30].

Moreover, depressive symptoms were prevalent in more than half the sample (57.6%). Having depressive symptoms is considered a risk factor for LLPA, in addition to worsening the symptoms of chronic diseases. One study verified the relationship between depressive symptoms and levels of physical activity and found that older adults with chronic diseases, such as DM2, have worse rates of physical activity and sleep quality[31]. In addition, individuals with depression tend to adopt behaviors that are harmful to their health, such as a sedentary lifestyle[32].

The most prevalent age range in the present study was 60-69 years, totaling 71 (62.9%) individuals, with a mean age of 68 (±6.62) years of age. There was statistical significance between age and LLPA (p=0.04), with the older the age, the lower the level of physical activity in the sample studied. The fraction of individuals who do not reach minimum levels of physical activity is greater in older Brazilians aged 60 years or older, women and the socioeconomically vulnerable[33]. It should be noted that LLPA can lead to a loss of functional mobility, strength and muscle endurance, and this problem worsens over the years, leading to a loss of autonomy, quality of life and the occurrence of falls, the incidence of which increases after the sixth decade of life[34].

Falls are considered one of the main causes of injuries and deaths in older people and acting on modifiable risk factors is relevant. This is a great concern for public health, as the costs to the Brazilian National Health Service for the treatment of fractures resulting from falls is more than R$51 million each year[35].

In this sense, although individuals with NCD perform less physical activity, a study that verified the prevalence of physical activity with the IPAQ among older Brazilian adults (50 or more) found that there was no association between NCDs and LLPA, a fact that suggests that age and schooling may be determinant for this behavior. Even if there is no such association, identifying factors that lead to LLPA is important, as it can prevent NCDs, functional limitations and mortality[33].

Due to the above-mentioned findings, the results of the present study can provide information about older adults at risk of disability and help identify reversible risk factors. It is important that longitudinal studies that more accurately assess the impact of DM2 on the older population are performed, specifically those that assess the influence of this disorder on the level of physical activity of such individuals, as these factors can lead to frailty, in an attempt to improve and/or preserve the quality of life of this population.

Among the limitations of this research are its cross-sectional design, which does not allow a cause and effect association to be established, and the lack of Brazilian studies into DM2 and the FS and their associated factors. Difficulty was also experienced when obtaining the values of glycated hemoglobin and fasting glycemia of the older participants, who occasionally did not have the recent values of these variables, which led to a reduction in cases of DM.

CONCLUSION

From the results of the present study it can be concluded that the low level of physical activity in pre-frail and frail older adults with type 2 Diabetes Mellitus is associated with low schooling, non-participation in social activities, lower limb pain, the presence of depressive symptoms and age. Some of these factors are modifiable, and identifying them is relevant for the development of adequate health interventions and the development of public health policies for the prevention and treatment of both type 2 diabetes mellitus and the frailty syndrome.

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REFERENCES

1. Costa AF, Flor LS, Campos MR, Oliveira AF, Costa MFS, Silva RS, et al. Burden of type 2 diabetes mellitus in Brazil. Cad Saúde Pública [Internet]. 2017 [acesso em 01 maio 2019];33(2):e00197915 [14 p.]. Disponível em: http://www.scielo.br/pdf/csp/v33n2/1678-4464-csp-33-02-e00197915.pdf

2. Flor LS, Campos MR. The prevalence of diabetes mellitus and its associated factors in the Brazilian adult population: evidence from a population-based survey. Rev Bras Epidemiol [Internet]. 2017 [acesso em 28 fev. 2020];20(1):16-29. Disponível em: http://www.scielo.br/pdf/rbepid/v20n1/en_1980-5497-rbepid-20-01-00016.pdf

3. Lima LR, Funghetto SS, Volpe CRG, Santos WS, Funez MI, Stival MM. Quality of life and time since diagnosis of diabetes mellitus among the elderly. Rev Bras Geriatr Gerontol [Internet]. 2018 [acesso em 28 fev. 2020];21(2):180-90. Disponível em: http://www.scielo.br/pdf/rbgg/v21n2/1809-9823-rbgg-21-02-00176.pdf

4. Silva AP, Pureza DY, Landre BC. Frailty syndrome in elderly patients with type 2 diabetes mellitus. Acta Paul Enferm [Internet]. 2015 [acesso em 01 maio 2019];28(6):503-9. Disponível em: http://www.scielo.br/pdf/ape/v28n6/1982-0194-ape-28-06-0503.pdf

5. Andrade JM, Duarte YAO, Alves LC, Andrade FCD, Souza Junior PRB, Lima-Costa MF, et al. Frailty profile in Brazilian older adults: ELSI-Brazil. Rev Saúde Pública [Internet]. 2018 [acesso em 28 fev. 2020];52 Supl 2:1-10. Disponível em: http://www.scielo.br/pdf/rsp/v52s2/pt_0034-8910-rsp-52-s2-S1518-87872018052000616.pdf

6. Fhon JRS, Rodrigues RAP, Santos JLF, Diniz MA, Santos EB, Almeida VC, et al. Fatores associados à fragilidade em idosos: estudo longitudinal. Rev Saúde Pública [Internet]. 2018 [acesso em 01 jun. 2019];52:1-8. Disponível em: http://www.scielo.br/pdf/rsp/v52/pt_0034-8910-rsp-S1518-52-87872018052000497.pdf

7. Fried LP, Tagen CM, Walston J, Newman AB, Hirsch NC, Gottdiene J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol Ser A Biol Med Sci [Internet]. 2001 [acesso em 01 maio 2019];56(3):146-56. Disponível em: https://www.ncbi.nlm.nih.gov/pubmed/11253156

8. Morley JE, Vellas B, Kan GAV, Anker SD, Bauer JM, Bernabei R, et al. Frailty consensus: a call to action. J Am Med Dir Assoc [Internet]. 2013 [acesso em 01 maio 2019];14(6):392-7. Disponível em: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4084863/pdf/nihms589815.pdf

9. Freitas EV. Diabetes Melito. In: Freitas EV, Py L. Tratado de geriatria e gerontologia. 3ª ed. Rio de Janeiro: Guanabra Koogan; 2013. Capítulo 70.

10. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes (2017-2018). São Paulo: Clannad; 2017 [acesso em 01 maio 2019]. Disponível em: https://www.diabetes.org.br/profissionais/images/2017/diretrizes/diretrizes-sbd-2017-2018.pdf

11. American Diabetes Association. Diagnosis and Classification of Diabetes Mellitus Diabetes Care [Internet]. 2010 [acesso em 01 maio 2019];33(1):562-9. Disponível em: https://care.diabetesjournals.org/content/33/Supplement_1/S62.full

12. Aveiro MC, Driusso P, Barham EJ, Pavarini SCI, Oishi J. Mobility and the risk of falls among elderly people of the community of São Carlos. Ciênc Saúde Colet [Internet]. 2012 [acesso em 01 maio 2019];17(9):2481-8. Disponível em: http://www.scielo.br/pdf/csc/v17n9/a28v17n9.pdf

13. Podsiadlo D, Richardson S. The Timed "Up & Go": a test of basical functional mobility for frail elderly persons. J Am Geriatr Soc [Internet]. 1991 [acesso em 01 maio 2019];39(2):142-8. Disponível em: https://onlinelibrary.wiley.com/resolve/openurl?genre=article&sid=nlm:pubmed&issn=0002-8614&date=1991&volume=39&issue=2&spage=142

14. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Suggestions for utilization of the mini-mental state examination in Brazil. Arq Neuropsiquiatr [Internet]. 2003 [acesso em 01 maio 2019];61(3):777-81. Disponível em: http://www.scielo.br/pdf/anp/v61n3B/17294.pdf

15. Almeida OP. The Mini-Mental State Examination and the Diagnosis of Dementia in Brazil. Arq Neuropsiquiatr [Internet]. 1998 [acesso em 01 maio 2019];56(3):1-10. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X1998000400014

16. Batistoni SST, Neri AL, Cupertino APFB. Validity of the Center for Epidemiological Studies Depression Scale among Brazilian elderly. Rev Saúde Pública [Internet]. 2007 [acesso em 05 maio 2019];41(4):598-605. Disponível em: http://www.scielo.br/pdf/rsp/v41n4/5833.pdf

17. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. International Physical Activity Questionnaire (IPAQ): Study of validity and reliability in Brazil. Rev Bras Ativ Fis Saúde. 2001[acesso em 05 maio 2019];6(2):5-18. Disponível em: http://rbafs.org.br/RBAFS/article/view/931/1222

18. Batistoni SST, Neri AL, Cupertino APFB. Validity of the center for epidemiological studies depression scale among Brazilian elderly. Rev. Saúde Pública [Internet]. 2007 [acesso em 02 maio 2019];41(4):598-605. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102007000400014&lng=pt&nrm=iso&tlng=en

19. Tavares RE, Jesus MCP, Machado DR, Braga VAS, Tocantins FR, Merighi MAB. Healthy aging from the perspective of the elderly: an integrative review. Rev Bras Geriatr Gerontol [Internet]. 2017 [acesso em 18 fev. 2020];20(6):889-900. Disponível em: http://www.scielo.br/pdf/rbgg/v20n6/1809-9823-rbgg-20-06-00878.pdf

20. Allendorf DB, Schopf PP, Gonçalves BC, Closs VE, Gottlieb MGV. Elderly resistance training practitioners have better mobility than physically active elderly non-practitioners. Rev Bras Cienc Mov [Internet]. 2016 [acesso em 11 mar. 2020];24(1):134-44. Disponível em: http://docs.bvsalud.org/biblioref/2017/10/859734/idosos-praticantes-de-treinamento-resistido.pdf

21. Bernini LS, Barrile SR, Mangili AF, Arca EA, Correr R, Ximenes MA, et al. O The impact of diabetes mellitus on the quality of life of patients of Primary Health Care. Cad Bras Ter Ocup [Internet]. 2017 [acesso em 18 fev. 2020];25(3):533-41. Disponível em: http://www.cadernosdeterapiaocupacional.ufscar.br/index.php/cadernos/article/download/1531/880

22. Benavente YL, Sánchez JÁ, Sánchez TR, Cerezuela MBL, Noguera AS, Abellán MDM. Difficulties and motivations for physical exerise in women older than 65 years: A qualitative study. Rev Latinoam Enferm [Internet]. 2018 [acesso em 11 mar. 2020];26:29-89. Disponível em: http://www.scielo.br/pdf/rlae/v26/0104-1169-rlae-26-e2989.pdf

23. Smith BE, Hendrick P, Smith TO, Bateman M, Moffatt F, Rathleff MS. Should exercises be painful in the management of chronic musculoskeletal pain?: a systematic review and meta-analysis. Br J Sports Med [Internet]. 2017 [acesso em 02 jun. 2020];51(23):1679-87. Disponível em: https://bjsm.bmj.com/content/51/23/1679.long

24. Ferreira LK, Meireles JFF, Ferreira MEC. Evaluation of lifestyle and quality of life in the elderly: a literature review. Rev Bras Geriatr Gerontol [Internet]. 2018 [acesso em 18 fev. 2020];21(5):639-51. Disponível em: http://www.scielo.br/pdf/rbgg/v21n5/pt_1809-9823-rbgg-21-05-00616.pdf

25. Zanesco C, Bordin D, Santos SB, Müller EV, Fadel CB. Factors determining the negative perception of the health of Brazilian elderly people. Rev Bras Geriatr Gerontol [Internet]. 2018 [acesso em 18 fev. 2020];21(3):293-303. Disponível em: http://www.scielo.br/pdf/rbgg/v21n3/pt_1809-9823-rbgg-21-03-00283.pdf

26. Pinto JM, Neri AL. Trajectories of social participation in old age: a systematic literature review. Rev Bras Geriatr Gerontol [Internet]. 2017 [acesso em 28 fev. 2020];20(2):260-73. Disponível em: http://www.scielo.br/pdf/rbgg/v20n2/pt_1809-9823-rbgg-20-02-00259.pdf

27. Shaw RJ, Čukić I, Deary IJ, Gale CR, Chastin SFM, Dall PM, et al. The influence of Neighbourhoods and the Social Environment on Sedentary Behaviour in Older Adults in Three Prospective Cohorts. Int J Environ Res Public Health [Internet]. 2017 [acesso em 01 jun. 2019];14(6):1-23. Disponível em: https://www.mdpi.com/1660-4601/14/6/557

28. Zanuso S, Sacchetti M, Sundberg CJ, Orlando G, Benvenuti P, Balducci S. Exercise in type 2 diabetes: genetic, metabolic and neuromuscular adaptations: a review of the evidence. Br J Sports Med [Internet]. 2017 [acesso em 01 jun. 2019];51(21):1533-38. Disponível em: http://bjsm.bmj.com/cgi/pmidlookup?view=long&pmid=28501806.

29. Ely KZ, Spode FS, Barcella RC, Schonhofen IV, Paiva D, Pohl HH, et al. Physical exercise in Diabetes Mellitus, a narrative review. Cinergis [Internet] 2017 [acesso em 28 fev. 2020];18(Supl 1):381-5. Disponível em: https://online.unisc.br/seer/index.php/cinergis/article/view/11175

30. Smith BE, Hendrick P, Smith TO, Bateman M, Moffatt F, Rathleff MS. Should exercises be painful in the management of chronic musculoskeletal pain?: a systematic review and meta-analysis. Br J Sports Med. 2017 [acesso em 02 jun. 2019];51(23):1679-87. Disponível em: https://bjsm.bmj.com/content/51/23/1679.long

31. Silva MR, Ferretti F, Pinto SS, Tombini Filho OF. Sintomas depressivos em idosos e sua relação com dor crônica, doenças crônicas, qualidade do sono e nível de atividade física. Br J Pain [Internet]. 2018 [acesso em 02 jun. 2019];1(4):293-8. Disponível em: http://www.scielo.br/pdf/brjp/v1n4/pt_1806-0013-brjp-01-04-0293.pdf

32. Barros MBA, Lima MG, Azevedo RCS, Medina LBP, Lopes CS, Menezes PR, et al. Depression and health behaviors in Brazilian adults – PNS 2013. Rev Saúde Pública [Internet]. 2017 [acesso em 18 fev. 2020];51 Suppl 1: 1-8. Disponível em: http://www.scielo.br/pdf/rsp/v51s1/0034-8910-rsp-S1518-87872017051000084.pdf

33. Peixoto SV, Mambrini JVM, Firmo JOA, de Loyola Filho AI, de Souza Junior PRBS, Andrade FB, et al. Prática de atividade física entre adultos mais velhos: resultados do ELSI-Brasil. Rev Saúde Pública. 2018 [acesso em 03 jun. 2019];52 Supl 2:1-9. Disponível em: http://www.scielo.br/pdf/rsp/v52s2/pt_0034-8910-rsp-52-s2-S1518-87872018052000605.pdf

34. Souza LHR, Brandão JCS, Fernandes AKC, Cardoso BLC. Falls on elderly and associated risk factors. Rev Aten Saúde [Internet] 2017 [acesso em 18 fev. 2020];15(54):55-60. Disponível em: https://seer.uscs.edu.br/index.php/revista_ciencias_saude/article/view/4804/pdf

35. Moraes SA, Soares WJS, Lustosa LP, Bilton TL, Ferrioli E, Perracini MR. Characteristics of falls in elderly persons residing in the community: a population-based study. Rev Bras Geriatr Gerontol [Internet]. 2017 [acesso em 18 fev. 2020];20(5):691-701. Disponível em: http://www.scielo.br/pdf/rbgg/v20n5/1809-9823-rbgg-20-05-00691.pdf

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Original Articles

1 of 11

Mobile Care System for Older Adults: perceptions about its use in caring for people with dementia

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Abstract

Objective: To analyze the perceptions of caregivers and health professionals about a mobile application used for the caring and social support of people with dementia. *Method:* A qualitative study was performed on the experience of implementing a Mobile Care System for Older Adults (*Sistema Móvel de Assistência ao Idoso*, SMAI) in the routine of caregivers of people with dementia, treated at an outpatient clinic for cognitive disorders. Data were obtained through the application of questionnaires about the characteristics of caregivers and the Zarit scale to assess the level of burden. An Activities of Daily Living Questionnaire (ADLQ) was applied for functional evaluation. The perception of caregivers and professionals were collected through the audio recording of focus groups and analyzed according to the thematic-categorical analysis technique. *Results:* Twenty caregivers and five health professionals participated in the focus groups. Categories that emerged from the study revealed themes related to users' experiences, communication, medication management, feelings of caregivers, patient management strategies, impact of dementia on caregivers' lives, illness of caregivers and application evaluation. *Conclusion*: Interventions using mobile applications can help improve communication and social support in the care of dementia. The experience with the SMAI and its applications represented an innovative opportunity for both family caregivers and healthcare professionals.

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INTRODUCTION

Technologies designed to support people with dementia include the use of mobile devices that manage health care and strengthen the relationships between health professionals, family members and patients[1,2]. The phenomenon of population aging has been accompanied by an increase in the number of people with dementia, generating a significant impact on the cost of care throughout life, and requiring interventions to provide support to families[3].

An informal caregiver is described as an unpaid individual who performs non-professional care actions. This can be a family member, a friend or neighbor who provides assistance to dependent older adults in their daily activities[4,5]. Most of these caregivers have a family relationship with the older adults, in addition to physical and emotional proximity, and they are predominantly women.

Caring for a person with dementia has a significant impact on family dynamics. Care tasks range from supervising the older adult to helping with daily activities related to self-care such as personal hygiene, feeding, control of medication use and financial management. These activities can cause negative effects such as physical, psychological, social and financial burden[6].

Health interventions carried out remotely represent a promising field of knowledge as well as supporting the care of dementia. Studies have highlighted the various forms of technology developed to care for this population group through tele-medicine[7-9]. Mobile applications are programs or software packages installed on smartphones with a friendly and attractive user interface. Health care is one of the main uses for apps, allowing monitoring of chronic diseases, the provision of guidance to caregivers and facilitating home monitoring systems[10,11].

Several distance care interventions have been used to provide support to the family caregivers of people with dementia[12]. Types of technology related to the care of dementia can be classified as support in memory, treatment, safety, training, care and social interaction. Studies have highlighted the efficiency of mobile apps in providing health care to people with dementia, and in supporting their caregivers[13-15].

The present study presents the experience of using the Mobile Care System for Older Adults (*Sistema Móvel de Assistência ao Idoso*, SMAI) and aims to analyze the perceptions of caregivers and health professionals about the use of the application in the care and social support of people with dementia.

METHOD

A qualitative study was carried out to evaluate the experience of using the SMAI app over an eighteen month period. Consolidated criteria for qualitative studies were used to plan and organize focus groups[16]. The study was carried out in a Geriatrics outpatient clinic and the sample was selected for convenience, rather than random, being composed of older adults and their caregivers, monitored from September 2015 to March 2017.

The following inclusion criteria were established: patients diagnosed with dementia and functional loss, treated at the geriatric outpatient clinic; the primary caregiver of the older people was interested in using the mobile app, and maintained direct contact with the older adults or formal caregiver. Patients who lived alone or in a Long Term Care Facility for older adults (LTCF) were not included. The health professionals included in the study were part of the multiprofessional team of the geriatric outpatient clinic and accompanied the older participants in face-to-face consultations.

The data were collected through questionnaires about the demographic and specific characteristics of the caregivers and the application of the Zarit scale, translated and adapted, to identify the level of burden of the caregivers[17]. To assess the patient's level of dependence, the Activities of Daily Living Questionnaire *(*ADLQ), used in the functional assessment of patients with Alzheimer's disease[18], was applied.

System Description

The SMAI structure is composed of two Android mobile apps (SMAI Caregiver and SMAI Doctor), a web app (SMAI Web) and a server (the

SMAI server). The apps were developed through a partnership between the geriatric outpatient clinic and the Computer Science Laboratory (CSL) of the Universidade do Estado do Rio de Janeiro (the State University of Rio de Janeiro, or UERJ).

The SMAI Web interface was developed with the objective of providing support to the health team through the monitoring of errors and data traffic, with the SMAI server responsible for the storage, authentication, access control and data transmission infrastructure of the apps.

A prior usability study was carried out with five caregivers selected at the clinic, in order to verify the behavior of the first prototype of the SMAI app. These caregivers used the prototype in real conditions for two weeks, evaluating the correct execution of the app and access to the remote database. Subsequently, the present study to assess perceptions was implemented with the second version of the app. Each participating caregiver received a Motorola Moto G smartphone, with the SMAI caregiver app installed and a SIM card with a data plan financed by the project, meaning there was no financial burden on participants during the study.

The SMAI includes features such as alerts for correct medication times, alarms, patient and caregiver reports, a facility for sending images, a GPS locator system and a space for exchanging messages between caregivers and medical staff. The patient report is organized in the form of a checklist containing information about sleep patterns, behavioral changes, eating habits, hydration, dysphagia, coughs, urine, bowel habits and a record of falls.

Health professionals monitored patients using a tablet with the "SMAI Doctor" version of the app installed, through which it was possible to view all the information sent by the caregivers individually.

In terms of data confidentiality, each user had a unique identification code within the system, which was authenticated before the sending and transmitting of data. All the data was encrypted to guarantee authenticity and confidentiality and communications sent by the health team were controlled by the identification (ID) of the respective professional.

Organization of Focus Groups

The perceptions of caregivers and professionals were analyzed using focus groups as a qualitative methodological strategy[19]. The meetings were conducted at the clinic, in a quiet place, free from distractions. They were audio recorded and lasted between 45 to 55 minutes. In addition to the participants, the main researcher attended as a facilitator, and an observer, who took notes during the focus groups, was present.

Three focus groups were organized after six, twelve and eighteen months of the use of the SMAI app by caregivers and the health team, as part of the continuity of distance care. In the first two meetings, open questions about the experience of using the system were asked. In the last meeting with the caregivers, closed questions were applied in order to focus on the evaluation of the system.

Data Analysis

The digital recordings were transcribed and the transcriptions were reviewed by the main researcher, who attended all the meetings. The data were analyzed using the thematic-categorical analysis method[20]. Content analysis is a communication analysis technique that reviews what is said in interviews and observed by researchers.

The first step, known as pre-analysis, includes the organization of the empirical material, and is represented by the literal transcription of the discourse. This process also includes an alternate reading and the definition of objectives, which supports the constitution of the textual corpus.

The exploration phase of the material begins through coding and decomposition in relation to the formulated objectives. In this step, the transformation of the data is observed through clipping, aggregation and enumeration techniques to achieve the representation of the content and the expression of the analyzed text. Finally, the material is classified into themes or categories that help to understand what lies behind the speeches[21].

The study was approved by the Research Ethics Committee under opinion no. 32654014.9.0000.5259. All the participants of the study signed an Informed Consent Term (ICF) and a Loan and Commitment Agreement for the device used in the study, containing information about the return of the device and procedures in case of loss or theft.

RESULTS

Twenty caregivers participated in the three focus group meetings, along with five health professionals (three physicians working in Geriatrics, one geriatrician and a social worker), all of whom accompanied the intervention study on the use of the system over an eighteen month period. Seven caregivers participated in the first focus group, the second meeting was attended by six caregivers, and seven caregivers participated in the final meeting. Tables 1 and 2 show the demographic and specific characteristics of the caregivers participating in the study, respectively.

There was a predominance of female, informal caregivers, who were married, had less than 12 years of schooling, a monthly income of 2 to 4 minimum wages, and who were retirees and daughters of the patients. Through the Zarit scale, a moderate to severe level of burden was identified, and the time spent as caregiver was up to 5 years. Most caregivers stated that they shared the care for the patient with another person in the family. Among the older participants, five (25%) had moderate disability (25%) and fifteen (75%) severe disability, according to the scores obtained in the ADLQ, characterizing a significant degree of dependence for activities of daily living.

Table 1. Demographic characteristics of caregivers. Rio de Janeiro, 2015-2017.

Characteristic	Caregivers (n=20)
Age	67 ($\pm$10.75)
Sex	
Female	18 (90%)
Male	2 (10%)
Marital status	
Married	9 (45%)
Widow/widower	1 (5%)
Divorced	3 (15%)
Single	7 (35%)
Education	
$\leq$ 12 years	12 (60%)
> 12 years	8 (40%)
Family income (in minimum wages)	
$\leq$ 2	6 (30%)
2-4	12 (60%)
4-6	2 (10%)
> 10	0 (0%)
Employment status	
Employed	2 (10%)
Unemployed	2 (10%)
Retired	16 (80%)
Kinship	
Son/daughter	15 (75%)
Spouse	3 (15%)
Other	2 (10%)

Table 2. Specific characteristics of caregivers. Rio de Janeiro, 2015-2017.

Characteristic	Caregivers (n=20)
Burden Level (Zarit)	
Moderate	7 (35%)
Moderate / Severe	8 (40%)
Severe	3 (15%)
Low/none	2 (10%)
Time as caregiver	
≤5 years	9 (45%)
6-7 years	4 (20%)
8 – 10 years	4 (20%)
> 10 years	3 (15%)
Divides care	
Yes	11 (55%)
No	9 (45%)
Lives with older adult	
Yes	18 (90%)
No	2 (10%)
Formal Caregiver	
Yes	4 (20%)
No	16 (80%)
Health problems	
None	1 (5%)
1-2	11 (55%)
> 2	8 (40%)
Psychological Support	
Yes	6 (30%)
No	14 (70%)

In the first meeting, communication with the health team was highlighted as a positive element in emergency situations, although the system was not designed for these cases. The comment about the reminder of the medication administration schedule indicated the need to update the prescriptions on the app screen after consultations at the clinic. Caregivers also expressed a feeling of security in their care through the use of the app (Table 3).

After 12 months, the caregivers highlighted the impact of dementia on their lives. When an interviewee talked about her life trajectory, dreams, projects and desires, it was noted that taking care of a person with functional dependence can have negative effects on the health of caregivers, especially when they are burdened. In addition to physical issues, social conflicts increase the complexity of care demands.

The observation of reports of caregiver burden and illness resulted in the referral of these people to the outpatient clinic to monitor their physical and emotional health. The importance of music therapy and leisure activities was highlighted when one of the caregivers said she had taken an older woman to cultural spaces she used to frequent. When talking about dementia, participants demonstrated concern about the progress of the disease. They also expressed satisfaction with the opportunity to exchange messages with the health team (Table 4).

Table 3. Themes & comments of caregivers after six months of use. Rio de Janeiro, 2015-2017.

Theme 1: Communication

- "She suffered a serious fall and we took her to the hospital, we recorded everything here. We were unable to resolve things with her doctor, because the appointment was scheduled for two or three months in the future. I sent messages and photos, then received the response, within the timescale" (Caregiver C5).

Theme 2: Medication management

- "The system sends a notification about the medication time, however, the medication registered is old and this worried me a little, and then it was confirmed. I sent a message about it "(Caregiver C2).

Theme 3: Feelings of caregivers

- "It has been very useful to ask the caregiver how they are feeling over the weekend, I think this is great. I just wanted to know what you do with it" (Caregiver C2).
- "I think I feel more secure when taking care of my mother, because every time I look, I find answers, I feel safer, so I use it a lot" (Caregiver C4).
- "So far, my experience has been very good, because it is very hard to be a caregiver, especially when you're alone, because it is only you taking care of that person" (Caregiver C7).

Table 4. Themes and comments from the health team. Rio de Janeiro. 2015-2017.

Theme 1: Impact of dementia on the life of caregivers

- "It affected my life 100%. When I retired, my dream was to live my life and go backpacking. I have always enjoyed traveling, my life has changed from wine to water. There are days when I cry, it has also affected me financially" (Caregiver C4).
- "The impact on my life was that I lived on my own, I had my job, my car and my life. Now, due to my father's Alzheimer's disease, I have to stay at my mother's place more than at my own. Because he has stopped driving now, I sleep there so I can drive if anything happens" (Caregiver C2).
- "Alzheimer's disease scares me because I see that with my mother's case is advancing very quickly, she is becoming more agitated, depressed and is crying a lot. I use the smartphone all the time to send a message to the doctor" (Caregiver C3).

Theme 2: Caregiver's illness

- "I had high blood pressure, high glucose and serious spinal problems. There were days when I couldn't walk and with this stress the disease got worse" (Caregiver C4).
- "I had some aggravated problems like cholesterol, glucose and an increase in triglycerides and fibroids" (Caregiver C1).
- "My blood pressure and glucose are high now and I have trouble sleeping, sometimes I take pills. I was very angry and had no patience with anyone. My mother and I disagree a lot, she is very controlling and usually attacks me and offends me verbally" (Caregiver C2).

Theme 3: Care strategies

- "I put on the radio station that plays old and romantic songs. This week I put on spirituals, when I put on these songs she sings, dances and claps" (Caregiver C1).
- "Two years ago, we took her to a music club that played old songs, but she didn't react, she loved carnival" (Caregiver C5).

After eighteen months, issues related to caregiver safety when using the app, communication and changes in daily care were observed, with emphasis on the exchange of messages with the health team (Table 5).

According to the SMAI Web interface the most frequently used functions were text messages, reminders about the administration of medication, appointment dates and the camera.

At the end of the intervention, the health professionals pointed out that some caregivers had difficulties attending consultations and the app allowed a closer relationship with the health team. They also agreed that the SMAI app would be very useful for patients with chronic conditions.

The patient report was considered repetitive and long for a daily task. Doctors highlighted the use of the system in the remote monitoring of patients with chronic conditions and mobility difficulties. In addition, they discussed the need to have a health professional responsible for managing the information transmitted by the mobile app in relation to the assessment of the treatment plan.

Adjustments were suggested for the third version of the SMAI Caregiver app, including simplifying the patient report. It was also observed that the messaging function was more prevalent than the others, as the caregivers expressed themselves more clearly and confidently. Finally, a change in the frequency of sending the patient report was suggested.

Table 5. Themes & comments of caregivers after 18 months of use. Rio de Janeiro, 2015-2017.

Theme 1: Caregiver safety

- "I feel that I have my guardian angel, my companion, my security guard. The difference is the security. We feel more relaxed and safe, knowing that there is someone there all the time, instead of waiting three or four months "(Caregiver C1).
- "I felt much more secure" (Caregiver C5).

Theme 2: Communication with the health team

- "Communication with the doctors has improved. This is because we get a response almost immediately" (Caregiver C5).
- "The doctor who takes care of my mother at the hospital is always giving feedback and asking how she is doing with the app. Sometimes I send a text to the doctor. I even apologize sometimes, but I have to report everything that was happening to her" (Caregiver C2).

Theme 3: Changes in daily care

- "I have this obsession with caring, but one thing I find difficult is water. How many glasses, it asks. And then I started to supervise myself and it was good in that sense. Now I have this concern about water, in addition to medications, because I wasn't worried about it before like I am today" (Caregiver C4).
- "My mother hates drinking water. They say it is a common problem with older adults and the app asks how many glasses she drinks. These days I try to give my mother a lot more water" (Caregiver C3).
- "I used to pay more attention to coughing and urination, now I pay attention to the smell of her urine. One day my husband asked me: do you smell my mother's urine? I said: yes, of course, we need to see if it smells strong, because it could be a urinary tract infection. These two observations were excellent for me" (Caregiver C2).

Table 6. Themes and comments from the health team. Rio de Janeiro. 2015-2017.

Theme 1: Perceptions of the SMAI Doctor App

- "I like the app. I find it very easy to use and patients can resolve small problems without having to make an appointment. They can resolve some very simple things, by sending and responding to messages, seeing something that is related to them" (P1, Resident in Geriatrics).
- "It is a very useful tool for monitoring these patients. Family members and caregivers have many important issues and burdens due to the type of care they provide. It also provides them with a certain degree of security when faced with an unexpected situation" (P2, Resident in Geriatrics).
- "Technology has brought many benefits to society and, in this case, it is extremely useful" (P3, Resident in Geriatrics).

Theme 2: Positive points about the system

- "They liked the app and felt accepted by our health team, feeling empowered to talk about their difficulties in the care process, so I think it works" (P5, Social Worker).
- "The technology broke a barrier that existed between us and the patient precisely because they are accessible to us all the time" (P3, Resident in Geriatrics).

Theme 3: Negative points about the system

- "They filled out or have to fill out the daily patient report. I think there were a lot of questions for them to fill out every day. There are many important things, but I think that responding every day probably causes some burden" (P1, Resident in Geriatrics).
- "The negative part is topics that can cause burden for the caregiver. If the app's intention is to alleviate this burden, it is a contradiction that they always have to answer a lot of questions" (P3, Resident in Geriatrics).
- "The patient's daily report is very detailed, however, it can become repetitive for the caregiver in their daily routine" (P5, Social Worker).

Theme 4: My professional practice

- "I would use it in my professional practice. It can be used for patients with Alzheimer's or other dementias, in palliative care and the monitoring of patients in home care" (P3, Resident in Geriatrics).
- "I wouldn't use it in a private consultation. I would use it in a situation where I have a multidisciplinary team. I have the impression that it is not really suitable for a private consultation" (P2, Resident in Geriatrics).
- "I think the biggest advantage of this app is to apply it in an institution like ours, which has a group of patients who need to be monitored clinically and among those who do not have direct access to doctors" (P4, Geriatrics).
- "I think it's great for monitoring complex patient groups across healthcare services. It is also very useful in situations such as home care "(P5, Social Worker).

Theme 5: Solutions and ideas for the caregiver app

- "I think that the most important issues are resolved by messages" (P2, Resident in Geriatrics).
- "It could be an app that the patient could download to their own smartphone. Currently, most people have a smartphone with various apps. I would like to have another colleague with me or a nurse to define the scheduling and message exchange functions" (P1, Resident in Geriatrics).
- "The messages are very important, but, on the other hand, we should make the app different from other apps, because messages can also be sent via WhatsApp, for example. Obviously, it is a health-related app, so this is already a differentiating factor. I also think it is important to keep the reports simplified" (P4, Geriatrics).
- "The big advantage is in terms of messages. I think we should value the qualitative space where we can express ourselves" (P5, Social Worker).
- "There could be an extra space for comments other than those requested daily, weekly or fortnightly" (P1, Resident in Geriatrics).

DISCUSSION

The thematic analysis of the focus groups demonstrated that the systems implemented in the routine of caregivers and the health team had been accepted positively. The experiences of using the SMAI confirmed the hypothesis that interventions based on smartphones are effective, as they assist in the communication of caregivers with the health team, contributing to the therapeutic plan and the continuity of distance care[22].

Communication through the SMAI app was highlighted by the caregivers, appearing in the first and third focus groups. However, although it had been agreed that the health team's response time would be 24 to 48 hours, some caregivers questioned the delay in response to some emergencies where the patient is at home. The system is aimed at the remote monitoring of patients and of interventions performed in face to face medical consultations, and does not include emergencies.

The study had certain limitations related to the reduced number of participants in the focus groups. The difficulty of gathering a larger number of participants was related to the lack of knowledge in the use of smartphones, as mentioned by the caregivers who refused the invitation to participate in the study. A study showed that factors such as age, sex and familiarity with technology influence participants when using technological devices[23]. In addition, the composition of the caregiver focus groups was not heterogeneous over the three meetings.

The system sent a notification at the exact time of the administration of medication, according to the registered medical prescription. It is necessary to update the medical prescription after each consultation. Care tools, such as medication reminders, facilitate adherence, in addition to monitoring adverse effects[24]. Low adherence to the daily sending of information was observed. Caregivers forgot to send the report or did not complete it correctly. For this reason, a more simplified report was suggested by the team.

The results showed that the use of a mobile app like SMAI can become a reality in the Brazilian health system. The need for an institutional structure with qualified personnel to manage remote interventions was described. Practical strategies such as skills training in health care management and the optimization of communication between caregivers and clinicians are considered potentially positive elements[25].

Studies have shown that physicians are more open to being involved in the development of health apps and emphasize that public health programs should publicize such projects to maximize adherence to these types of technology[26,27]. However, the ease of developing and disseminating mobile apps should not mask the real challenges of applicability in clinical practice and the possible threats to patient safety.

CONCLUSION

The experience of implementing the SMAI app in the routine of family caregivers was an innovative opportunity for the geriatric outpatient clinic, offering social and clinical support, remote monitoring and professional guidance. In addition, a new dimension of care was observed in relation to feelings of loneliness and problems of burden and the illness of caregivers were identified.

The monitoring of patients by the health team made it possible to integrate technology into clinical practice. The perceptions of professionals about the SMAI Doctor app were positive. The exchange of messages was highlighted as a way of improving the communication options and social support of the caregiver.

Mobile apps are potentially useful in clinical practice when they value the health and social needs of patients and caregivers.

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REFERENCES

1. Hall A, Wilson CB, Stanmore E, Todd C. Moving beyond 'safety' versus 'autonomy': a qualitative exploration of the ethics of using monitoring technologies in long-term dementia care. BMC Geriatr. 2019;19(145):1-13.

2. Brown EL, Ruggiano N, Li J, Clarke PJ, Kay ES, Hristidis V. Smartphone-Based Health Technologies for Dementia Care: Opportunities, Challenges, and Current Practices. J Appl Gerontol. 2017;38(1):73-91.

3. Lima-Costa MF, Peixoto SV, Malta DC, Szwarcwald CL, Mambrini JVM. Cuidado informal e remunerado aos idosos no Brasil (Pesquisa Nacional de Saúde, 2013). Rev Saúde Pública. 2017;51(Sup 1):1-6.

4. Rocha BMP, Pacheco JEP. Idoso em situação de dependência: estresse e coping do cuidador informal. Acta Paul Enferm. 2013;26(1):50-6.

5. Vieira CPB, Fialho AVM, Freitas CHA, Jorge MSB. Práticas do cuidador informal do idoso no domicílio. Rev Bras Enferm. 2011; 64(3):570-9.

6. Caldas CP, Moreira MD. A importância do cuidador no contexto da saúde do idoso. Esc Anna Nery Rev Enferm. 2007;11(3):520-5.

7. Jackson GA, Browne D. Supporting carers of people with dementia: what is effective? B J Psych Adv. 2017;23(3):179-86.

8. Sriram V, Jenkinson C, Peters M. Informal carers' experience of assistive technology use in dementia care at home: a systematic review. BMC Geriatr. 2019; 19(1):1-25.

9. Stutzel MC, Filippo MP, Costa RMEM, Sztajnberg A, Brites AS, Motta LB, et al. Multi-part quality evaluation of a customized mobile application for monitoring elderly patients with functional loss and helping caregivers. BMC Med Med Inform Decis Mak. 2019;19(40):1-18.

10. Wiklund Axelsson S, Nyberg L, Naslund A, Melander Wikman A. The Anticipated Positive Psychosocial Impact of Present Web-Based E-Health Services and Future Mobile Health Applications: An Investigation among Older Swedes. Int J Telemed Appl. 2013;1:1-9.

11. Rocha TAH, Fachini LA, Thumé E, Silva NC, Barbosa AC, Carmo MD, et al. Saúde Móvel: novas perspectivas para a oferta de serviços em saúde. Epidemiol. Serv Saúde. 2016;25(1):159-70.

12. Lorenz K, Freddolino PP, Comas-Herrera A, Knapp M, Damant J. Technology-based tools and services for people with dementia and carers: Mapping technology onto the dementia care pathway. Dementia. 2017;18(2):725-41.

13. Yousaf K, Mehmood Z, Saba T, Rehman A, Munshi AM, Alharbey R, et al. Mobile-health applications for the efficient Delivery of health care facility to People with Dementia (PwD) and support to their carers: a survey. BioMed Res Int. 2019;2019:1-26.

14. Quinn CC, Staub S, Barr E, Gruber-Baldini A. Mobile support for older adults and their caregivers: Dyad Usability Study. JMIR Aging. 2019;2(1):1-10.

15. Rathnayake S, Jones C, Calleja P, Moyle W. Family perspectives of managing activities of daily living and use of mHealth applications in dementia care: a qualitative study. J Clin Nurs. 2019;28(23-24):1-11.

16. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;9(6):349-57.

17. Queluz FNFR, Campos CRF, Santis L, Isaac L, Barham EJ. Zarit Caregiver Burden Interview: evidências de validade para a população brasileira de cuidadores de idosos. Rev Colomb Psicol. 2018;28(1):99-113.

18. Medeiros ME, Guerra RO. Tradução, adaptação cultural e análise das propriedades psicométricas do Activities of Daily Living Questionnaire (ADLQ) para avaliação funcional de pacientes com doença de Alzheimer. Rev Bras Fisioter. 2009;13(3):257-66.

19. Soares MI, Camelo SHH, Resck ZMR. A técnica de grupo focal na coleta de dados qualitativos: relato de experiência. Rev Min Enferm. 2016;20(1)1-5.

20. Silva AH, Fossá MIT. Análise de conteúdo: exemplo de aplicação da técnica para análise de dados qualitativos. Qualit@s Rev Eletr. 2015;16(1):1-14.

21. Bardin L. Análise de conteúdo. Portugal: EdiçõesTrês; 2010.

22. Waller A, Dilworth S, Mansfield E, Sanson-Fisher R. Computer and telephone delivered interventions to support caregivers of people with dementia: a systematic review of research output and quality. BMC Geriatr. 2017;17:1-20.

23. Sparkes J, Valaitis R, McKibbon A. A Usability Study of Patients Setting Up a Cardiac Event Loop Recorder and BlackBerry Gateway for Remote Monitoring at Home. Telemed J e.Health. 2012;18:484-90.

24. van Kerkhof LWM, van der Laar CWE, de Jong C, Weda M, Hegger I. Characterization of apps and other e-tools for medication use: insights into possible benefits and risks. JMIR. Mhealth Uhealth. 2016;4(2):1-14.

25. Tremont G, Davis JD, Ott BR, Galioto R, Crook C, Papandonatos GD, et al. Randomized trial of the family intervention: telephone tracking caregiver for dementia caregivers: use of community and healthcare resources. J Am Geriatr Soc. 2017;65:924-30.

26. Jamwal NR, Kumar SP. Smarter palliative care for cancer: use of smartphone applications. Indian J Palliat Care. 2016;22:108-10.

27. Kuhn E, Eftekhari A, Hoffman JE, Crowley JJ, Ramsey KM, Reger GM, et al. Clinician perceptions of using a smartphone app with prolonged exposure therapy. Adm Policy Ment Health. 2014:41:800-7.

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Original Articles

1 of 11

Biopsychosocial factors associated with complaints of dizziness in older adults with Type 2 Diabetes *Mellitus*

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Abstract

Objective: To analyze the biopsychosocial factors associated with complaints of dizziness in older adults with Type 2 Diabetes Mellitus. *Methods:* A cross-sectional, descriptive study with a sample selected for convenience was performed in a university hospital. The participants were individuals aged 60 years or older diagnosed with type 2 Diabetes Mellitus. Patients were assessed using a multidimensional survey, containing sociodemographic, clinical-functional, psycho-psychological and cognitive data. The Mini-Mental State Exam and the Short Geriatric Depression Scale (GDS-15) were used to screen for cognitive deficits and depressive symptoms, respectively, and the Timed Up and Go Test was used to assess mobility. Data analysis was performed using the Chi-square and Mann-Whitney tests. *Results:* The sample consisted of 157 older adults of whom 45.22% complained of dizziness. There was a statistically significant association between dizziness and the variables: female sex, being unmarried, a low level of education, a negative self-perception of general health and vision, complaints of pain in the lower limbs, a fear of falling, a tendency to fall, cognitive impairment and psychological symptoms. *Conclusion:* Knowledge of the factors associated with the complaint of dizziness in older adults with DM2 allows improved targeting of prevention, assessment and intervention actions, in order to minimize the occurrence of falls, maintain or optimize functional capacity and cognitive skills, and thus improve quality of life.

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INTRODUCTION

The increase in the number of older adults and growing life expectancy has led to concerns among public health authorities[1,2], as the process of human aging leads to a reduction in organic functions, functional decline, increased dependence and risk factors for chronic non-communicable diseases (NCDs)[2,3], which lead to high costs for governments due to the greater use of health services and the lower productivity of the individual in the labor market. Notable NCDs include cardiovascular diseases (hypertension, heart failure), respiratory diseases, cancer and impaired glucose metabolism (Diabetes Mellitus) [1-3].

Diabetes Mellitus (DM) is an endocrine-metabolic disease characterized by failures in the secretion and action of insulin, as well as in the regulation of hepatic glucose production, which consequently generates blood hyperglycemia. The chronicity of blood hyperglycemia can cause several types of damage to systems and organs, especially the kidneys, nerves, heart, blood vessels and the visual, somatosensory and vestibular systems[4-6].

About nine million Brazilians are self-reported sufferers of DM, according to the National Health Survey[7], a total which corresponds to 6.2% of the adult Brazilian population. However, half of DM patients do not know they have the disease[7].

Among the subclassifications of DM, Type 2 Diabetes Mellitus (DM2) stands out, being the most frequently found glucose metabolism dysfunction among the population, representing around 90% of total cases of DM[4].

In this context, DM2 is responsible for disturbances in postural balance (PB), such as dizziness[6]. Over time, individuals with DM2 can develop diseases such as retinopathy[8] and/or peripheral neuropathy[9] and changes in the vestibular system[10,11], as the inner ear has intense metabolic activity and no energy reserve, which makes it sensitive to acute or chronic disorders in blood glucose levels. Thus, the sensory systems involved in sending information to the Central Nervous System (CNS) to maintain body balance may be altered[8-11].

However, studies that include older adults with DM2 in their samples are scarce[12-14], although dizziness is considered one of the complications of this condition[11].

Dizziness has a great impact on the lives of older adults, as it tends to cause various conditions such as: physical and psychological insecurity, irritability, anxiety, phobias, panic, depression and falls[15,16]. It is therefore extremely necessary to identify the biopsychosocial factors that are associated with dizziness in patients with DM2, as this will represent an important contribution towards developing effective preventive and rehabilitative strategies and, thus, systematizing an ideal model of care for this population.

Therefore, the present study aims to analyze the biopsychosocial factors associated with complaints of dizziness in older adults with type 2 diabetes mellitus.

METHOD

An observational, cross-sectional, descriptive study was carried out in a university hospital offering medium and high complexity care. Data collection took place from November 2016 to November 2017.

The sample calculation was performed from a pilot sample from the study population itself. A power of 80% and a 5% significance level were used for two-tailed hypothesis testing. Among the variables, the largest sample size was obtained for the Time Up Go Test (TUGT)[17]. Thus, it was found that the sample size necessary for the study was at least 138 patients (69 in each group).

This is a sample selected for convenience, consisting of 157 individuals aged 60 years or over, of both sexes, with a clinical diagnosis of DM2, according to the criteria of the American Diabetes Association (ADA), referred by the Endocrinology, Otoneurology and Geriatrics outpatient clinics of a university hospital. The referred older adults were entered into register created by the Liga Acadêmica de Atenção as Pessoas com Diabetes Mellitus (the Academic League for Care of People with Diabetes Mellitus) (performed by the outpatient clinics mentioned above) and, from this, were

invited to a telephone evaluation. During this telephone contact the objectives of the research were explained and the tests carried out and the date of the evaluation was scheduled for those older adults who demonstrated interest.

The study excluded older adults who (a) were experiencing a dizzying crisis at the time of the evaluation (b) had complained of dizziness in the last 30 days[18], (c) had physical and cognitive limitations that prevented the evaluation protocol from being carried out, such as the inability to understand and respond to simple verbal commands and/or imitate movements, (d) had severely reduced visual and hearing acuity that rendered them incapacitated for the performance of activities of daily living, even with the use of corrective lenses and/or hearing aids, (e) had suffered lower limb amputation, regardless of degree (f) were unable to walk (e) could move around by wheelchair only or (f) presented a major discomfort that would make the tests unfeasible.

Following inclusion in the research, the older adults were allocated to the group with complaints of dizziness or without complaints of dizziness, according to their answer to the question *Do you feel dizzy*? It should be noted that the older adults were referred from the outpatient clinics mentioned above, and therefore brought with them tests that proved the complaint of dizziness.

For the evaluation of the older adults treated, an evaluation protocol was applied containing questions related to sociodemographic, clinical-functional and psycho-cognitive data.

The sociodemographic data were composed of the variables: sex, age, age group (from 60 to 69 years old/over 70 years old), marital status and education.

The clinical-functional data consisted of questions related to the self-perception of general health, vision and hearing, which were categorized as excellent, very good, good, poor or very poor; number of drugs in use, number of concomitant diseases, time since diagnosis of DM2, laboratory tests performed in the last six months for the control of DM2 (fasting glucose and glycated hemoglobin), presence of pain in the lower limbs (lower limbs), number of falls in the last year (12 months), tendency

to fall and fear of falling. Finally, the TUGT[17] was used to assess mobility.

The TUGT[17] analyzes the time spent in seconds that older adult needs to perform the proposed task, which consists of getting up from a chair with armrests (46 cm high), walking 3 meters, turning around a cone, returning to the chair and sitting down. Before starting the test, the older adults were sitting on the chair, with their arms supported, wearing their normal shoes. When the instructor gave the order to go, the subject started the task. The test was completed the moment the older adult sat in the starting position.

Weight was measured using a BalmakActlife® platform scale and height was measured by a tape measure attached to the wall. For the analysis of pain intensity in lower limbs, the Visual Analogue Scale (VAS) was used, while for the investigation of falls in the last year, tendency to fall and fear of falling the following questions were used: *have you fallen in the last year ?*, *Do you sometimes feel like you are going to fall, but don't?*, *Are you afraid of falling?*, respectively.

The psychological and cognitive data were obtained through the application of the Mini-Mental State Exam (MMSE)[19] and the Geriatric Depression Scale (GDS-15)[20] to screen for cognitive deficit and depressive symptoms, respectively. Values of 13 for illiterate, 18 for low and medium levels of schooling and 26 for high levels of schooling were adopted as cut-off points for the MMSE[19].

The analysis of data distribution was carried out by means of the Kolmogorov-Smirnov test, which identified non-parametric characteristics of the sample. For inferential analysis, associations were made between the dependent variable of the qualitative type of complaint of dizziness (yes or no) and the independent dichotomous variables using the Chi-square test. To analyze the association of the complaint of dizziness with the non-categorical variables (age, years of schooling, number of medications, time since diagnosis of DM2, glycated hemoglobin, VAS of pain in LL, TUGT, MMSE and GDS-15) the Mann-Whitney test was used. It should be noted that for this type of analysis, the median of each quantitative variable is used.

To identify the independent predictive factors for the presence of dizziness, multiple logistic regression analysis was performed. For this, the Stepwise Forward Selection Procedure method was used, in which the variables that make up the model were grouped into blocks, and ordered according to their significance statistic. The modeling was initiated by the lowest p value of the Chi-square test, that is, greater statistical significance, and the other variables were then added one by one, with a critical p value of <0.25 used to compose the model. The permanence of the variable in the multiple analysis occurred through verisimilitude (Likelihood Ratio Test), the absence of multicollinearity, as well as the ability of the variable to improve the model through the Hosmer and Lemeshow test, without interfering with confidence intervals. Finally, waste analysis was performed to isolate cases that exerted undue influence on the model, causing little adherence. In all analyzes a significance level of 5% was considered.

The research was approved by the Ethics Committee on Research with Human Beings under opinion number 1132574. All the older adults signed an informed consent form (ICF) after the objectives, protocols and possible risks of the research were explained.

RESULTS

A total of 212 older adults were contacted to make up the sample. However, 20 were not interested in participating in the research, three died between the period of telephone contact and the date of evaluation and, during the evaluation, five fell ill, 25 did not appear and two were discharged from the clinic and changed their cell phone number. Thus, the sample consisted of 157 older adults (Figure).

The average age of the interviewees was 69.1 (+6.54) years, with a maximum age of 86 years and an average schooling of 6.83 (+5.47) years. The most frequently reported marital status was that of married (including civil unions) (63.7%) and women (65.6%) predominated among the study population.

A total of 45.22% of the total population complained of dizziness. Of this group, 71.23% had rotational dizziness, 13.69% non-rotating, 6.84% both types (rotational and non-rotating) and 8.21% were unable to say which type they suffered from. In addition, 60.64% of this population reported having suffered from dizziness for 3 to 5 years. It is worth mentioning that 51.5% of those experiencing dizziness were women and 46.8% were 70 years old or more. The sociodemographic data of the groups with and without complaints of dizziness are shown in table 1.

When analyzing the clinical-functional variables in relation to the groups studied, there was a higher frequency of older adults with dizziness in the categories of poor or very poor self-perception of general health (p <0.0001) and vision (p=0.001), pain in lower limbs (p = 0.007), fear of falling (p = 0.040), tendency to fall (p = 0.002) in comparison with older adults who did not complain of dizziness (Table 2).

Table 3 shows that people with less education have a greater complaint of dizziness (5.17 ± 0.80). As for the visual analog scale, there was a difference in the means of the two groups, and in the group of people with complaints of dizziness, the intensity of pain in the lower limbs is greater (4.79 ± 0.74). In relation to the psycho-cognitive variables, it is seen that they had a lower score on the MMSE and higher scores on the GDS-15, which points to a greater risk of cognitive deficit and a greater number of depressive symptoms.

No statistically significant associations were found between older adults with complaints of dizziness and the variables: age group, self-perceived hearing, number of diseases, falls in the last year, glycated hemoglobin, fasting glucose, number of medications, time since diagnosis of DM, VAS and TUGT.

In the multivariate analysis (Table 4) the variables: poor or very poor self-perception of general health (PR 1.61; 95% CI 1.04-2.48), poor or very poor self-perception of vision (PR 1.62; 95% CI 1.02-2.58) and being unmarried (including civil unions) (PR 1.66; 95% CI 1.14-2.40) exhibited a positive association with the group that reported having dizziness, adjusted for the impaired hearing and falls in the previous year variables.
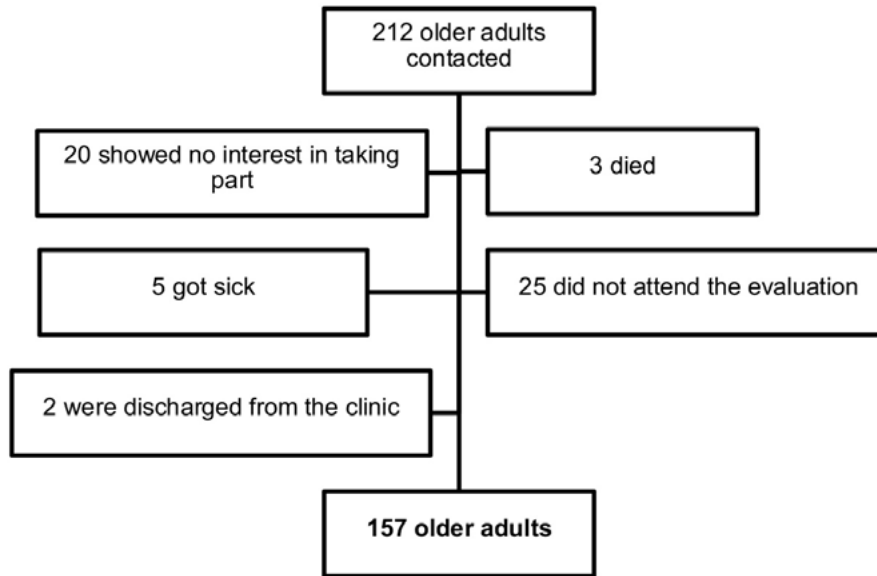
Figure 1. Flowchart of the study sample from contact at the clinic to the time of assessment. Natal, Rio Grande do Norte, Brazil, 2017.

Table 1. Sociodemographic characterization of the sample of older adults with and without complaints of dizziness (N = 157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (N=71) (%)	Dizziness No (N=86) (%)	Prevalence Ratio	Confidence Interval (95%)	*p*-value (Chi-squared)
Sex					
Female	53 (51.5%)	50 (48.5%)	1,54	1.013 – 2.352	**0.030**
Male	18 (33.3%)	36 (66.7%)			
Age group (years)					
70 or more	29 (46.8%)	33 (53.2%)	1.058	0.747 – 1.499	0.752
60-69	42 (44.2%)	53 (55.8%)			
Marital status					
Married (including civil unions)	35 (61.4%)	22 (38.6%)	1.706	1223 - 2.379	**0.002**
Unmarried	36 (36.0%)	64 (64.0%)			
Years of Schooling					
1 to 3	45 (52.3%)	41 (47.7%)	1.429	0.990 – 2.061	**0.049**
4 or greater	26 (36.6%)	45 (63.4%)			

Table 2. Clinical and functional characterization of the sample of older adults with and without dizziness (N=157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (N=71) (%)	Dizziness No (N=86) (%)	Confidence Interval (95%)	*p*-value (Chi-squared)
Self-perception of general health				
PoorPoor or very poorpoor	43 (60.6%)	28 (39.4%)	1.301 – 2.659	**<0.0001**
Excellent, very good, good	28 (32.6%)	58 (67.4%)		
Self-perception of vision				
Poor or very poor	43 (58.9%)	30 (41.1%)	1.235 - 2528	**0.001**
Excellent, very good, good	28 (33.3%)	56 (66.7%)		
Hearing self-perception				
Poor or very poor	23 (52.3%)	21 (47.7%)	0.863 – 1.754	0.268
Excellent, very good, good	48 (42.5%)	65 (57.5%)		
Number of diseases				
5 or more diseases	31 (53.4%)	27 (46.6%)	0.943 – 1.857	0.113
1 to 4 diseases	40 (40.4%)	59 (59.6%)		
Glycated Hemoglobin				
Normal (up to 8%)	24 (44.4%)	30 (55.6%)	0.667 – 1.555	0.932
Altered (8.1% or more)	24 (43.6%)	31 (56.4%)		
Fasting Glucose				
Altered (131mg / dL or more)	31 (44.9%)	38 (55.1%)	0.758 – 1.620	0.596
Normal (up to 130mg / dL)	30 (40.5%)	44 (59.5%)		
Complaint of pain in LL				
Yes	46 (55.4%)	37 (44.6%)	1.130 - 2.382	**0.007**
No	25 (33.8%)	49 (66.2%)		
Falls in the last year				
Yes	33 (52.4%)	30 (47.6%)	0.922 – 1.821	0.140
No	38 (40.4%)	56 (59.6%)		
Fear of Falling				
Yes	60 (49.2%)	62 (50.8%)	0.964 – 2.901	**0.040**
No	10 (29.4%)	24 (70.6%)		
Tendency to Fall				
Yes	47 (56.6%)	36 (43.4%)	1220 - 2647	**0.002**
No	23 (31.5%)	50 (68.5%)		

LL: lower limb;

Table 3. Clinical-functional and psycho-cognitive characterization of the sample (N=157) by quantitative variables. Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes (n=71)			Dizziness No (n=86)			*p*-value (Mann Whitney)
	Mean (SD)	Median	CI (95%)	Mean (SD)	Median	CI (95%)	
Number of medications	6,38 (0,53)	6,00	5,29-7,47	5,70 (0,438)	5,00	4,82-6,59	0,929
Time since DM2 diagnosis (months)	8,59	6,00	6,01-11,17	13,02 (1,679)	10,00	9,63-16,40	0,677
TUGT (seconds)	14,48 (3,13)	10,40	8,06-20,89	10,63 (0,46)	10,00	9,70-11,56	0,214
MMSE (total score)	22,62 (0,802)	23,00	20,98-24,26	25,34 (0,60)	26,50	24,13- 26,55	0,002
GDS-15 (total score)	6,00 (0,566)	5,00	4,84-7,16	4,11 (0,393)	3,00	3,32-4,91	0,030

TUGT: *Timed Up and Go Test; MMSE*: *Mini-Mental State Exam; GDS-15*: *Short Geriatric Depression Scale.*

Table 4. Prevalence ratio of the occurrence of dizziness according to sociodemographic, clinical-functional, cognitive and psychological well-being of older adults with Type 2 Diabetes Mellitus (n = 157). Natal, Rio Grande do Norte, Brazil, 2017.

Variables	Dizziness Yes	No				
	(N=71) (%)	(N=86) (%)	PR	PR Adjusted	CI 95%	*p*-value
Self-perception of general health						
Poor or very poor	43 (60,6%)	28 (39,4%)	1,86	1,61	1,04-2,48	0,033
Excellent, very good, good	28 (32,6%)	58 (67,4%)				
Marital status						
Unmarried	35 (61,4%)	22 (38,6%)	1,71	1,66	1,14-2,40	0,007
Married (including civil unions)	36 (36,0%)	64 (64,0%)				
Self-perception of vision						
Poor or very poor	43 (58,9%)	30 (41,1%)	1,77	1,62	1,02-2,58	0,041
Excellent, very good, good	28 (33,3%)	56 (66,7%)				

Hosmer and Lemeshow Test =0.910; Resid; R2 Nagelkerke =0.194; Model adjusted by the variables Hearing and Falls in previous year.

DISCUSSION

Older adults with DM2 commonly develop, over time, changes in the visual[8], somatosensory[9] and vestibular[10,11] systems which are responsible for PB, and which can make complaints of dizziness more common in this population.

The occurrence of complaints of dizziness in the present study was 45.22% of whom 71.23% presented rotational dizziness, a similar proportion to that found in the population-based study by Moraes et al.[12] who studied 391 older adults, 176 of whom complained of dizziness, of which 70.4% had rotational dizziness and 43.9% DM.

Among the variables studied, the complaint of dizziness in elderly diabetics exhibited an association with sex, education, marital status, self-perception of general health and vision, complaint and intensity of pain in the lower limbs, fear of falling, tendency to fall, psychological symptoms and cognitive changes.

Among the individuals who complained of dizziness, 51.5% were female and 52.3% had a low level of education. The predominance of women can be attributed to hormonal variations, relevant to sex, and to the fact that this population seeks care more frequently[21,22]. The low level of education is a controversial finding in literature. Some studies[23,24] have identified low educational levels in older adults with complaints and/ or the diagnosis of dizziness while others[12,25] have not made this association. It is known, however, that a low level of schooling compromises access to health education and the understanding of medical guidelines. Therefore, these older adults are more likely to have difficulties with the proper follow-up of the treatment advised by the medical team and to have erroneous perceptions of self-care, thus adding to the harm caused by disease carried and, consequently, leading to a decrease in quality of life[26].

Most of older adults with complaints of dizziness were not married (61.4%), a finding which agrees with some studies found in literature[23,25]. From this perspective, the study by Gonçalves et al.[27] deserves to be highlighted, as it found that more than 50.0% of older adults who were married (including civil unions) were cared for by their spouses. Thus, the importance of affective bonds in older adults is highlighted, as well as the role of the caregiver. Both promote health, prevent disabilities and help to maintain the functional capacity of the person cared for, which results in a reduction in hospitalizations, inappropriate use of medications and isolation[28]. These factors may be associated with the presence of complaints of dizziness[23,29]. It is worth noting that no studies were found that identified an association between marital status and complaints of dizziness in the population with DM2.

The population with DM2 who also suffered from dizziness described the self-perception of general health (60.6%) and vision (58.9%) mostly as poor or very poor. Some studies with methodologies similar to that used in the present study identified a negative self-perception of vision in 48.8%[12], 35.4%[25] and 53.3%[12] in relation to general health in the overall older adult population. This higher prevalence of a negative self-perception of vision may be due to

the aging process, which brings a greater incidence of eye disorders, such as cataracts and glaucoma, and, consequently, causes a decrease in visual acuity, which negatively affects the maintenance of PB[25]. The negative self-perception of general health may have been caused by the increase in the number of diseases along with the dizziness that reduces the quality of life of its patients[2,3,15].

Older adults with complaints of dizziness also exhibited complaints of pain in the lower limbs (55.4%), which is a common symptom of peripheral neuropathy (PN), a comorbidity commonly developed, over time, by patients with DM2. This condition can interrupt afferent and efferent lower limbs, altering proprioception and, consequently, PB[9,30].

Changes in PB are commonly associated with falls and, therefore, older adults with dizziness report a greater fear of falling and a tendency to fall in relation to the older population in general, as seen in the present study and in literature[31,32]. Duarte and Soldera[32] sought to investigate the association between dizziness, fear of falling and the occurrence of falls in older adults, with the results showing that 97.4% of the total sample studied had a fear of falling and, consequently, found their daily activities restricted. It is worth noting that, in addition to limitations in daily activities, fear of falling can also lead to a reduction in self-confidence, and these factors together cause greater dependence and loss of autonomy[31,32].

In addition, there is a high prevalence of anxiety disorder, phobias and depression in older adults with chronic dizziness[16]. However, the present study focused only on investigating depressive symptoms, as this disease can be screened by any health professional. The results of the present study are similar to those of the study by Peluso et al. which found an association between dizziness and depressive symptoms. Thus, the importance of identifying patients with this type of involvement is emphasized, and is essential that they are referred to specialized care, thus improving the process of intervention in their dizziness and quality of life.

The CNS is one of the systems most affected by anatomic-physiological changes resulting from the aging process. Thus, changes in regions responsible

for cognitive functions are common[33]. Skills such as thinking, remembering, reasoning and producing responses to requests and external stimuli can be deficient and hinder the rehabilitation process[33,34]. Patients with DM2 and complaints of dizziness had lower medians in the MMSE, thus presenting a greater probability of cognitive impairment in this population, a fact that may hinder the balance rehabilitation process, in view of the need to change habits, perform exercises and alter routines[33,34].

Among the variables that showed an association with dizziness, special emphasis should be placed on the self-perception of poor or very poor general health, the self-perception of poor or very poor vision and a marital status of unmarried, as logistic regression analysis showed these to be predictors of dizziness. Thus, older adults in these categories have 61%, 62% and 66% more chance, respectively, of developing dizziness, regardless of the other variables.

Some of the studied variables were not associated with the complaint of dizziness in the study population, namely: self-perceived hearing, age, time since diagnosis and laboratory tests (glycated hemoglobin and fasting glycemia).

It is believed that the complaint of dizziness did not exhibit a statistically significant association with the self-perception of hearing, as it can be directly influenced by several factors, among them life context and experience, culture, education and cognition. In addition, presbycusis (hearing loss common in elderly) has a slow, gradual and progressive character, which allows older adults to develop adaptive strategies and, consequently, reduce the negative self-perception related to hearing loss[35].

It is assumed that the age and time since diagnosis of DM2 were not associated with dizziness due to the fact that all older adults evaluated are constantly being monitored by the multidisciplinary medical team, which allows the disorders caused by DM2 to be reduced.

It should be noted that complaints of dizziness are common in older adults, but are not always sufficiently valued by family members and/or medical staff, as they are vague, unspecific or simply considered

innate to the human aging process. However, the description of the complaint provides important information to elucidate the etiology of the condition and/or warn of other disorders, such as hearing, vestibular and memory alterations or risk of falls[8-11].

Therefore, providing diabetic older adults who complain of dizziness with a comprehensive assessment capable of identifying the associated sociodemographic, clinical and psycho-cognitive factors is extremely important from the perspective of developing effective preventive and rehabilitative strategies, as well as to systematize and apply an ideal model of care to this population.

Among the limitations of the present study are the difficulty experienced in obtaining the results of the last laboratory tests (glycated hemoglobin and fasting glucose) of the participants as, although these were requested in advance and access was provided to medical records, there were still losses in the number of patients; the absence of data regarding the triggering factors of the dizziness; and the lack of a causal link, since this study had a cross-sectional design.

It is expected that more studies in this area will be carried out, as literature still provides little information regarding changes in PB in older adults with DM2. With this, it is possible to construct clinical guidelines and public policies that support this population.

CONCLUSION

Among the biopsychosocial factors analyzed in older adults with DM2, it was found that the variables: the female sex, a low education, unmarried marital status, negative self-perception of general health and vision, complaint and intensity of pain in the lower limbs, fear of falling, a tendency to fall, cognitive impairment and psychological symptoms showed a significant association with the complaint of dizziness.

The knowledge of the factors associated with complaints of dizziness in older adults with DM2 allows prevention interventions to be improved, as

well as the methods used to assess postural balance (with the emphasis on sensory systems), general and psycho-cognitive health. Consequently, such knowledge will also help to improve clinical and rehabilitative treatments in order to minimize the occurrence of falls, improve functional capacity and cognitive skills (attention, cognition), thus generating an improvement in quality of life.

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REFERENCES

1. Carneiro DN, Vilela ABA, Meira SS. Evaluation of cognitive deficit, mobility and activities of daily living among elderly. Rev APS. 2016;19(2):203-9.

2. Martinez R, Lloyd-Sherlock P, Soliz P, Ebrahim S, Vega E, Ordunez P, et al. Trends in premature avertable mortality from non-communicable diseases for 195 countries and territories, 1990–2017: a population-based study. Lancet Glob Health. 2020;8(4):511-23.

3. Garcia JS, Ciappina PC, Pereira ECA, Teodoro ECM, Pereira WMP. Evaluation of the functional autonomy of active aged. Rev Ciênc Saúde. 2016;1(1):51-60.

4. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes (2017-2018). São Paulo: AC Farmacêutica; 2017.

5. American Diabetes Association. Classification and Diagnosis of Diabetes. Diabetes Care. 2017;40:11-24.

6. Bittar RSM, Santos MA, Mezzalira R. Glucose metabolism disorders and vestibular manifestations: evaluation through computerized dynamic posturography. Braz J Otorhinolaryngol. 2016;82(4):372-6.

7. Iser BP, Stopa SR, Chueiri OS, Szwarcwald CL, Malta DC, Monteiro HOC, et al. Self-reported diabetes prevalence in Brazil: results from National Health Survey 2013. Epidemiol Serv Saúde 2015;24(2):305-14.

8. Mozetic V, Daou JP, Martimbianco ALC, Riera R. What do Cochrane systematic reviews say about diabetic retinopathy? São Paulo Med J. 2017;135(1):79-87.

9. Maronesi CTP, Cecagno-Zanini SC, Oliveira LZ, Bavaresco SS, Leguisamo CP. Physical exercise in patients with diabetic neuropathy: systematic review and meta-analysis of randomized clinical trials. Fisioter Pesqui. 2016;23(2):216-23.

10. David LZ, Finamor MM, Buss C. Possible hearing implications of diabetes mellitus: a literature review. Rev CEFAC. 2015;17(6):2018-24.

11. Jáuregui-Renaud K, Sánchez B, Olmos A I, González-Barcena D. Neuro- otologic symptoms in patients with type 2 diabetes mellitus. Diabetes Res Clin Pract. 2009;84(3):45- 7.

12. Moraes SA, Soares WJS, Rodrigues RAS, Fett WCR, Ferriolli E, Perracini MR. Dizziness in community-dwelling older adults: a population-based study. Braz J Otorhinolaryngol. 2011;77(6):691-9.

13. Shapovalova MV, Zamergrad MV. Persistent postural perceptual dizziness of the elderly. Zh Nevrol Psikhiatr Im S S Korsakova. 2019;119(9):5-9.

14. Van Vugt VA, Bas G, Van der Wouden JC, Dros J, van Weert HCPM, Yardley L et al. Prognosis and Survival of Older Patients With Dizziness in Primary Care: a 10-Year Prospective Cohort Study. Ann Fam Med. 2020;18(2):100-9.

15. Rocha Júnior PR, Kozan ES, Moraes JF, Pereira FG, Moreno AB. Vestibular rehabilitation in the quality of life and the symptomatology of dizziness among the elderly. Ciênc Saúde Colet. 2014;19(8):3365-74.

16. Peluso ETP, Quintana MI, Ganança FF. Anxiety and depressive disorders in elderly with chronic dizziness of vestibular origin. Braz J Otorhinolaryngol. 2016;82(2):209-14.

17. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc. 1991;39(2):142-8.

18. Van Vugt VA, Van der Horst HE, Payne RA, Maarsingh OR. Chronic vertigo: treat with exercise, not drugs. BMJ. 2017;358:1-10.

19. Bertolucci PH, Brucki SM, Campacci SR, Juliano Y. The Mini-Mental State Examination in a General Population: Impact of Educational Status. Arq Neuropsiquiatr. 1994;52(1): 1-7.

20. Almeida OP, Almeida SA. Confiabilidade da versão brasileira da Escala de Depressão Geriátrica (GDS) versão reduzida. Arq Neuropsiquiatr. 1999;57(2B):421-6.

21. Martins TF, Mancini PC, Souza LM, Santos JN. Prevalence of dizziness in the population of Minas Gerais, Brazil, and its association with demographic and socioeconomic characteristics and health status. Braz J Otorhinolaryngol. 2017;83(1):29-37.

22. Bittar RSM, Lins EMDVS. Clinical characteristics of patients with persistent postural-perceptual dizziness. Braz J Otorhinolaryngol. 2015;81(3):276-82.

23. Ferreira LMBM, Jerez-Roig J, Ribeiro KMOBF, Moreira FSM, Lima KC. Association between continuous use drugs and dizziness in institutionalized elderly people. Rev CEFAC. 2017;19(3):381-6.

24. Gazzola JM, Ganança FF, Aratani MC, Perracini MR, Ganança MM. Clinical evaluation of elderly people with chronic vestibular disorder. Rev Bras Otorrinolaringol. 2006;72(4):515-22.

25. Rosa TS, Moraes AB, Santos Filha VAV. The institutionalized elderly: sociodemographic and clinical-functional profiles related to dizziness. Braz J Otorhinolaryngol. 2016;82(2):159-69.

26. Andrade JMO. Influence of socioeconomic factors on the quality of life of elderly hypertensive individuals. Ciênc Saúde Colet. 2014;19(8):3497-504.

27. Gonçalves LHT, Costa MAM, Martins MM, Nassar SM, Zunino R. A dinâmica da família de idosos mais idosos no contexto de Porto, Portugal. Rev Latinoam Enferm. 2011;19 (3):1-9.

28. Brasil. Ministério da Saúde, Secretaria de Atenção à Saúde, Secretaria de Gestão do Trabalho e da Educação na Saúde. Guia prático do cuidador. Brasília, DF: MS; 2008.

29. Sousa RF, Gazzola JM, Ganança MM, Paulino CA. Correlation between the body balance and functional capacity from elderly with chronic vestibular disorders. Braz J Otorhinolaryngol. 2011;77(6): 791-8.

30. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes (2015-2016). São Paulo: AC Farmacêutica; 2016.

31. Nascimento JS, Tavares DMS. Prevalence and factors associated with falls in the elderly.Texto Contexto Enferm. 2016;25(2): e0360015 [9 p.].

32. Duarte GA, Soldera CLC. Associação entre queixa de tontura, medo de cair e ocorrência prévia de idosos. Rev Bras Geriatr Gerontol. 2013;7(3):208-14.

33. Andrade FLJP, Lima JMR, Fidelis KNM, Jerez-Roig J, Lima KL. Cognitive impairment and associated factors among institutionalized elderly persons in Natal, Rio Grande do Norte, Brazil. Rev Bras Geriatr Gerontol. 2017;20(2):186-97.

34. Melo BRS, Diniz MA, Casemiro FG, Figueiredo LC, Santos-Orlandi AA, Haas VJ et al. Cognitive and functional assessment about elderly people users of health public servisse. Esc Anna Nery Rev Enferm. 2017;21(4): e20160388 [8 p.].

35. Costa-Guarisco LP, Dalpubel D, Labanca L, Nisihara MH. Perception of hearing loss: use of the subjective faces scale to screen hearing among the elderly. Ciênc Saúde Colet. 2017;22(11):3579-88.

Situational diagnosis of older adults with diabetes mellitus in a city in the state of Ceará, Brazil

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Abstract

Objective: To describe the situational diagnosis of older adults with diabetes mellitus (DM) registered at a Basic Family Health Unit, using sociodemographic profile, health conditions and lifestyle. *Method:* A descriptive, cross-sectional study was carried out with 70 older adults in the city of Jijoca de Jericoacoara, Ceará, Brazil. Data were gathered from questionnaires on sociodemographic conditions, health and individual lifestyle profile, and were submitted to descriptive statistics techniques, and the results presented in tables. *Results:* The predominance of women was three times greater than men (52=74%); the mean age was 71.19 years (±7.12); the number of married people was higher than the other categories (44=62.8%); the vast majority of the sample received a pension equivalent to the minimum wage as a rural worker (64=91%); and just over half declared themselves to be literate (36=51.4%). In terms of health conditions, the majority (56=80%) had had DM for more than 10 years, although they considered their health status to be satisfactory (40=57.14%). Among the main complications were hypertension (n=53; 75.71%), muscle and joint pain (n=43; 61.43%) and hearing loss (48=68.57%). *Conclusion:* The present study provided indicators for the planning and execution of educational actions, based on interprofessional collaboration aimed at the promotion of health.

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INTRODUCTION

Diabetes *mellitus* (DM) is a chronic disease that represents a serious public health problem due to its high global prevalence, which is higher still among older adults, the morbidity it causes, and as it is one of the main cardiovascular and cerebrovascular risk factors. Its prevalence is also related to a sedentary lifestyle and the stress of urban life[1].

The population of people with diabetes in Brazil is estimated at 13 million and the country occupies 4th position in the global ranking. Between 2006 and 2017, according to data from the Surveillance of Risk and Protection Factors for Chronic Diseases by Telephone Survey (or VIGITEL), the percentage of diabetes cases in the country rose from 5.5% to 8.9%. This survey also revealed an increase in cases of 54% among men and 28% among women, highlighting the increase in those aged over 65 and with only eight years of schooling (24% and 14.8%, respectively)[2].

Considering the magnitude of the disease and its negative effects on the health of individuals, systematic monitoring becomes an important intervention strategy and method of controlling possible complications. When the disease reaches older adults, who have complex health demands, services must be able to respond adequately to the needs not only of disease prevention and control, but also of promoting active and healthy aging[3].

In this context, the Family Health Strategy (FHS) aims to encourage the reorientation of health practices and actions, structured around the work of multiprofessional teams. By establishing the family as the center of care, it encourages bonds and contributes to continuous actions to promote health and education, aimed at the autonomy and well-being of individuals[4].

In addition, the health care model proposed by the FHS presents a new perspective of care and a continuous stimulus to an advanced practice, aimed at the community as a whole. However, in order to carry out health practices consistent with the needs of the territory, it is necessary to strengthen the autonomy of the actors involved in the care process, breaking with traditional models of health care, valuing human singularities and knowledge of the reality and risks to which the population is exposed[5].

This study is justified by the need to understand the reality of older adults diagnosed with diabetes and how their sociodemographic, health and lifestyle conditions can influence adherence to treatment and improve quality of life. It is also a relevant study for health professionals who are involved in the care of older adults, as it can guide them towards providing effective and comprehensive care aimed at meeting the biological and psychosocial needs of such users.

Thus, the objective of the present study was to describe the situational diagnosis of older adults with DM registered in a Basic Family Health Unit based on sociodemographic profile, health conditions and lifestyle.

METHOD

A descriptive, cross-sectional study, with a quantitative approach, was carried out in the municipality of Jijoca de Jericoacoara, Ceará, Brazil, with data collection taking place from April to July 2019.

This study is an excerpt from a study entitled *Interprofessional Collaboration in the Promotion of Healthy Lifestyles for the Older Population with Diabetes Mellitus.*

Jijoca, until 1989, was a district of the city of Cruz. Pursuant to Law No. 11,796 of 1990, it became an autonomous municipality, with Jericoacoara beach becoming part of its territory, and changed its name to Jijoca de Jericoacoara. It is 287 km from the capital Fortaleza and belongs to the northwestern mesoregion of Ceará[6] and the 12th Acaraú region[7], integrating Jericoacoara National Park.

According to data from the Brazilian Institute of Geography and Statistics (IBGE), the municipality had an estimated population of 19,816 people in 2019; a territorial area of 204,793 km²; a HDI of 0.652 (average) and a GDP per capita of R$11,443.58. Tourism is its main economic source, through Jericoacoara beach[8].

The municipality has six Basic Health Units where seven FHS teams work, supported by an Extended Family Health Center (EFHC) team.

For the selection of participants, a survey of the number of older adults, aged from 60 years old, with a medical diagnosis of DM was carried out by community health agents in their respective micro-areas, and the area with the largest number of patients with this profile was chosen. The team selected recruited more older adults, giving a total of 107 users. It was decided to exclude bedridden users and those restricted to home from the study, since, from this diagnostic stage, a collective educational intervention would be carried out, and 85 older people were ultimately identified.

For the sample calculation, a population of 85 older adults was used, with a 95% confidence interval and a margin of error of 5%, which resulted in a sample of 70 older adults. Everyone who agreed to participate in the research signed an Informed Consent Form (ICF), ensuring the right to privacy, secrecy, access to data or any other information, as well as the freedom to withdraw from the study, if they so wished.

The data collection instruments were: a Sociodemographic Questionnaire, which addressed issues related to sex, age, profession, education, income and whether the participant lived with people over 65; a Questionnaire on Health Conditions that considered Body Mass Index (BMI), self-reported health status, the presence of comorbidities (cardiovascular disease, respiratory disease, hypertension, depression, among others already listed in the questionnaire), the self-reporting of some symptoms also already contained in a list in the questionnaire (urinary incontinence, vision loss, feeling of sadness, loss of hearing, difficulty walking, among others) and the occurrence of falls and fainting in the six months before the interview.

The BMI considers the following cut-off points and classifications for older adults (≥60 years): Low weight ≤22; Adequate or Normal Weight>22 and <27; Overweight ≥27, according to the Food and Nutrition Surveillance System (or SISVAN)[9].

Another instrument was the Individual Lifestyle Profile (or ILP) developed by Nahas et al.[10] and validated by Both et al.[11], which evaluated the components of nutrition, physical activity, preventive behavior, relational behavior and stress control. The first two instruments were adapted from the study by Pimenta et al.[12] and all were applied at home.

The Lifestyle Profile scale comprises a total of 15 questions, three for each of the lifestyle components. Each question has a Likert scale answer ranging from 0 to 3. The values 0 and 1 are linked to a negative lifestyle profile, which correspond respectively to: *is absolutely not part of my lifestyle* and *sometimes corresponds to my behavior*. The responses associated with a positive profile are values 2 and 3, which describe, respectively: *almost always true for my behavior* and *always true in my daily life*[10]. Each component can score a maximum of 9 points and both the average and the median can vary from 0 to 3.

The Shapiro-Wilk test was performed to assess the distribution of data at a 95% confidence interval (*p-value*<0.05), followed by descriptive analysis of the data.

For the descriptive analysis of the components of the Lifestyle Profile Scale, the median (Ma) was used, as the variables did not comply with the assumptions of normality according to the Shapiro-Wilk Test. The median of each individual was calculated for each component of the scale, followed by the median of the total sample, the interquartile range (IIQ), minimum value (Min) and maximum value (Max), calculated by component and sex. Medians with values ≥2 were considered positive behavior.

This research was submitted to the Ethics Committee of the Universidade Estadual Vale do Acaraú, following Resolution 466/12, dated December 12, 2012 for research involving human beings, and was approved under opinion No. 3,241,908.

RESULTS

Of the total of 70 older adults approached, most were women (74%), while the average age of the participants was 71.19 years (±7.12), with a maximum age of 89 years and a minimum age of 60 years. The women were older than the men, as can be seen in Table 1.

With regard to marital status, most women (51.9%) and men (94.5%) were married. The majority of both sexes were farm workers (33 (63.4%) of the women and 17 (94.5%) of the men). Pensions were the most cited source of income among the participants, with 47 (90.4%) of the women and 17 (94.5%) of the men receiving this social security benefit. Regarding education, 30 (57.7%) of the women reported knowing how to read and write and 12 (66.7%) of the men reported not knowing how to read and write. Most women, 28 (53.8%) stated that they had only 3 to 4 years of schooling. Among men, 8 (44.4%) reported having no education and 8 (44.4%) reported having 3 to 4 years of schooling. Regarding family life, the majority of women and men, 27 (52%) and 14 (78%) respectively, stated that they lived/resided with people over 65 years of age (Table 1).

Table 1. Sociodemographic characterization of the older participants. Jijoca de Jericoacoara, Ceara, 2019.

Variables	Women 52 (74%)	Men 18 (26%)
Average Age (±)	70.61 (±7.11)	72.83 (±7.19)
Age group (years)		
60 – 64	11 (21.1%)	2(11.1%)
65 – 69	15 (28.8%)	4(22.2%)
70 – 74	11 (21.1%)	6(33.3%)
75-79	9 (17.3%)	2(11.1%)
80 or +	6 (11.5%)	4(22.2%)
Marital status		
Married	27 (51.9%)	17(94.5%)
Widowed	20 (38.4%)	0
Divorced	2 (3.8%)	0
Separated	3 (5.7%)	1 (5.5%)
Profession		
Farm worker	33 (63.4%)	17 (94.5%)
Home worker	5 (9.6%)	0
Seamstress	5 (9.6%)	0
Other	9 (17.3%)	1 (5.5%)
Income Source		
Pension	47 (90.4%)	17 (94.5%)
Private pension	1 (1.9%)	0
Social payments	3 (5.8%)	0
Work	1 (1.9%)	1 (5.5%)
Literacy (Can read/write)		
Yes	30 (57.7%)	6 (33.3%)
No	22 (42.3%)	12 (66.7%)
Education		
None	17 (32.7%)	8 (44.4%)
From 3 to 4 years of schooling	28 (53.8%)	8 (44.4%)
9 years of schooling	6 (11.6%)	2 (11.1%)
Higher Education	1 (1.9%)	0
Cohabitants> 65 years old (lives/resides>65 years old (lives/resides with people older than 65 years old)		
Yes	27 (52%)	14 (78%)
No	25 (48%)	4 (22%)

Table 2 shows the health conditions of the older adults, broken down by sex. It was found that 40 (57.14%) considered their health status to be satisfactory (good/very good), while 38 (54.29%) were overweight. The mean BMI was 27.48 (± 3.45) with a maximum value of 35.58 and a minimum value of 17.30. Thus, in the present study, BMI revealed a prevalence of overweight older adults with DM (54.29%).

It was also observed that the most prevalent comorbidities were hypertension and arthritis; the most cited symptoms and manifestations were persistent sadness, muscle and joint pain and hearing loss. Falls and blackouts were not frequent. Of the 17 (24.29%) who had a fall episode, 7 (41.18%) needed the help of others to get up.

Table 3 shows the medians broken down by sex and their classification for each component of the ILP scale. It is noteworthy that *physical activity* had a negative profile classification for both men and women. The *nutrition* component, however, was classified as positive for both sexes, although men had a lower score than women. The other components evaluated presented maximum scores and were classified as having a positive profile.

Table 2. Relationship of the distribution of the health condition variables: health status; BMI; diseases combined with DM; symptoms and manifestations; falls and fainting episodes and reactions after the fall. Jijoca de Jericoacoara, Ceara, 2019.

Variables	Men n (%)	Women n (%)
Satisfactory health status (good/very good)	13 (72.22%)	27 (51.92%)
Overweight	10 (55.56%)	28 (53.85%)
Stroke	6 (33.33%)	3 (5.77%)
Cardiovascular disease	4 (22.22)	4 (7.69%)
Parkinson	1 (5.56%)	0
Arthritis	0	24 (46.15%)
Oncological Disease	0	1 (1.92%)
Respiratory disease	1 (5.56%)	5 (9.62%)
Alzheimer's disease	1 (5.56%)	1 (1.92%)
Depression	1 (5.56%)	9 (17.31%)
Systemic Arterial Hypertension	8 (44.44%)	45 (86.54%)
Urinary incontinence	6 (33.33%)	20 (38.46%)
Feeling of sadness	3 (16.67%)	28 (53.85%)
Memory Loss	4 (22.22%)	20 (38.46%)
Musculoskeletal and Osteoarticular Pain	5 (27.78%)	38 (73.08%)
Difficulty walking	4 (22.22%)	20 (38.46%)
Constant imbalances	7 (38.89%)	20 (38.46%)
Reduced vision	4 (22.22%)	11 (21.15%)
Hearing loss	10 (55.56%)	38 (73.08%)
Falls/Blackouts (last 6 months)	4 (22.22%)	13 (25%)
Needed help getting up after a fall	1 (25%)	6 (46.15%)

Table 3. Measures of central tendency of Lifestyle Profile scale scores and the classification of each component broken down by sex. Jijoca de Jericoacoara, Ceara, 2019.

Lifestyle Profile Scale Component	Men			Women		
	Median	Range (Min-Max)	Classification	Median	Range (Min-Max)	Classification
Nutrition	2	0 – 3	Positive Profile	3	0 - 3	Positive Profile
Physical activity	0,5	0 – 3	Negative Profile	1	0 - 3	Negative Profile
Preventive behavior	3	2 - 3	Positive Profile	3	0 - 3	Positive Profile
Relational behavior	3	1 - 3	Positive Profile	3	0 - 3	Positive Profile
Stress Management	3	1 - 3	Positive Profile	3	0 - 3	Positive Profile
Lifestyle Profile Scale	3	1 - 3	Positive Profile	3	1 - 3	Positive Profile

DISCUSSION

The predominance of women in the population studied can be explained by the feminization of aging phenomenon, and also reflects the tendency of women to have a greater perception of diseases and self-care, seeking medical care more frequently in order to increase the probability of the diagnosis of disease[13].

The findings related to gender corroborate those of the National Health Survey (or PNS) carried out in 2013, in which women (7.0%) had a higher proportion of reports of diabetes diagnosis than men (5.4%)[14].

The average age of the sample was close to 72 years, which is in line with the epidemiological transition that Brazil is currently experiencing, characterized by an aging population and the prevalence of chronic diseases, such as diabetes itself. It is also important to note that the great majority of diabetes cases manifest themselves after the age of 40[15].

As for age groups, most of the sample was aged between 60 and 74 years old, while women were younger, aged between 65 and 69 years old (27.14%). There was a prevalence of women aged between 65 and 69 years old (n=15; 28.8%) while most men were aged between 70 and 74 years old (n=6; 33.3%) The diagnosis of the disease becomes more common among older individuals[16].

With regard to schooling, the findings of this study agreed with PNS data, as most participants reported having only a basic level of education, referring to the first years of schooling. The 2013 PNS found that the educational level that showed the highest prevalence of diabetes diagnosis was uneducated and those with an incomplete elementary school, with 9.6%[14].

A pension was the source of income most cited by participants (91%). Such benefit comes from a working life spent in rural areas, especially in agriculture, as 71% of the older adults reported that they worked as farm workers.

In economic terms, a pension is of great significance, as it guarantees older adults their livelihood and the provision of their needs, in addition to increasing their household income, as before they basically depended on income from agricultural work, which it is not always stable or guaranteed[15,16]. In the study by Wanderley et al.[17], the minimum wage, derived from a pension, was also the most reported family income among older adults with diabetes.

As for the findings regarding health status, 57.14% of the participants considered their health to be satisfactory (good/very good). This data is similar to that found in the study by Ferraz et al.[18], carried out with older adults diagnosed with diabetes and hypertension in a city in the state of Bahia, in which 50.6% of the participants also considered their health status to be good.

It is believed that the fact that older adults with diabetes declare their health status to be good is related to the control of pathologies and access to

medication and monitoring at the health unit, which is a positive point, demonstrating the possibility of control of the condition, and the fact that these older adults learn to live with diseases and develop coping strategies[19].

Another variable assessed within the health conditions was BMI. BMI is a measure of body composition, which determines whether body mass (weight) is within the recommended range for health. It is useful for the nutritional diagnosis of older adults, in addition to being a simple method which can effectively predict future diseases, mortality and functional disability, and can be used as an initial screening technique, both for the diagnosis and the monitoring of diseases[9].

The present study found that the majority of the older adults (54.29%) were overweight, with emphasis on men (55.56%). It should be highlighted that the male participants of this study also had scores ≤2 in the evaluation of the nutrition and physical activity components, fundamental aspects for the reduction/control of weight, highlighting the existence of risk behaviors in daily routines.

The Brazilian Diabetes Society reports that a 5 to 10% decrease in body weight can reduce blood glucose levels, postpone the progression of the disease, reduce insulin needs and, even in initial cases, allow the withdrawal of pharmacological treatment[2].

The high prevalence of overweight older adults is associated with the aging process, which is accompanied by several changes, among which are changes in the body composition of individuals, which occur as a natural factor of senescence and/or due to the occurrence of metabolic disorders[20].

With regard to diseases associated with diabetes, there was a prevalence of hypertension, with an especially high percentage among women (86.54%).

This finding also warns of a concern of the Ministry of Health in recent years, as the combination of Systemic Arterial Hypertension (SAH) and DM is even more dangerous with possible complications, as the use of medication is greater and diet and eating requires greater care, and are sometimes not properly performed. In addition, the main cause of morbidity and mortality of the Brazilian population, according to the Ministry of Health, is cardiovascular disease, where two of the main risk factors are SAH and DM[21].

Another disease mentioned by the participants was arthritis, with a notable prevalence among women, as none of the older men reported having this disease. This finding is consistent with literature, which reveals that the disease affects mainly women over 40 years of age. The female sex is more affected by arthritis than the male sex at a proportion of approximately 3:1, with some studies highlighting an even worse prognosis among women[22].

As for symptoms and manifestations, hearing loss (68.57%), musculoskeletal and osteoarticular pain (61.43%) and persistent sadness (44.29%) prevailed among the participants. It should be highlighted that substantiating the findings related to arthritis, the majority of women (73.08%) again reported symptoms of musculoskeletal and osteoarticular pain. These data reflect the need for Family Health professionals to develop alternative care and therapeutic strategies, especially in the field of health promotion, with a view to preventing the worsening of the health of patients who, in addition to such comorbidities, also had a sedentary lifestyle, as shown in the physical activity component of the ILP scale.

Hearing loss was the most prevalent symptom among participants in this study. Age-related hearing loss is one of the most frequent and disabling physiological changes in the human aging process. Such a loss can trigger problems related to the social and family participation of older adults, who often show less interest in carrying out daily activities, in addition to perceiving themselves as helpless when faced with life and in relation to others[23].

Such a feeling of helplessness can lead to distancing and a low demand for health services. The challenge for FHS professionals is to ensure access for this population with impaired hearing, which must be strengthened and improved in order to guarantee continuity of treatment and integral care.

The feeling of persistent sadness was also frequently reported among women (53.85%). Confirming this fact, literature shows that the feeling of sadness associated with loneliness is often

related to mourning, resulting from the death of a spouse, and mainly affects women, who are more often widowed. These negative feelings can worsen and determine symptoms of a depressive condition, associated with physical weakness, emotional fragility and difficulties in family and social relationships[24].

Regarding falls, while the present study did not present a high prevalence of such events among the participants, it is important to highlight that the early and correct identification of the main risk factors for falls converges with the possibility of preventing such accidents and, consequently, improving the quality of life of the older adults[17].

As for lifestyle, the scale used allowed this characteristic to be considered individually, so that later, intervention strategies and directive sessions could be implemented to reduce less healthy lifestyles.

The *nutrition* and *physical activity* components had the lowest scores, and were classified as negative, with men obtaining a lower score than women. In relation to physical activity, Da Silva et. al.[25] statistically demonstrated that the practice of regular physical activity declines as age increases, falling to between 20.7% and 27.5% in studies conducted in Brazil.

Regarding nutrition, participants of both sexes had a positive profile classification, although men had a lower score than women. In the older population, it is also important to consider variables at personal, family and community levels. The causes and influences that lead to unhealthy food choices are complex and multidimensional, and greater investments in research, surveillance, prevention, health promotion and the support of healthy living are required[26, 27].

The five components analyzed by the Nahas Lifestyle Profile Scale (nutrition, physical activity, preventive behavior, social relationships and stress control) are essential for people in all age groups, as they are complementary, reveal interdependence and specificity, allowing the individual's lifestyle, way of

thinking and acting to be identified, all of which have a great influence on general health and quality of life.

Although the findings of studies of this nature cannot be expanded to more general populations, the relevance for planning and decision-making by health professionals and local managers is undeniable, as they allow the planning of actions to prevent diseases and injuries based on a real context.

CONCLUSION

The realization of the present study allowed the sociodemographic and clinical characterization of older adults treated by Primary Health Care professionals, providing a situational diagnosis and an analysis of health indicators, which can be replicated in new scenarios. In terms of sociodemographic data, there was a predominance of women and the marital status of married, and the main source of income cited was pensions. With regard to clinical conditions, more than half of the participants of both sexes were overweight, the most cited comorbidities were hypertension and arthritis and the most common symptoms were sadness and hearing loss.

When constructing the situational diagnosis of older adults with diabetes, it is noticeable that this is one of the main diseases that greatly affect different aspects of the lives of these patients and reveals the complexity involved in reorienting lifestyle based on this medical diagnosis.

For this reason, the FHS must seek to help individuals with diabetes make changes in their lifestyle, by raising the population's awareness of the importance of health promotion (suitable eating habits, an active life favoring the reduction of risk behaviors on a daily basis). Furthermore, situational diagnosis enables the provision of specific and qualified care and is of great importance for the foundation of care based on interprofessional collaboration.

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REFERÊNCIAS

1. World Health Organization. Informe mundial sobre la diabetes: Resumen de Orientación. Genebra: WHO; 2016.

2. Sociedade Brasileira de Diabetes. Posicionamento Oficial SBD nº 01/2019. Conduta Terapêutica no Diabetes Tipo 2: Algoritmo SBD [Internet]. São Paulo: SBD; 2019 [acesso em 28 ago. 2019]. Disponível em: https://www.diabetes.org.br/publico/images/pdf/sbd_dm2_2019_2.pdf

3. Schenker M, Costa DH. Avanços e desafios da atenção à saúde da população idosa com doenças crônicas na Atenção Primária à Saúde. Ciênc Saúde Colet [Internet]. 2019 [acesso em 28 ago. 2019];24(4):1369-80. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232019000401369&tlng=pt

4. Duarte ENC, Marques APO, Leal MCC. Qualidade de vida em idosos diabéticos assistidos na estratégia de saúde da família. Rev Baiana Saúde Pública. 2018 [acesso em 02 set. 2019];42(1):109-25. Disponível em: http://rbsp.sesab.ba.gov.br/index.php/rbsp/article/view/2501/2442

5. Lanzoni GMM, Meirelles BHS, Cummings G. Práticas de liderança do enfermeiro na atenção básica à saúde: uma teoria fundamentada nos dados. Texto & Contexto Enferm. 2016 [acesso em 25 ago. 2019];25(4):1-9. Disponível em: http://www.scielo.br/scielo.php?pid=S0104-07072016000400305&script=sci_arttext&tlng=pt

6. Programa das Nações Unidas para o Desenvolvimento. Atlas do desenvolvimento humano no Brasil [Internet]. S.l: PNUD; 2013. Disponível em: http://atlasbrasil.org.br/2013/

7. Ceará. Secretaria de Saúde, Coordenadoria de Promoção e Proteção à Saúde, Núcleo de Informação e Análise em Saúde. Caderno de Informação em Saúde: Região de Saúde Acaraú. Fortaleza: SESA; 2014.

8. Instituto Brasileiro de Geografia e Estatística. Cidades. Jijoca de Jericoacoara [Internet]. Rio de Janeiro: IBGE; [1995] [acesso em 14 jun. 2018]. Disponível em: http://www.cidades.ibge.gov.br/xtras/perfil.php?lang=&codmun=230725&search=ceara|jijoca-de-jericoacoara

9. Brasil. Ministério da Saúde. Orientações para coleta e análise de dados antropométricos em serviços de saúde: norma técnica do sistema de Vigilância Alimentar e Nutricional. Brasília, DF: Ministério da Saúde; 2011[acesso em 20 maio 2019]. (Série G. Estatística e Informação em Saúde). Disponível em: http://dab.saude.gov.br/portaldab/biblioteca.php?conteudo=publicacoes/orientacoes_coleta_analise_dados_antropometricos

10. Nahas MV, Barros MGV, Francalacci V. O pentáculo do bem estar: base conceitual para a avaliação do estilo de vida em indivíduos ou grupos. Rev Bras Ativ Fís Saúde. 2000;2(5):48-59.

11. Both J, Borgatto AF, do Nascimento JV, Sonoo CN, Lemos CAF, Nahas MV. Validação da escala "perfil do estilo de vida individual". Rev Bras Ativ Fís Saúde. 2008;13(1):5-14.

12. Pimenta SE, Martins MM, Monteiro C, Reis SM, Martinho J. Elderly people with limited mobility: their families and the implications of their dependency. Rev ROL Enferm. 2018 [acesso em 20 jun. 2018];41(11-12):217-21. Disponível em: http://comum.rcaap.pt/handle/10400.26/31742

13. Vitoi NC, Fogal AS, Nascimento CM, Franceschini SCC, Ribeiro AQ. Prevalência e fatores associados ao diabetes em idosos no município de Viçosa, Minas Gerais. Rev Bras Epidemiol [Internet]. 2015 [acesso em 12 set. 2019];18(4):953-65. Disponível em: https://www.scielosp.org/article/rbepid/2015.v18n4/953-965/

14. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde: 2013: Percepção do estado de saúde, estilos de vida e doenças crônicas [Internet]. Rio de Janeiro: IBGE; 2015 [aceso em 02 out. 2019]. Disponível em: https://biblioteca.ibge.gov.br/visualizacao/livros/liv94074.pdf

15. Roos AC, Baptista DR, de Miranda RC. Adesão ao tratamento de pacientes com Diabetes Mellitus tipo 2. DEMETRA [Internet]. 2015 [acesso em 05 ago. 2019];10(2):329-46. Disponível em: https://www.e-publicacoes.uerj.br/index.php/demetra/article/view/13990

16. Flor LS, Campos MR. Prevalência de diabetes mellitus e fatores associados na população adulta brasileira: evidências de um inquérito de base populacional. Rev Bras Epidemiol [Internet]. 2017 [acesso em 28 Set. 2019];20(01):16-29. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1415-790X2017000100016&lng=pt&tlng=pt

17. Wanderley RMM, da Cunha DGP, Felisberto MAS, de Oliveira BRS, Bittencourt GKGD, Amaral AKFJ, et al. Avaliação da condição de saúde da pessoa idosa na atenção básica. Rev Enferm UFPE. 2019;3(2):472-82.

18. Ferraz MOS, Dos Reis LA, Lima PV. Condições de saúde de idosos portadores de Diabetes mellitus e hipertensão arterial sistêmica. Rev Multidiscipl Psicol [Internet]. 2017 [acesso em 01 set. 2019];10(33):56-71. Disponível em: https://idonline.emnuvens.com.br/id/article/view/599/856

19. Brasil. Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus. Brasília, DF: MS; 2013.

20. Burgos MGPA, dos Santos EM, Morais AACL, Santos OS, Melo NCO, Costa MBM. Consumo de macro e micronutrientes de idosos com diabetes mellitus tipo 2 atendidos no núcleo de apoio ao idoso. Med (Ribeirão Preto) [Internet]. 2019 [acesso em 30 ago. 2019];52(2):121-7. Disponível em: https://www.revistas.usp.br/rmrp/article/view/159721

21. Brasil. Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Estratégias para o cuidado da pessoa com doença crônica: diabetes mellitus. Brasília, DF: Ministério da Saúde; 2013.

22. Pereira MS, Luz DCM, Ramos JMN, Khouri PBS, Viana Neto RE, Souza CMF, et al. Avaliação do perfil sociodemográfico, clínico, laboratorial e terapêutico dos pacientes com artrite reumatoide em um ambulatório-escola de Teresina, Piauí. Arch Health Invest. 2017;6(3):125-8.

23. Camargo C, Lacerda ABM, Sampaio J, Lüders D, Massi G, Marques JM. Percepção de idosos sobre a restrição da participação relacionada à perda auditiva. Distúrb Comun [Internet]. 2018 [acesso em 02 out. 2019];30(4):736-47. Disponível em https://revistas.pucsp.br/dic/article/viewFile/35364/27293

24. Meneses DLP, da Silva Júnior FJG, Melo HDSF, Carvalho J, de Sousa Luz VLE, Figueiredo MDLF. A dupla face da velhice: o olhar de idosos sobre o processo de envelhecimento. Enferm Foco [Internet] 2013 [acesso em 02 out. 2019];4(1):15-8. Disponível em http://revista.cofen.gov.br/index.php/enfermagem/article/view/495

25. Da Silva E, de Souza AC, Kumpel C, Souza JS, Porto EF. Estilo de vida de indivíduos usuário do sistema único de saúde. Life Style [Internet]. 2018 [acesso em 03 out. 2019];5(2):61-5. Disponível em: https://revistas.unasp.edu.br/LifestyleJournal/article/view/1073

26. Brasil. Ministério da Saúde. Relatório do 3º Fórum de monitoramento do plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis no Brasil. Brasília, DF:MS; 2018.

27. Organização das Nações Unidas. FAO alerta para obesidade na América Latina e Caribe [Internet]. [S.l] : ONU; 2018 [acesso em 07 mar 2018]. Disponível em: http://bit.ly/35I8WAQ

The Brazilian version of the Home Falls and Accidents Screening Tool (HOME FAST): translation, cross-cultural adaptation, validation and reliability

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Abstract

Objective: to translate and cross-culturally adapt the Home Falls and Accidents Screening Tool – HOME FAST into Brazilian Portuguese and to evaluate its construct validity and intra-and inter-rater reliability. *Method:* a cross-sectional study was carried out that included older people aged 60 years or older. Translation and cross-cultural adaptation were carried out in the following stages: 1. Translation, 2. Synthesis, 3. Back translation, 4. Expert panel (review and pre-final version), 5. Pre-testing, 6. Analysis by the expert panel and the final version of the instrument. The Berg Balance Scale – BBS was used to test construct validity (Spearman correlation coefficient). Additionally, intra-and inter-rater reliability analysis was conducted using the Intraclass Correlation Coefficient (ICC) and the Bland-Altman plot. Results were considered significant at $p<0.05$. *Results:* the HOME FAST-Brazil was applied to 53 older people with a mean age of 71(5) years; 79% (42) of whom were female and 21% (11) of whom were male. The translation and cross-cultural adaptation process resulted in similar versions among translations. The correlation of the total score of HOME FAST-Brazil with the BBS was $\varrho=-0.241$, $p=0.041$. The reliability rate was ICC=0.99 and 0.92 (intra-and inter-rater, respectively). *Conclusion:* The HOME FAST-Brazil, translated and cross-culturally adapted to Brazilian Portuguese, was shown to have construct validity and excellent intra-and inter-rater reliability.

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INTRODUCTION

Falls are considered a global public health issue, and significantly contribute to the increase in the rate of injuries, hospitalizations, and deaths among the older population[1]. Approximately 30% of older people fall at least once a year, and the home environment is the main location of falls[1-4].

Factors related to falls can be intrinsic, such as dysfunctions in the systems involved in postural control (the sensory, musculoskeletal and central nervous systems). Their risk factors can also be extrinsic, and include environmental risks, such as loose mats, slippery surfaces, poor lighting, inadequate clothes and shoes, poorly kept public roads, among others[1].

Review studies have shown the most prevalent environmental factors related to falls are irregular, wet, or slippery floor surfaces, loose objects and/or mats, uneven ground and issues with stairs[5,6]. Rossetin et al.[7] pointed out that environmental hazards, such as stairs, mats and loose tiles, were more present in the homes of older people who fell than in the homes of those who did not. Additionally, an association between falls and environmental factors was found among older people, such as stairs; uneven floors; pets, lack of anti-slip mats in the bedroom and kitchen; and objects on the bedroom floor[8].

The number of household hazards and injuries related to falls may be reduced when there is an evaluation and interventions to improve the environment and guide residents on the risks present to older people within their own homes[1,9-12]. This usually requires an in-person visit to the home. Additionally, the risk of falls among older people may also be reduced by regular multimodal exercises (balance, strength, flexibility), physical therapy, and the review of psychotropic drugs[1,12,13].

Some standardized instruments with demonstrated clinometric properties have already been developed for measuring home hazards related to risk of falls among older people living in the community. The Home Falls and Accidents Screening Tool (HOME FAST) was one such instrument, and demonstrated strong potential for evaluating home hazards, with a cut-off point for the risk of falls[14]. Nonetheless, most of the instrument available take a long time to apply, do not relate to the functionality of older adults in performing home activities, have no cut-off point for risk of falls and/or are not translated and validated into Brazilian Portuguese. Therefore, standardized instruments designed to assess risk of falls within residential environments in Brazilian Portuguese are lacking, which in turn, means that preventative strategies for falls may not be based on accurate data.

The HOME FAST is composed of items assessing safety, function and mobility factors in the homes of older adults, and was developed in order to address the main risk factors for falls within the home[15]. This instrument has good potential for assessing the domestic risks linked to falls, since it has satisfactory evidence on psychometric and clinical properties and requires minimal training. Moreover, this material is designed specifically for older people at risk of falling, comprises fewer items and is openly available[14,16].

Considering the need for assessment of the risk of falls in the home environments of older Brazilians, and the lack of instruments in Brazilian Portuguese, the objective of the present study was to translate and cross-culturally adapt the *Home Falls and Accidents Screening Tool* into Brazilian Portuguese and assess both its construct validity and intra-and inter-rater reliability.

METHOD

This is a cross-sectional study of the translation, cross-cultural adaptation and assessment of psychometric properties, and was approved by the Ethics Committee of Faculdade Dom Bosco, Paraná (register 1.203.602), Curitiba City Hall, and the State Department of Health (register 1.254.580), all in Brazil, according to National Health Council Resolution 466/2012. Prior consent from the creator of the HOME FAST was obtained from Dr. Lynette Mackenzie, at the University of Sydney, Australia.

The inclusion criteria were: older people of both sexes, aged 60 years or older, who were initially assessed in Health Care Centers in the city of Curitiba (Paraná) and who agreed to home visits from the researchers on two occasions. Data collection

occurred between June 2016 and February 2018. Individuals with neurological or musculoskeletal problems which could limit their performance in the procedures of the study were excluded.

The following data were evaluated in order to characterize the sample: sex; age; height and weight, to calculate Body Mass Index (BMI), measured by scales and stadiometers; residence (single-story house; multi-story house or apartment); whether the older adult lives alone or, if not, who they share their home with (spouse; children; others); schooling (illiterate; 1-4 years; 5-8 years; >8 years); and falls in the last year, through the question: *have you fallen in the last 12 months?* Participants were also asked about the place where the fall occurred.

The HOME FAST instrument has the goal of assessing the risk of falls within the homes of older people. A rater, together with the older person and/or caregiver, visited the house and checked the rooms, in order to assess the presence of environmental attributes that could trigger a fall event, as well as the attitudes of the older person in the face of these risks. The use of the HOME FAST requires an observational assessment to be made of how the older person manages each item assessed in their home[15].

In total, the HOME FAST contains 25 items related to key safety factors, functional tasks and the individual's mobility in domestic environments. The items refer to the floors, furniture, lighting, bathroom, storage, stairs, and function/mobility. Each item contains a definition to guide the evaluator, and questions must be answered with *yes, no*, or, in some cases, *not applicable*. The result is given by the sum of the answers marked only as *no*. The closer the final sum is to 25 points, the higher the risk of falls within the domestic environment[15].

The questions can also be grouped under seven domains: floors, furniture, lighting, bathroom, storage, stairways/steps and mobility[15]. Additionally, if a score of 8 points or more is achieved, the home environment is considered as containing a high risk of falls[17].

Translation and cross-cultural adaptation of the HOME FAST were performed according to Beaton et al.[18], following the stages: 1. Translation; 2. Synthesis; 3. Back translation; 4. Expert panel (review and pre-final version); 5. Pre-testing; 6. Analysis by the expert panel and the final version of the instrument.

1. Two bilingual translators (Portuguese/ English), native to Brazil, fluent in both languages, independently performed the translation of the instrument into Brazilian Portuguese. One of the translators is a health professional, with prior knowledge of the objectives of the study, and the other is an English language teacher. This stage resulted in two initial translations in Portuguese: version 1 (T1) and version 2 (T2). It is worth noting that the instrument was translated in its entirety, including the definitions for each question, in order to guide the evaluators.

2. Both translations were compared and analyzed in a meeting with the translators and the researchers involved in the study. Differences from the two initial translations were reduced, and the cultural context of the Brazilian population and the original concepts of the instrument were preserved. This resulted in a consensual version of the questionnaire in Portuguese, hereby titled T12.

3. In addition, two bilingual English language teachers, who had English as their native language, independently performed the back-translation, that is, from the Brazilian Portuguese version into English, and verified the differences in relation to the original material. During this stage, the translators received no additional information about the study or the instrument to be translated.

4. Versions T12, the back translation and the original were submitted to an expert panel, comprised of all four bilingual translators, three health professionals (one from Physical Education, one from Physical Therapy and a third from Medicine) and the researchers of the study. The experts assessed the semantics, idiomatic expressions, cultural and conceptual equivalences, and identified and discussed any discrepancies. When a consensus was reached, a new version, named the HOME FAST-Brazil, was established, along with its respective version in English.

5. In the pre-testing stage, rater 1 applied the HOME FAST-Brazil to participants in their home environment. At the end of each visit and after the assessment of the home environment, rater 1 read the instrument in its entirety to the participants in order to clarify possible doubts or misunderstandings regarding the items. The goal of this stage was to identify difficulties in the use of the HOME FAST-Brazil and to provide solutions to ensure improved comprehension of the questionnaire. In the case of a misunderstanding regarding one or more items of the instrument, and of over 20% of the assessed sample, the parts were reviewed by the expert panel.

6. Finally, analysis was performed by the panel in order to discuss the results of pre-testing and obtain the final version of the HOME FAST-Brazil.

The construct validity of the HOME FAST-Brazil was tested to determine its association with another scale used in falls prevention work, namely the Berg Balance Scale (BBS)[19,20,21]. The BBS questionnaire aims to assess functional balance in different tasks, ranging from standing and walking to sitting and getting up from a chair, considering the effect of environment on the postural control required in daily life. From a total score of 56, the higher the value, the better the performance[19].

Evaluation of the correlation between HOME FAST-Brazil and BBS was justified due to a lack of valid instruments in Brazilian Portuguese to assess home hazards related to falls. In addition, it was hypothesized that a higher risk of home falls (evaluated by HOME FAST) was related to worse postural balance (assessed by the BBS).

The assessment of reliability was performed according to Terwee et al.[20] and Mokkink et al.[21]. Once the translation and cultural equivalence were established, the questionnaire was applied three times at the home of the participant. The first two assessments were carried out on the same day by two independent raters, rater 1 and rater 2 (inter-rater),

at the same time, with each rater conducting their observation independently by checking the home environment as recommended in HOME FAST. The second assessment was performed 7 days after the first, by rater 1 only (intra-rater).

In 2016 the Municipal Health Secretary of Curitiba, Brazil, a city of 1,751,907 of inhabitants, of whom 11.3% are aged 60 or older, served 100,194 older adults across nine city districts. Participants from 16 Health Units in the city, selected by convenience from five districts, were personally invited. The sample size was estimated based on the recommendations of Beaton et al.[18] for the process of translation and cross-cultural adaptation (n=30-40 participants), and Terwee et al.[20] and Mokkink et al.[21] for validation and reliability (n=at least 50 participants). After a participant agreed to take part in the study they signed an informed consent form and a visit to their home for the application of the HOME FAST-Brazil by the researchers was scheduled.

The results are presented as descriptive statistics (mean ± standard deviation, absolute and relative frequencies). In order to analyze the construct validity, the Spearman correlation coefficient was applied between the HOME FAST-Brazil and the BBS. Additionally, the domains of the HOME FAST-Brazil were related to the BBS questionnaire, considering: <0.1, trivial; between 0.1-0.29, small; 0.30-0.49, moderate; 0.50-0.69, high; 0.70-0.90, very high; >0.90, almost perfect. Nevertheless, results were considered significant when $p<0.05$.

To test intra-and inter-rater reliability, the Intraclass Correlation Coefficient (ICC) was used for the sum of the items of the HOME FAST-Brazil, with reliability ICC values >0.70 considered positive[20,21] (poor to moderate reliability <0.74; good reliability 0.75-0.89 and excellent reliability >0.90). In addition, we employed the Bland-Altman plot to evaluate the magnitude of differences among the two measurement procedures of the same variable[20]. All the values of the inter-and intra-rater differences were expected to be arranged in parallel around the zero horizontal axis and within the limits of agreement.

RESULTS

A total of 53 older adults participated in the study, and 43 residences were assessed. In ten of these homes, the participants were married couples. Thus, for the analysis of construct validity of the instrument, all 53 participants were considered. As for the analysis of reliability, the data of 50 participants were used, as three of the older adults were assessed only once due to a shortage of raters in the week following the first assessment.

The general characteristics of the participants are presented in Table 1.

The process of translation and cross-cultural adaptation of the HOME FAST into Brazilian Portuguese produced similar versions, namely T1 and T2. Table 2 shows the small adjustments in the items of the instrument, which were made in order to create version T12. In item 6, the word "sofá" was added to encompass situations in which the participant did not own the item of furniture "lounge chair".

Table 1. Characteristics of the participants (N=53). Curitiba, Paraná, 2016-2018.

Characteristics	n(%)	Mean(sd)
Sex		
Male	11(20.8)	
Female	42(79.2)	
Age		71($\pm$5)
Body Mass Index		27($\pm$4)
Fall		
No	39(73.6)	
Yes	14(26.4)	
Place of falls*		
Only at home (including throughout the property areas)	5(9.6)	
Only outside home	2(3.8)	
Inside and outside home	6(11.5)	
Residence		
Single-story house	31(58.5)	
Apartment	17(32.1)	
Multi-story house	5(9.4)	
With whom do you live?		
With spouse	34(64.2)	
Alone	11(20.8)	
With children	6(11.3)	
Other	2(3.8)	
Schooling		
Illiterate	0(0)	
1-4 years	13(24.5)	
5-8 years	9(17.0)	
>8 years	31(58.5)	

n: number of participants; sd: standard deviation; *One participant did not report his history of falls.

Table 2. Changes in the process of translation and cross-cultural adaptation of HOME FAST-Brazil. Curitiba, Paraná, 2016-2018.

Item	Original version	T1	T2	T12
1	Are walkways free of cords and other clutter?	As passagens são livres de cordas e outros objetos?	As calçadas estão livres de cordas e outros itens?	As passagens são livres de fios e outros objetos?
2	Are floor coverings in good condition?	O piso está em boas condições?	Os revestimentos do piso estão em boas condições?	O piso está em boas condições?
3	Are floor surfaces non slip?	Os pisos são antiderrapantes?	As superfícies dos pisos são antiderrapantes?	Os pisos são antiderrapantes?
4	Are loose mats securely fixed to the floor?	Os tapetes estão bem fixados no chão?	Os tapetes avulsos estão fixados firmemente ao piso?	Os tapetes estão bem fixados no chão?
5	Can the person get in and out of bed easily and safely?	A pessoa pode deitar-se e levanta-se da cama facilmente e com segurança?	A pessoa consegue entrar e sair da cama com facilidade e segurança?	A pessoa pode deitar-se e levantar-se da cama facilmente e com segurança?
6	Can the person get up from their lounge chair easily?	A pessoa consegue levantar-se de sua poltrona facilmente?	A pessoa consegue levantar de sua poltrona facilmente?	A pessoa consegue levantar de sua poltrona e/ou sofá facilmente?
7	Are all the lights bright enough for the person to see clearly?	Todas a lâmpadas são claras o suficiente para que a pessoa enxergue com facilidade?	A iluminação de todas as lâmpadas é suficiente para que a pessoa enxergue com clareza?	A iluminação de todas as lâmpadas é suficiente para que a pessoa enxergue com clareza?
8	Can the person switch a light on easily from their bed?	A pessoa consegue ligar facilmente a luz da cama?	A pessoa consegue facilmente acender a luz quando está em sua cama?	A pessoa consegue facilmente acender a luz quando está em sua cama?
9	Are the outside paths, steps and entrances well lit at night?	As calçadas externas, degraus e entradas são bem iluminadas à noite?	As calçadas, degraus e entradas fora da casa são bem iluminados à noite?	As calçadas, degraus e entradas externas são bem iluminados à noite?
10	Is the person able to get on and off the toilet easily and safely?	A pessoa consegue entrar e sair do banheiro com facilidade e segurança?	A pessoa consegue sentar e levantar do vaso sanitário com facilidade e segurança?	A pessoa consegue sentar e levantar do vaso sanitário com facilidade e segurança?
11	Is the person able to get in and out of the bath easily and safely?	A pessoa consegue entrar e sair da banheira facilmente e de maneira segura?	A pessoa é capaz de entrar e sair da banheira com facilidade e segurança?	A pessoa consegue entrar e sair da banheira facilmente e de maneira segura?
12	Is the person able to walk in and out of the shower recess easily and safely?	A pessoa consegue entrar e sair do 'box' do banheiro com facilidade e segurança?	A pessoa consegue entrar e sair do box do chuveiro com facilidade e segurança?	A pessoa consegue entrar e sair do 'box' do banheiro com facilidade e segurança?
13	Is there an accessible/sturdy grab rail/s in the shower or beside the bath?	Existe(m) alguma(s) barra(s) de apoio no chuveiro ou na banheira?	Há barra(s) de suporte firme(s) e ao alcance da mão no chuveiro ou ao lado da banheira?	Existe(m) alguma(s) barra(s) de apoio no chuveiro ou na banheira?
14	Are slip resistant mats / strips used in the bath/bathroom/shower recess?	Tapetes e/ou fitas antiderrapantes são usadas no banheiro/banheira/box?	Há tapetes ou frisos antiderrapantes na banheira, no quarto de banho ou no box do chuveiro?	Tapetes e/ou fitas antiderrapantes são usadas no banheiro e/ou banheira e/ou box?
15	Is the toilet in close proximity to the bedroom?	O banheiro é próximo ao quarto?	O banheiro fica próximo ao quarto?	O banheiro fica próximo ao quarto?

to be continued

Continuation of Table 2

Item	Original version	T1	T2	T12
16	Can the person easily reach items in the kitchen that are used regularly without climbing, bending or upsetting his or her balance?	A pessoa consegue pegar itens normalmente utilizados na cozinha sem a necessidade de subir em algo, inclinar o corpo ou sem perder o equilíbrio?	A pessoa consegue alcançar facilmente os itens de cozinha usados regularmente sem subir em algo, curvar-se ou prejudicar seu equilíbrio?	A pessoa consegue pegar itens normalmente utilizados na cozinha sem a necessidade de subir em algo, inclinar o corpo ou sem perder o equilíbrio?
17	Can the person carry meals easily and safely from the kitchen to the dining area?	A pessoa consegue levar suas refeições da cozinha para a sala de jantar facilmente?	A pessoa consegue levar os alimentos com facilidade e segurança da cozinha até o local de refeições?	A pessoa consegue levar os alimentos com facilidade e segurança da cozinha até o local de refeições?
18	Do the indoor steps/stairs have an accessible/sturdy grab rail extending along the full length of the steps/stairs?	Escadas ou degraus internos possuem corrimão ou barras de apoio por toda a sua extensão?	Há uma barra de apoio firme e fácil de alcançar ao longo de toda a extensão de degraus ou escadas existentes dentro da casa?	Escadas ou degraus internos possuem corrimão ou barras de apoio por toda a sua extensão?
19	Do the outdoor steps/stairs have an accessible/sturdy grab rail extending along the full length of the steps/stairs?	Escadas ou degraus externos possuem corrimão ou barras de apoio por toda a sua extensão?	Há uma barra de apoio firme e fácil de alcançar ao longo de toda a extensão de degraus ou escadas existentes fora da casa?	Escadas ou degraus externos possuem corrimão ou barras de apoio por toda a sua extensão?
20	Can the person easily and safely go up and down the steps/stairs inside or outside the house?	A pessoa consegue subir e descer os degraus/escadas, internas e/ou externas, facilmente e de forma segura?	A pessoa consegue subir e descer os degraus e escadas dentro e fora da casa com facilidade e segurança?	A pessoa consegue subir e descer os degraus e/ou escadas dentro e fora da casa com facilidade e segurança?
21	Are the edges of the steps/stairs (both inside and outside the house) easily identified?	As bordas dos degraus/escada (tanto interno como externo da casa) facilmente identificáveis?	As beiradas de degraus ou escadas (dentro e fora da casa) são identificadas com facilidade?	As bordas dos degraus e/ou escadas (dentro e fora da casa) são visualizados com facilidade?
22	Can the person use the entrance door/s safely and easily?	A pessoa consegue utilizar a(s) porta(s) de entrada facilmente e de forma segura?	A pessoa consegue usar a(s) porta(s) de entrada com segurança e facilidade?	A pessoa consegue utilizar a(s) porta(s) de entrada facilmente e de forma segura?
23	Are paths around the house in good repair, and free of clutter?	As calçadas ao redor da casa estão em boas condições e livres desobstruídos?	Os caminhos ao redor da casa estão em boas condições e desimpedidos?	Os caminhos ao redor da casa estão em boas condições e desimpedidos?
24	Is the person currently wearing well-fitting slippers or shoes?	A pessoa consegue, atualmente, calçar bem pantufas ou calçados?	Atualmente a pessoa usa chinelos ou calçados bem ajustados?	Normalmente a pessoa usa chinelo ou sapatos apropriados?
25	If there are pets – can the person care for them without bending or being at risk of falling over?	Se há animais de estimação, a pessoa consegue cuidar deles sem inclinar-se ou sem expor-se ao risco de cair?	Caso haja animais de estimação, a pessoa consegue cuidar deles sem precisar se curvar ou sem risco de queda?	Se há animais de estimação, a pessoa consegue cuidar deles sem inclinar-se ou sem expor-se ao risco de cair?

T1: translation version 1; T2: translation version 2; T12: consensus version between T1 and T2.

Moreover, the *HOME FAST* presents its definitions for each of the 25 items so that the rater fully understands the questions. Thus, some modifications were made to the Brazilian Portuguese version: in item 2, the word "taco" was added to the floor conditions, since in the original version the only reference shown was for "lajota" and "carpetes". In item 3 the word translated "piso de vinil" was changed to "piso de Paviflex" and the word "laminado" was added for the types of non-slip resistant floors. In this way, the question became more explanatory, contemplating types of floors such as "pisos de Paviflex", "cerâmica" and "laminado"; the only suitable surfaces were non-slip floors.

The word "sofá" was incorporated to item 6, in addition to "poltrona". Additionally, more information was given to define this item, initially translated as "o assento não é nem macio demais ou baixo demais", but was rewritten to "o assento não é baixo demais nem macio demais a ponto de afundar". The word "abajur" was added to item 8, related to "luz de cabeceira ou iluminações noturnas".

Synonyms were also used to improve the ease of understanding of Brazilian readers, as in the case of the definition of item 10, in which the word "cadeira higiênica" was used in addition to the translation "cadeira de banho" as a complement.

In item 11 the words "borda" and/or "assento" were used as a translation of the English word "bath board". In item 20 the translation of the word "medical factors", which initially referred to "condições médicas", was later defined as "condições patológicas". In item 23, the word "irregular" was added to the sentence "sem calçadas irregulares e/ou quebradas e/ou soltas" in order to complement the question.

Additionally, we to item 24 the sentence "Se a pessoa não usar calçados dentro de casa" to item 24, instead of only "Se a pessoa não usar calçados". Finally, in item 25 the sentence "os animais não exigirem muito exercício" was replaced by "os animais não requerem muito trabalho".

Regarding the total score of the HOME FAST-Brazil instrument, the mean of the sample was 5.45($\pm$2.09) hazards. When considering the risk of falls with a score $\geq$8 in the instrument, the participants did not present a high risk of home falls. However, regarding the frequency analysis, eight (15%) of the participants presented a high risk of home falls (score $\geq$8).

The main risks found in the households of participants according to the 25 items in the HOME FAST-Brazil were: loose carpets (92%), lack of support bars in the bathroom (81%), lack of non-slip floors in the kitchen, bathroom and laundry (79%) and no handrails or grab bars on the steps or stairs outside the house (60%) (Figure 1).

When analyzing the frequency of risk of falls according to the distribution of the HOME FAST-Brazil items in their domains, the following results were observed: 96% risk for the floors domain; 87% for the bathroom domain; 85% for the stairways/steps domain; 40% for the lighting domain; 17% for the furniture domain; 9% for the mobility domain and 2% for the storage domain.

For construct validity evaluation, the correlation of the total score between the HOME FAST-Brazil and BBS was ϱ=-0.241, p=0.041. Moreover, when the domain scores of the HOME FAST-Brazil were related with the BBS questionnaire, the significant results were: furniture with BBS ϱ=-0.434, p=0.001 and bathroom with BBS ϱ=-0.240, p=0.042.

When analyzing the intra-and inter-rater reliability for the sum of the items of the HOME FAST-Brazil, the intra-rater ICC was 0.99, 95%CI=0.98-0.99, p=0.000, and the inter-rater ICC was 0.92, 95%CI=0.86-0.95, p=0.000, both of which are considered excellent intra-and inter-rater reliability.

It was observed, through the Bland-Altman plot, that the majority of the differences in the intra and inter-rater values are arranged within the limits of agreement, as shown in Figure 2.
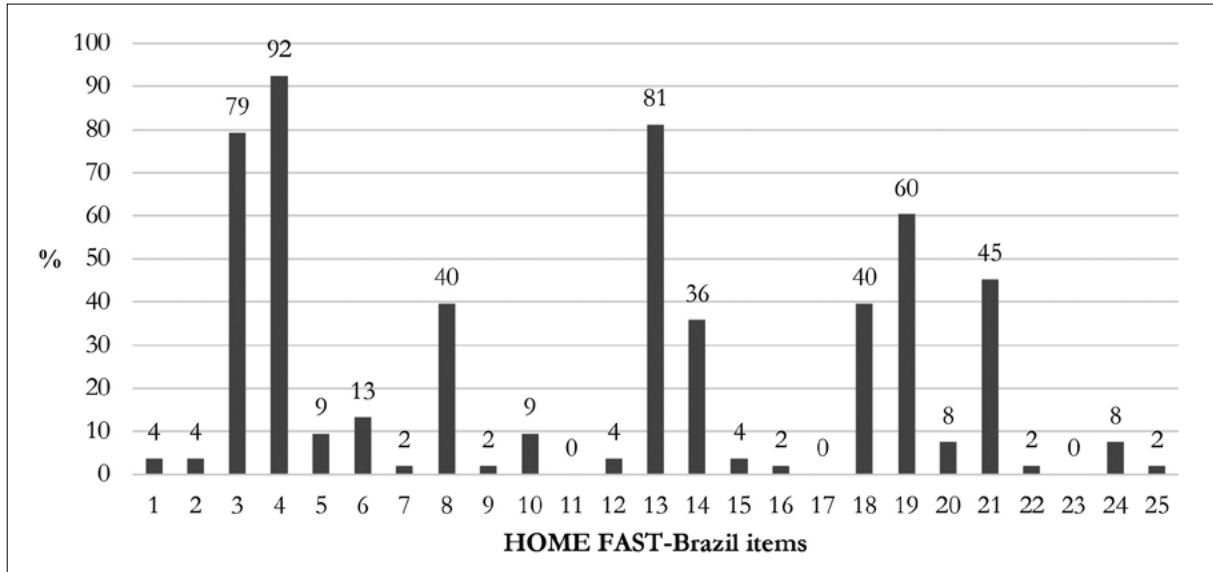
Figure 1. Percentage (%) of risks of home falls from the 25 items of the HOME FAST-Brazil. Curitiba, Paraná, 2016-2018.

A. Intra-rater difference HOME FAST-Brazil items.

B. Inter-rater difference HOME FAST-Brazil items.

UL: upper limit; IL: inferior limit.
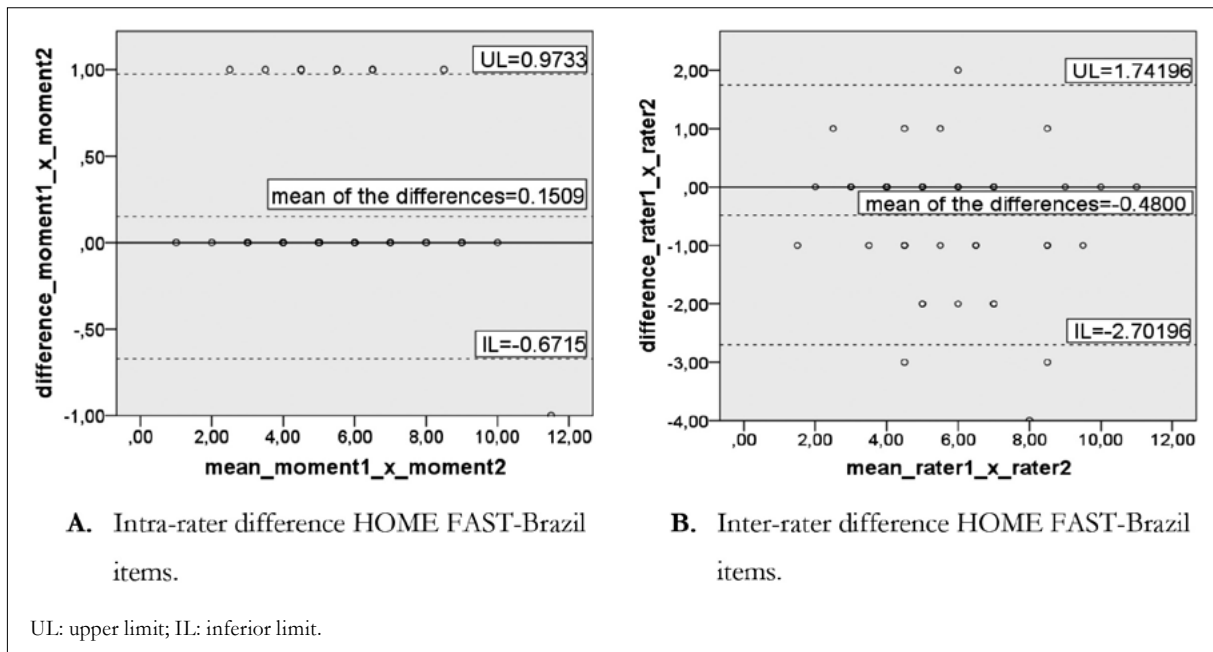
Figure 2. Bland-Altman plots of the differences between measures 1 and 2 of rater 1 (intra-rater) (A) and between measures of rater 1 and 2 (inter-rater) (B) for the sum of the items of the HOME FAST-Brazil. Curitiba, Paraná, 2016-2018.

DISCUSSION

The HOME FAST-Brazil instrument was translated and cross-culturally adapted into Brazilian Portuguese, presenting construct validity and excellent reliability for the evaluation of the risk of falls in the home environment among Brazilian older adults.

Falls among older people display multifactorial risks, and concerns about the risks of home falls should therefore be incorporated into any control and prevention strategies. The frequency of falls found in the present study (26.4%) corroborates Brazilian and international findings[1-4]. The HOME FAST-Brazil showed that the risk of home falls of Brazilian participants (5.4 points) was lower than the risks observed in the homes of older people in Scotland (8.6 points)[22]. It is worth noting that the risk of falls may vary among different populations, since the sample in the present study was composed of older people living in urban areas in the city of Curitiba (Paraná), while the participants in the study under discussion were older people living in urban and rural areas in Scotland.

Byles et al.[17] found that 27% of a sample of 260 older people in Sydney (Australia) were at a high risk of falls (HOME FAST ≥8), and identified the main risk factors as: absence of non-slip flooring; absence of non-slip mats; absence of support bars in the shower; and difficulties in identifying the edges of stairs. In the present study, the frequency of the risk of falls was lower (15%), however, the main risks appear to be similar in both studies and include easy to fix problems, such as non-slip mats, non-slip flooring and support bars in homes.

Changes in the environment may contribute to the reduction of the risk of falls[1,9-12]. In a preventive health study, Mackenzie et al.[16] observed that the average number of home hazards significantly decreased after a 3-year follow-up period in 727 older people from urban and rural areas in Australia. In addition, the chance of these older people falling increased from 1 to 2% when the HOME FAST score increased. Thus, the HOME FAST can also be used to identify older people at risk of falls in combination with the measurement of other risk factors for falls.

The process of the translation and cross-cultural adaptation of the HOME FAST-Brazil into Brazilian Portuguese was successful, since the instrument contemplates the main risks of residential falls for older people and is easy to use for health professionals. In addition, it was clear when observing the items evaluated and how the older participants related to what was being evaluated, that the final version in Portuguese was effective.

To facilitate the understanding of the instrument regarding words, terms and expressions, each question has a definition, including examples, which help to reduce misunderstanding caused by regional differences and even schooling. In the definition of question 3, the terms "*pisos de paviflex e/ou laminado e/ou cerâmica*" ("paviflex and/or laminate and/or ceramic floors") are related to slippery floors. For the term "*condições patológicas*" ("pathological conditions"), in the definition of question 20, examples are given, such as "*síndrome do pé caído, perda de sensação nos pés, distúrbios nos controles de movimentos, etc*" ("foot drop syndrome, loss of sensation in the feet, disorders in movement controls, etc."). Furthermore, in the definition of question 25, for the statement "*Os animais não requerem muito trabalho*" ("the animals do not require a lot of work") in the translated questionnaire, the following definition is included "*animais de estimação = qualquer animal pelo qual a pessoa seja responsável. Para pontuar como "sim", a pessoa não precisa alimentar animais de estimação quando eles estão pulando ou movimentando-se próximo aos pés, a pessoa não precisa se curvar em direção ao chão para encher novamente tigelas e/ou pratos ou limpar os animais. Os animais não requerem muito trabalho*" ("pets = any animal for which the individual is responsible. To score "yes", the individual does not need to feed pets when they are jumping or moving close to their feet, one does not need to bend towards the floor to refill bowls and/or plates or clean the animals. The animals do not require much work.") Thus, the definition refers to the fact that the older person does not need to feed, clean or take their pet for a walk, exposing themselves to the risk of falling.

In assessing the construct validity of the instrument, a small and significant correlation was found with the BBS questionnaire, which, although it also assesses the risk of falls, was designed to measure postural balance. Despite this, this scale was chosen to test construct validity as in Brazilian Portuguese literature there are no other valid and reliable instruments to assess the risk of home falls among older people. Furthermore, the BBS aims to assess the functional performance of an older person involving balance in different situations, therefore considering the effect of the environment on function[19].

In contrast to the current study, Mackenzie et al.[22], found poor to excellent inter-rater reliability (experienced rater and another rater) with a sample of older people in Scotland. In the Persian version of HOME FAST, however, it was observed that the intra-rater agreement was moderate to excellent and the inter-rater reliability was poor to excellent[23]. The authors justified this by stating that the presence of multiple conditions in different homes with different people can affect the reliability of an instrument. However, these differences can also be related to the tests used for reliability analysis, since this study used the ICC, whereas the other studies under discussion used the Kappa Index.

Even with psychometric evidence of the reliability and validity of a tool, it is critical that the instrument possesses clinical applicability[14]. Mackenzie[24] evaluated health professionals working in different services in the UK, Canada and Australia with the objective of evaluating the clinical utility of the HOME FAST from the perspective of instrument users, and found . The findings of the study were that the HOME FAST can be used as a screening tool in a variety of international scenarios, both in clinical settings and in scientific research, by different health professionals, and that many barriers would be overcome by developing a support manual for the practical use of the instrument.

Some participants in this present study already had LED bulbs (Light Emitting Diode) in their homes, and so in the lighting item of the HOME FAST-Brazil can be expanded to include illumination by LED lamps, in addition to incandescent and fluorescent lighting. Also in relation to house lighting, some participants were not accustomed to turning on their bedside lamps at night when available, or even turning on the bedroom lights. Hence, the light in their room came from other sources such as street lights. Furthermore, some participants wore rubber flip-flops to take a bath in place of using non-slip mats in the bath or shower recess.

Given the importance of the home environment as a risk factor for falls in older people, the incorporation of tools to evaluate the home contributes to the identifying and guiding of modifications to the environment. In addition, identifying hazards that cause falls in the home can help improve the understanding of older people about the risk of falls and prevention strategies to be implemented.

The present study has some limitations, such as the use of only one instrument to test construct validity. However, this was justified due to the lack of valid and reliable instruments to assess the risk of home falls in older people in Brazilian Portuguese. Despite the quick application of the HOME FAST-Brazil (15-20 minutes), the costs involved in health professionals visiting the homes of older persons (both financial and in terms of time) should be considered in its adoption by Brazilian health services. The homes used in this study were not randomized and the final data indicated an imbalance in the sex and schooling of participants.

CONCLUSION

The HOME FAST-Brazil was translated and cross-culturally adapted into Brazilian Portuguese and was found to have construct validity and excellent intra-and inter-rater reliability. Therefore, risk factors for home falls can be assessed using the HOME FAST-Brazil, and can contribute to the control and prevention of falls in older people by health services and strategies, with the aim of ensuring safer and more accessible homes to promote greater independence and autonomy for older people.

Link to access the HOME FAST-Brazil questionnaire: https://stopfallsathome.com.au/resources/tip-sheets/#health-professionals

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REFERENCES

1. World Health Organization. Integrated care for older people: guidelines on community-level interventions to manage declines in intrinsic capacity. Geneva: WHO; 2017.

2. Vieira LS, Gomes AP, Bierhals IO, Farías-Antúnez S, Ribeiro CG, Miranda VIA, et al. Falls among older adults in the South of Brazil: prevalence and determinants. Rev Saúde Pública;2018;52:1-12.

3. Nascimento CF, Duarte YAO, Lebrão ML, Chiavegatto Filho ADP. Individual and contextual characteristics of indoor and outdoor falls in older residents of São Paulo, Brazil. Arch Gerontol Geriatr. 2017;68:119-25.

4. Carneiro JA, Ramos GCF, Barbosa ATF, Vieira EDS, Silva JSR, Caldeira AP. Falls among the non-institutionalized elderly in northern Minas Gerais, Brazil: prevalence and associated factors. Rev Bras Geriatr Gerontol. 2016;19(4):613-25.

5. de Oliveira AS, Trevizan PF, Bestetti MLT, de Melo RC. Fatores ambientais e risco de quedas em idosos: revisão sistemática. Rev Bras Geriatr Gerontol. 2014;17(3):637-45.

6. Maia BC, Viana PS, Arantes PMM, Alencar MA. Consequências das quedas em idosos vivendo na comunidade. Rev Bras Geriatr Gerontol. 2011;14(2):381-93.

7. Rossetin LL, Rodrigues EV, Gallo LH, Macedo DS, Schieferdecker MEM, Pintarelli VL, et al. Indicadores de sarcopenia e sua relação com fatores intrínsecos e extrínsecos às quedas em idosas ativas. Rev Bras Geriatr Gerontol. 2016;19(3):399-414.

8. Pereira SG, Santos CB, Doring M, Portella MR. Prevalence of household falls in long-lived adults and association with extrinsic factors. Rev Latinoam Enferm. 2017;25:e2900 [7 p.].

9. Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, et al. Interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev. 2012;9:1-4.

10. Clemson L, Mackenzie L, Ballinger C, Close JCT, Cumming SRG. Environmental interventions to prevent falls in community-dwelling older people: a meta-analysis of randomized trials. J Aging Health. 2008;20(8):954-71.

11. Keall MD, Pierse N, Howden-Chapman P, Cunningham C, Cunningham M, Guria J, et al. Home modifications to reduce injuries from falls in the Home Injury Prevention Intervention (HIPI) study: a cluster-randomised controlled trial. Lancet. 2015;385(9964):231-8.

12. Phelan EA, Mahoney JE, Voit JC, Stevens JA. Assessment and management of fall risk in primary care settings. Med Clin North Am. 2015;99(2):281-93.

13. Moncada LVV, Mire LG. Preventing falls in older persons. Am Fam Physician 2017;96(4):240-7.

14. Romli MH, Mackenzie L, Lovarini M, Tan MP, Clemson L. The Clinimetric Properties of instruments measuring home hazards for older people at risk of falling: a systematic review. Eval Health Prof. 2018;41(1):82-128.

15. Mackenzie L, Byles J, Higginbotham N. Designing the Home Falls and Accidents Screening Tool (HOME FAST): selecting the items. Br J Occup Ther. 2000;63(6):1-10.

16. Mackenzie L, Byles JE, D'Este C. Longitudinal study of the Home Falls and Accidents Screening Tool in identifying older people at increased risk of falls. Australas J Aging. 2009;28(2):64-9.

17. Byles JE, Mackenzie L, Redman S, Parkinson L, Leigh L, Curryer C. Supporting housing and neighbourhoods for healthy ageing: findings from the Housing and Independent Living Study (HAIL). Australas J Aging. 2014;33(1):29-35

18. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186-91.

19. Miyamoto ST, Lombardi Junior I, Berg KO, Ramos LR, Natour J. Brazilian version of the Berg balance scale. Brazilian version of the Berg balance scale. Braz J Med Biol Res. 2004;37(9):1411-21.

20. Terwee CB, Bot SDM, De Boer MR, van Der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007;60(1):34-42.

21. Mokkink LB, Prinsen CAC, Bouter LM, de Vet HCW, Terwee CB. The COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) and how to select an outcome measurement instrument. Braz J Phys Ther. 2016;20(2):105-13.

22. Mackenzie L, Byles J, Higginbotham N. Reliability of the Home Falls and Accidents Screening Tool (HOME FAST) for identifying older people at increased risk of falls. Disabil Rehabil. 2002;24(5):266-74.

23. Maghfouri B, Mehraban AH, Taghizade G, Aminian G, Jafari H. Internal Consistency of reliability assessment of the Persian version of the 'Home Falls and Accident Screening Tool. Iran Rehabil J. 2013;11(18):46-50.

24. Mackenzie L. Evaluation of the clinical utility of the Home Falls and Accidents Screening Tool (HOME FAST). Disabil Rehabil. 2016;39(15):1489-1501.

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Original Articles

1 of 10

Incidence of and mortality from COVID-19 in the older Brazilian population and its relationship with contextual indicators: an ecological study

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Abstract

Objective: to analyze the incidence of and mortality caused by COVID-19 in the older population in Brazil and its relationship with contextual variables. *Methods:* the 22 Brazilian states (including the Federal District) with 50 deaths or more due to COVID-19 by May 25th, 2020 were included. The rates of accumulated incidence, accumulated mortality and accumulated lethality among older adults were considered as dependent variables. Among the contextual variables, the provision of health services and professionals, and demographic, income and development indicators were included. The variables were analyzed in a descriptive and bivariate manner using Spearman's correlation. *Results:* the state of Pará had the highest incidence and mortality rate among older adults. The highest accumulated lethality rates among this population were observed in Bahia (56.46%), Rio de Janeiro (48.10%) and Pernambuco (40.76%). There was a significant negative moderate correlation between the accumulated incidence rate and the aging index (rho=-0.662; p=0.001) and the proportion of older adults (rho=-0.659; p=0.002); and between the mortality rate and the aging index (rho=-0.520; p=0.013) and the proportion of older adults (rho=-0.502; p=0.017). The accumulated incidence rate and mortality rate also revealed, respectively, a significant positive correlation with the proportion of black (Afro-Brazilian) and brown (mixed race) skinned people (rho=0.524; p=0.018 and rho=0.558; p=0.007) and with the income ratio (rho=0.665; p=0.0001 and rho=0.683; p<0.001). *Conclusions:* the Brazilian epidemiological situation shows that the mortality of older adults due to COVID-19 in Brazil is related to demographic and income distribution aspects.

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INTRODUCTION

Since December 2019, public health authorities around the world have been on alert due to reports of cases of pneumonia with an unknown etiology in China. In January 2020, the illness was discovered to be Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), and the disease caused by this new zoonotic agent became known as Coronavirus Disease - 2019 (COVID-2019)[1,2].

Since its discovery, the new coronavirus has had an extremely high transmission rate, and by January 30, 7,818 cases of infected people had been reported in 18 countries, with 170 people having already died in China due to COVID-19. As a result, the World Health Organization (WHO) declared a Public Health Emergency of International Concern[3]. COVID-19 cases were growing rapidly worldwide and on March 11, the WHO declared a pandemic, when more than 118,000 cases of the disease were registered in 113 countries, with more than 4,000 deaths[4].

The first case of the disease was recorded in Brazil on February 26th, in an older man with a history of having travelled to Italy[5]. Since then, cases of the disease have shown significant daily growth in the country and, by May 25th, more than 374,000 cases and 23,473 deaths had been registered throughout the country[6].

When analyzing the distribution of cases of the disease and deaths by age group, both in Brazil and around the world, a higher incidence of the disease in the adult population can be observed, with lethality higher still among the older population[7]. The presence of associated morbidities contributes significantly to the increase of this rate, with 69.3% of deaths in Brazil occurring in people over 60 years old, of whom 64% had at least one risk factor[8]. A similar situation had already been reported by patients infected with the Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) and the Middle East Respiratory Syndrome coronavirus (MERS-CoV)[9,10].

Data from COVID-19 show that among people aged 80 or over, 14.8% of those infected with the disease subsequently died, compared to 8.0% among older adults aged 70 to 79 years, and 8.8% among those aged 60 to 69 years old (a rate 3.82 times higher than the overall average), which should alert health authorities to the need to develop strategies to protect the health of older adults. This, however, has not occurred. The risk of dying from COVID-19 increases with age, as most deaths occur in older adults, especially those with chronic illnesses. Immunosensence increases vulnerability to infectious diseases and the prognosis for those with chronic diseases is unfavorable[11].

In addition, in developing countries, tackling the COVID-19 pandemic becomes even more challenging due to the high rates of poverty, conflict and political instability, violence, illiteracy, deficiencies in diagnostic laboratories and other infectious diseases that compete for scarce health resources[12]. Socioeconomic conditions, housing and precarious infrastructure contribute to increased socio-spatial vulnerability of contamination, demanding specific measures for different parts of the territory.

Looking at the territory allows us to identify the particularities of the dynamics of the evolution of the pandemic, favoring the design of specific strategies to tackle the different scales of the disease[13]. In Brazil, socioeconomic data have revealed that those most affected are older women, with low levels of education, who live on a per capita household income of up to half the minimum wage[14]. The identification of sociodemographic characteristics related to COVID-19 can contribute to the understanding of the dynamics of the disease in the country, in addition to being crucial for the development of measures to deal with the pandemic and minimize damage among this specific population.

In this context, the present study aimed to describe and analyze the indicators of incidence and mortality from COVID-19 in the older population in Brazil and its relationship with contextual variables.

METHOD

This is an observational, ecological and analytical study. For analysis units, Brazilian states (including the Federal District) that had 50 or more deaths due

to COVID-19 up to May 25th, 2020, were included, namely: Amazonas, Alagoas, Bahia, Ceará, o Distrito Federal (the Federal District), Espírito Santo, Goiás, Maranhão, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Rondônia, Roraima, Santa Catarina, São Paulo and Sergipe.

For data collection, a survey was carried out of the epidemiological bulletins of the respective states, available from the websites of the state health departments. The collected information was entered into a matrix for analysis in Microsoft Excel 2016.

Dependent variables related to COVID-19 among older adults (over 60 years of age) were considered, namely: an accumulated incidence rate per 100,000 older adults (accumulated number of new cases /number of older adults in the state*100,000), accumulated mortality rate per 100,000 older adults (accumulated number of deaths/number of older adults in the state *100,000), and accumulated lethality rate (accumulated number of deaths/number of cases in the older adults*100).

The independent variables applied were: number of hospital beds per 1000 inhabitants, number of doctors per 1000 inhabitants, percentage of coverage by the Family Health Strategy, percentage of Primary Health Care coverage, rates of aging and overaging[15], proportion of older adults, human development index (HDI), percentage of black (Afro-Brazilian) and brown (mixed race) skinned people, income ratio and demographic density per km². The information was obtained from the Brazilian Institute of Geography and Statistics (or IBGE) and from the Informatics Department of the National Health Service (or DATASUS), all of which are in the public domain.

The variables were analyzed in a descriptive and bivariate manner, through Spearman correlation

analysis, considering a significance level of 5%, using the $R^®$ software package.

RESULTS

When observing the population characteristics and number of cases and deaths from COVID-19 in Brazil, the state of São Paulo has the highest number of cases and deaths from COVID-19, with 82,161 cases and 6,163 deaths. The state with the lowest number of cases due to the disease is Roraima with 2,514 cases, and this state also has the lowest number of deaths due to the disease, with 86 (Table 1).

The state of Ceará has the highest number of cases of COVID-19 among older adults with 6,896 cases, and the state of Roraima has the lowest number of cases in the older population, with 198. Although the state of São Paulo did not present case data by age group, the highest number of deaths among older adults was registered in the state, with 4,495. The lowest number of deaths in this age group was also observed in the state of Roraima, with 43 (Table 1).

The highest proportion of cases and deaths among older adults, respectively, were observed in the states of Pará (22.36%) and Rio Grande do Sul (84.44%), and the lowest proportions, respectively, were in the states of Bahia (3.90%) and Amazonas (37.66%) (Table 1).

Table 2 presents the socioeconomic and health resource and services characteristics and indicators of population aging in the states analyzed. About 12.47% of the population in the evaluated states is made up of older adults, with an average mean aging rate of 58.40. In contrast, Primary Health Care coverage is around 78.47% of the population, with an average rate of 1.65 doctors and 2.38 hospital beds for every 1000 inhabitants.

Table 1. Population characteristics and number of cases and deaths by COVID-19 in Brazilian states. Brazil, 2020.

State	Total Cases	Total Deaths	Older Adult Cases	Older Adult Deaths	Proportion of Cases	Proportion of Deaths	Total Population	Pop. Older adults
São Paulo	82161	6163	-	4495	-	72.94%	45,919,049	6,993,969
Rio de Janeiro	39298	4105	5823	2801	14.82%	68.23%	17,264,943	2,893,098
Ceará	35947	2330	6896	1602	19.18%	68.76%	9,132,078	1,148,430
Pernambuco	27759	2200	4546	1853	16.38%	84.23%	9,557,071	1,213,174
Amazonas	29867	1758	2091	662	7.00%	37.66%	4,144,597	311,473
Pará	26077	2375	5830	1673	22.36%	70.44%	8,602,865	763,716
Maranhão	22786	784	4063	560	17.83%	71.43%	7,075,181	722,295
Bahia	13899	460	542	306	3.90%	66.52%	14,873,064	1,919,264
Espírito Santo	10007	447	1678	327	16.77%	73.15%	4,018,650	566,931
Paraíba	7823	272	-	174	-	63.97%	4,018,127	546,557
Santa Catarina	6696	105	919	74	13.72%	70.48%	7,164,788	1,043,218
Minas Gerais	6668	226	1091	171	16.36%	75.66%	21,168,791	3,315,874
Rio Grande do Sul	6470	180	1151	152	17.79%	84.44%	11,377,239	2,069,569
Distrito Federal	5902	98	795	74	13.47%	75.51%	3,015,268	328,379
Alagoas	6214	316	1087	215	17.49%	68.04%	3,337,357	370,746
Sergipe	5314	93	507	59	9.54%	63.44%	2,298,696	253,134
Rio Grande do Norte	4709	184	779	118	16.54%	64.13%	3,506,853	445,618
Piauí	3550	110	644	77	18.14%	70.00%	3,273,227	411,268
Paraná	3212	153	595	106	18.52%	69.28%	11,433,957	1,712,479
Rondônia	3201	121	359	73	11.22%	60.33%	1,777,225	169,913
Goiás	2518	96	401	66	15.93%	68.75%	7,018,354	836,663
Roraima	2514	86	198	43	7.88%	50.00%	605,761	41,240

Table 2. Socioeconomic characteristics, health service provisions and aging indicators of analyzed states. Brazil, 2020.

Variable	n (%)	Minimum	Maximum	Median	Mean	SD
Hospital beds per 1000 inhabitants	22	1.59	3.61	2.34	2.38	0.435
Doctors per 1000 inhabitants	22	0.48	3.38	1.53	1.65	0.671
Percentage of FHS coverage	22	39.47	99.95	73.27	71.06	15.581
Percentage of primary care coverage	22	53.36	99.98	78.12	78.47	12.160
Overaging index	22	9.26	16.41	14.47	13.96	1.922
Ageing index	22	24.99	99.19	57.22	58.40	19.380
Proportion of older adults	20	6.81	18.19	12.63	12.47	2.876
Human Development Index	22	0.631	0.824	0.687	0.704	0.054
Percentage of black and brown skinned people	22	19.20	82.00	67.40	62.86	18.507
Income ratio	22	13.48	87.71	35.68	37.63	19.863
Demographic density per km²	22	2.00	444.00	54.58	82.46	112.665

n = number of states; SD = standard deviation; FHS = Family Health Strategy; km² = square kilometers

The highest rate of accumulated incidence and mortality due to COVID-19 was registered in the state of Pará, with 763.37 cases per 100,000 older adults and 219.06 deaths per 100,000 older adults. The lowest accumulated incidence was observed in Bahia with 28.24 cases per 100,000 older adults and the lowest mortality rate was in the state of Minas Gerais (5.16 deaths per 100,000 older adults). Regarding lethality, it was found that the highest rate was registered in Bahia (56.46%) and the lowest in Santa Cantarina (8.05%) (Table 3).

When assessing the correlation between the indicators of cases and deaths in older adults and independent sociodemographic variables, coverage by health services and population aging indicators, a significant negative moderate correlation was observed between the accumulated incidence and mortality rates, respectively, with the aging index (rho = -0.662; p=0.001 and rho = -0.520; p=0.013) and the proportion of older adults (rho = -0.659; p=0.002 and rho = -0.502; p=0.017). The accumulated incidence and mortality rates showed, respectively, a significant positive correlation with the proportion of black and brown skinned people (rho=0.524; p=0.018 and rho=0.558; p=0.007) and with the income ratio (rho=0.665; p=0.0001 and rho=0.683; p<0.001) (Table 4).

Table 3. Indicators of cases and deaths in older adults from COVID-19 in Brazilian states. Brazil, 2020.

State	Accumulated Incidence *	Accumulated Mortality*	Accumulated Lethality
São Paulo	-	64.27	-
Rio de Janeiro.	201.27	96.82	48.10%
Ceará	600.47	139.49	23.23%
Pernambuco	374.72	152.74	40.76%
Amazonas	671.33	212.54	31.66%
Pará	763.37	219.06	28.70%
Maranhão	562.51	77.53	13.78%
Bahia	28.24	15.94	56.46%
Espírito Santo	295.98	57.68	19.49%
Paraíba	-	31.84	-
Santa Catarina	88.09	7.09	8.05%
Minas Gerais	32.90	5.16	15.67%
Rio Grande do Sul	55.62	7.34	13.21%
Federal District	242.10	22.53	9.31%
Alagoas	293.19	57.99	19.78%
Sergipe	200.29	23.31	11.64%
Rio Grande do Norte	174.81	26.48	15.15%
Piauí	156.59	18.72	11.96%
Paraná	34.74	6.19	17.82%
Rondônia	211.28	42.96	20.33%
Goiás	47.93	7.89	16.46%
Roraima	480.12	104.27	21.72%

* per 100,000 inhabitants

Table 4. Correlation between indicators of cases and deaths among older adults by COVID-19, and socioeconomic, health resource and services characteristics, and indicators of population aging in Brazilian states. Brazil, 2020.

Variable	Accumulated Incidence	Accumulated Mortality	Accumulated Lethality
Hospital beds per 1000 inhabitants	-0.183	-0.203	-0.086
Doctors per 1000 inhabitants	-0.355	-0.299	-0.155
Percentage of FHS coverage	-0.141	-0.202	-0.322
Percentage of primary care coverage	-0.331	-0.369	-0.408
Overaging Index	-0.247	-0.127	0.036
Ageing index	-0.662*	-0.520*	-0.141
Proportion of older adults	-0.659*	-0.502*	-0.104
Human Development Index	-0.353	-0.345	-0.258
Percentage of black and brown skinned people	0.524*	0.558*	0.390
Income ratio	0.665*	0.683*	0.385
Demographic density per km²	-0.134	-0.074	-0.215

ESF=Family Health Strategy; km²=square kilometers; *correlation is statistically significant at the 5% level.

DISCUSSION

The results show that among the Brazilian states included in the analysis there was a correlation between the incidence and mortality rate of older adults and race/skin color. In relation to this demographic factor, similar data have been observed in the population of the United States, where there is high prevalence and high mortality among the African American population, with more than 70% of deaths by COVID-19 occurring in this group in some states[16,17].

Race/color as a social construct, in the context of a discriminatory and exploratory historical process, has become a socioeconomic determinant capable of defining inequalities in health, life and death conditions[18]. The COVID-19 pandemic has exposed the geography of inequalities and mercilessly reflected past historical processes.

In the racial composition of those vulnerable to COVID-19 in Brazil, residents of *favelas* and outlying urban regions, homeless people and the group with the highest prevalence of specific morbidities (diabetes and hypertension, for example) are expressively composed of black people[19]. The population with the lowest levels of education, which in Brazil is mostly composed of black/Afro-Brazilian citizens, is also the population with the greatest difficulty in accessing health services and who are highly dependent exclusively on the National Health Service (or SUS); have a lower income, and live in areas of substandard housing and infrastructure of basic services, with worse social and health indicators[20-23]. A low level of education can increase access difficulties for individuals by reducing their understanding of the system, making it hard to recognize situations of risk and health problems, compromising their ability to make informed decisions about their health and, consequently, reducing the demand for and use of health services[24].

These vulnerabilities are heightened among the older population. The findings of a study carried out with data from the 2008 National Household Sample Survey (or PNAD) indicate that social inequalities, in health and living conditions, exist among older adults in Brazil, with black and poor populations experiencing the aging process with overlapping risks[23]. The COVID-19 epidemic in Brazil has revealed how challenging these inequalities are for the organization of a health system based on the principles of integrality, universality and equity, in a scenario of intense demographic and epidemiological transition.

Despite the fact that higher incidence and mortality rates are inversely related to the proportion of older adults in the population and the aging rate, these findings corroborate the premise that the areas most affected by the COVID-19 pandemic in Brazil are the states of the north and northeast of the country, the regions with the youngest age structures. Similar to many developed countries, the demographic changes experienced in Brazil have converged towards a rapid and accentuated aging process and an increase in population longevity[25].

However, this process has not occurred simultaneously throughout the country, where the gains in life expectancy observed throughout the second half of the twentieth century revealed marked regional disparities, especially with regard to the less developed regions of Brazil. This uneven process is reflected in the age pyramids and the age structure indicators of the regions of Brazil, with lower aging rates in the north and northeast[26].

The idea that Brazil has "rejuvenated" the COVID-19 pandemic has arisen, as a result of the combination of the Brazilian age pyramid and low degrees of social distancing. Despite the number of deaths being higher among older age groups, a significant percentage of young people are being hospitalized. The percentage of deaths observed in Brazil for people under 50 years of age has been higher than that observed in other countries, such as Italy, Spain and the United States[27].

Another important finding of the present study is the higher incidence and mortality due to COVID-19 among older adults in the poorest states in Brazil. There are several variables that make the low-income population more prone to infection from the new coronavirus, such as the use of public transport, higher numbers of residents per household, inadequate access to basic sanitation and health services, and the difficulty older adults and family members experience in maintaining social isolation without significant loss of income or work[28].

The northern regions of the country are among the least developed in Brazil[29] and, in this current health emergency, have stood out due to their high COVID-19 burden. A possible explanation for the higher mortality rates due to COVID-19 among older adults in these regions is related to the difficulty of access to and availability of health services. Data from the National Health Survey show that there are major differences in access to health services between the regions of Brazil, with higher proportions of medical appointments in the regions that have the best living conditions and the highest Human Development Indexes[21]. The higher mortality rates observed in the northern states of the country can be justified by the territorial size of the regions, the inadequate transport system, which is composed of few highways and is in poor condition, in addition to waterways with navigability problems, impairing the effective distribution and organization of health services, making accessibility difficult for users[30]. In addition, the north region of the country has, proportionally, the lowest number of ICU beds, doctors and respirators, which are widely needed in the treatment not only of these diseases, but also of complications triggered by COVID-19 infections[28].

The low availability of specific diagnostic tests, particularly real time RT-PCR, is a crucial challenge for the detection of COVID-19. Brazil faces a shortage of kits for the detection of agents (primers, probes and controls, among others), and limited human resources trained to carry out testing, which generates a delay in the release of local results, generating not only a delay in notification, but overburdening reference laboratories, leading to under-notification[31]. This is one of the main limitations for population-based studies that intend to describe the scenario of the disease in the country, since a large portion of cases may not have been reported.

It is believed that the current scenario of COVID-19 in Brazil is also related to the low adherence of the population to guidelines of social distancing, since data from May 25 indicate that the index of social isolation in the country was 43.9%, below the recommended value of 70%, and among the states, the one with the highest index was Amapá with 52.6% and the lowest was registered in Goiás with 37.2%[32]. According to the Center for Disease Control and Prevention (CDC) in the United States, for the effectiveness of non-pharmacological interventions during the pandemic, such as social distancing, there must be acceptance and participation among the population, and for this to happen, it is

extremely important that communication between the authorities and the population is honest, transparent and coherent, leading to confidence on the part of the population, who, in turn, will adopt control measures to mitigate the disease[33,34].

To impose these sanitary measures to control the pandemic in Brazil, it is crucial that special care for the older population is considered. The implementation of measures such as vertical social isolation may expose the part of the population that is already highly vulnerable, to greater vulnerability. In this sense, vertical isolation will not be effective in completely protecting older adults, who are at high risk of developing serious illness and death, since, even with restricted circulation, the older population will be susceptible to intra-household transmission, because they have contact with individuals who leave the home and, therefore, will be more exposed to the virus, as well as to collateral damage arising from the change in routine of this group, such as a greater risk of developing or worsening mental health problems and chronic non-communicable diseases, especially cardiovascular illnesses[35].

It is important to highlight the limitations arising from the design of the present study. As it is an ecological study, its findings can be expanded to population groups, but not to an individual level. In addition, as it uses data collected by municipalities and states, the underreporting of cases should be considered due to the lack of resources for mass

testing, as previously discussed. However, the study can support decision making and the creation of safety nets for the population groups identified, as well as encouraging increased notifications and monitoring among the older population.

CONCLUSION

The COVID-19 epidemic in Brazil has revealed that, in the states analyzed, the accumulated incidence and mortality in the older population are related to demographic issues - age, skin color/race and income, highlighting the need for specific care and monitoring of older adults. At the present moment, when social distancing is considered a priority strategy for disease control, Primary Health Care (PHC) becomes an essential pillar for the care of older adults, both for its principles and its territorial scope – especially in the areas of greatest vulnerability. This demonstrates the need for the structuring and strengthening of this level of health care, which plays an extremely important role in reducing health inequities.

In this sense, it is important to rethink the working processes of PHC professionals and to introduce information and communication technologies as a complementary strategy for monitoring the health of older adults, which have been shown to be an important tool for integrated healthcare at this level.

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REFERENCES

1. Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak: an update on the status. Mil Med Res. 2020;7(11):1-10.

2. Chan JFW, Yuan S, Kok KH, To KKW, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet. 2020;395(10223):514-23.

3. World Health Organization. Coronavirus disease 2019 (COVID-19): Situation Report – 10 [Internet]. Genebra: WHO; 2019 [acesso em18 mar. 2020]. Disponível em: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

4. World Health Organization. Coronavirus disease 2019 (COVID-19): Situation Report – 51[Internet]. Genebra: WHO; 2019 [acesso em 18 mar. 2020]. Disponível em: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

5. Croda J, Oliveira WK, Frutuoso RL, Mandetta LH, Baia-da-Silva DC, Brito-Sousa JD, et al. COVID-19 in Brazil: advantages of a socialized unified health system and preparation to contain cases. J Braz Soc Trop Med. 2020; 53:e20200167 [6 p.].

6. Brasil. Ministério da Saúde. COVID-19 – Painel Coronavirus [Internet]. 2020 [acesso em 25 maio 2020]. Brasília, DF: MS; 2020. Disponível em: https://covid.saude.gov.br/

7. Shahid Z, Kalayanamitra R, McClafferty B, Kepko D, Ramgobin D, Patel R, et al. COVID-19 and older adults: what we know. J Am Geriatr Soc. 2020;85(5):926-9.

8. Brasil. Ministério da Saúde, Secretaria de Vigilância em Saúde. Boletim Epidemiológico Especial 16 [Internet]. 2020 [acesso em 25 maio 2020]. Disponível em: https://www.saude.gov.br/images/pdf/2020/May/21/2020-05-19---BEE16---Boletim-do-COE-13h.pdf

9. Azhar EI, Lanini S, Ippolito G, Zumla A. The Middle east respiratory syndrome Coronavirus: a continuing risk to global health security. In: Rezza G, Ippolito G, editores. Emerging and re-emerging viral infections. New York: Springer; 2016. (Advances in Microbiology, infectious diseases and public health, vol. 6).

10. Zhong NS, Wong GWK. Epidemiology of severe acute respiratorysyndrome (SARS): adults and children. Paediatr Respir Rev. 2004;5:270-4.

11. Hammerschmidt KSA, Santana RF. Saúde do idoso em tempos de pandemia COVID-19. Cogitare Enferm. 2020;25:e72849 [10p.].

12. Anser MK, Yousaf Z, Khan MA, Nassani AA, Alotaibi SM, Abro MMQ, et al. Does communicable diseases (including COVID-19) may increase global poverty risk?: a cloud on the horizon. Environ Res. 2020;187:e109668. [10 p.].

13. Costa MA, Lui L, Santos RMD, Curi RLC, Albuquerque CGD, Tavares SR, et al. Apontamentos sobre a dimensão territorial da pandemia da Covid-19 e os fatores que contribuem para aumentar a vulnerabilidade socioespacial nas unidades de desenvolvimento humano de áreas metropolitanas brasileiras. In: Repositório do Conhecimento do IPEA [Internet]. Brasília, DF: IPEA; 2020 [acesso em 25 maio 2020]. Disponível em: http://repositorio.ipea.gov.br/handle/11058/9985

14. Melo NCVD, Ferreira MAM, Teixeira KMD. Condições de vida dos idosos no Brasil: uma análise a partir da renda e nível de escolaridade. Oikos. 2014;25(1):4-19.

15. Melo LA, Ferreira LMBM, Santos MM, Lima KC. Socioeconomic, regional and demographic factors related to population ageing. Rev Bras Geriatr Gerontol. 2017;20(4):493-501.

16. Morrow-Howell N, Galucia N, Swinford E. Recovering from the COVID-19 Pandemic: a focus on older adults. J Aging Soc Policy. 2020;32(4-5):1-10.

17. Evelyn K. 'It's a racial justice issue': Black Americans are dying in greater numbers from COVID-19. The Guardian [Internet]. 08 abr. 2020 [acesso em 26 maio 2020]. Disponível em: https://www.theguardian.com/world/2020/apr/08/its-a-racial-justice-issue-black-americans-are-dying-in-greater-numbers-from-covid-19

18. Romero DE, Maia L, Muzy J. Tendência e desigualdade na completude da informação sobre raça/cor dos óbitos de idosos no Sistema de Informações sobre Mortalidade no Brasil, entre 2000 e 2015. Cad Saúde Pública. 2019;35(12):e00223218 [10 p.].

19. Bernardes JA, Arruzzo RC, Monteiro DMLV. Geografia e COVID-19: neoliberalismo, vulnerabilidades e luta pela vida. Rev Tamoios. 2020;16(1):188-205.

20. Paradies Y, Truong M, Priest N. A Systematic review of the extent and measurement of healthcare provider racism. J Gen Intern Med. 2014;29(2):364-87.

21. Malta DC, Moura L, Bernal RTI. Diferenciais dos fatores de risco de Doenças Crônicas não Transmissíveis na perspectiva de raça/cor. Ciênc Saúde Colet. 2015;20(3):713-25.

22. Stopa SR, Malta DC, Monteiro CN, Szwarcwald CL, Goldbaum M, Cesar CLG. Use of and access to health services in Brazil, 2013 National Health Survey. Rev Saúde Pública. 2017;51 Suppl 1:1-10.

23. Oliveira BLCA, Thomaz EBAF, Silva RA. The association between skin color/race and health indicators in elderly Brazilians: a study based on the Brazilian National Household Sample Survey (2008). Cad Saúde Pública. 2014;30:1438-52.

24. Saadi A, Himmelstein DU, Woolhandler S, Mejia NI. Racial disparities in neurologic health care access and utilization in the United States. Neurology 2017;88(24):2268-75.

25. Camargos MCS, Gonzaga MR, Costa JV, Bomfim WC. Estimativas de expectativa de vida livre de incapacidade funcional para Brasil e Grandes Regiões, 1998 e 2013. Ciênc Saúde Colet. 2019;24(3):737-47.

26. Vasconcelos AMN, Gomes MMF. Transição demográfica: a experiência brasileira. Epidemiol Serv Saúde. 2012;21(4):539-48.

27. No Brasil, maioria dos contaminados são mais jovens, diz estudo. O Globo (Rio de Janeiro) [Internet]. 05 maio 2020 [acesso em 26 maio 2020]. Disponível em: https://www.spriomais.com.br/2020/05/05/no-brasil-maioria-dos-contaminados-sao-mais-jovens-diz-estudo/

28. Mendonça FD, Rocha SS, Pinheiro DLP, Oliveira SV. Região Norte do Brasil e a pandemia de COVID-19: análise socioeconômica e epidemiológica. J Health NPEPS. 2020;5(1):20-37.

29. Instituto de Pesquisa Econômica Aplicada. Desenvolvimento humano nas macrorregiões brasileiras [Internet]. Brasília, DF: 2016 [acesso em 25 maio 2020]. Disponível em: http://repositorio.ipea.gov.br/bitstream/11058/6217/1/Desenvolvimento%20humano%20nas%20macrorregi%C3%B5es%20brasileiras.pdf

30. Rodrigues CG, Simões RF, Amaral PV. Distribuição da rede de oferta de serviços de saúde na região norte: uma análise espacial multivariada. Belo Horizonte: UFMG/Cedeplar; 2007.

31. Martins LR, Codeço CV, Gomes MFC, Cruz OG, Bastos LS, Villela DAM, et al. The novel coronavirus (SARS-CoV-2) emergency and the role of timely and effective national health surveillance. Cad Saúde Pública. 2020;36(3):e00019620 [10 p.].

32. Dolzan M. Monitor acompanha taxas de isolamento social no Brasil. Estadão [Internet]. 14 maio 2020 [acesso em 26 maio 2020]. Disponível em: https://www.estadao.com.br/infograficos/saude,monitor-acompanha-taxas-de-isolamento-social-no-brasil,1093828

33. Qualls N, Levitt A, Kanade N, Wright-Jegede N, Dopson S, Biggersataff M, et al. Diretrizes da comunidade para mitigação de prevenção da gripe pandêmica - Estados Unidos. Morbidity and Mortality Weed Report. Atlanta: CDC; april 21 2017. Recommendatios and reports. Report 66 (N° RR-1):1–34.

34. Garcia LP, Duarte E. Intervenções não farmacológicas para o enfrentamento à epidemia da COVID-19 no Brasil. Epidemiol Serv Saúde. 2020;29(2):e2020222 [10 p.].

35. Schuchmann AZ, Schnorrenberger BL, Chiquetti ME, Gaiki RS, Raimann BW, Maeyam MA. Isolamento social vertical X Isolamento social horizontal: os dilemas sanitários e sociais no enfrentamento da pandemia de COVID-19. Braz J Health Rev. 2020;3(2):3556-76.

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Original Articles

1 of 10

Utilitarian walking and walking as exercise among community-dwelling older adults: what factors influence it?

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Abstract

Objective: to investigate the association between utilitarian walking and walking as exercise, and socio-demographic, clinical and functional covariates related to these walking types. *Methods:* a cross-sectional exploratory study was conducted with 148 older adults (aged 60 and over). Walking frequency and duration was assessed using the IPEQ-W (Incidental and Planned Exercise Questionnaire – Version W). Socio-demographic, clinical conditions, level of disability and mobility were also assessed. Types of walking were compared among the variables using the Mann-Whitney test and non-parametric Spearman *rho* correlations were used to investigate the association between the types of walking and the variables. *Results:* the participants performed a mean of 1.1 (±2.1) h/week of walking as exercise and 2.2 (±2.3) h/week of utilitarian walking. Older adults who had diabetes ($p=0.015$) did fewer h/week of walking as exercise. Participants who were older ($p=0.014$), reported poor self-rated health ($p<0.001$), poor disability levels ($p<0.001$), hypertension ($p=0.048$), strokes ($p<0.001$), heart disease ($p=0.026$), urinary incontinence ($p<0.001$), dizziness ($p=0.008$), or sleep disorders ($p=0.042$) spent fewer hours performing utilitarian walking. Correlations between the covariates and types of walking varied from very weak to weak. *Conclusion:* chronic diseases and unfavorable health conditions decreased walking time. Utilitarian walking was the most frequent type of walking performed by the older adults. Health care professionals and public policy managers should use utilitarian walking as a way of increasing levels of physical activity and to promote healthy aging.

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INTRODUCTION

Physical activity is one of the key determinants for healthy ageing and plays an important role in reducing disability, mortality and preventing chronic diseases[1]. A total of 150 minutes per week of moderate to-vigorous physical activity is recommended, in bouts of 10 minutes or more[2]. Meeting and maintaining at least the minimum physical activity recommendations could prevent 45% of deaths associated with physical inactivity[3]. Studies show that older people are more inactive and do not follow such recommendations[4,5], which are frequently perceived as unattainable, particularly for older adults who are disabled and frail[6].

Older people spend around two thirds of their time in sedentary activities, one third in light activities and only 2.1% of their days in activities considered moderate to vigorous[7]. Furthermore, it has been observed that the older the age, the greater is the tendency to sedentary behavior and/or to performing light physical activities[7].

One tool for increasing the level of physical activity and minimizing sedentary behavior is encouragement from health care professionals for older persons to be more active in general. The orientation for older adults to add small amounts of physical activity on a daily basis [6] and increase the time spent on low-intensity activities, such as light walking[8] are among the recommended strategies. Walking is the most common physical activity performed by adults[9], with an energy expenditure ranging from 2.0 METs (Metabolic Equivalent of Task) per hour for slow walking indoors to 2.5 METs for utility walking and 3.5 METs for walking as exercise[10].

Walking is recognized as an entry-level physical activity as it is accessible, inexpensive and safer than other strenuous forms of exercise, and can be monitored and quantified[11,12]. Overall, nearly 30% of adult men and 40% of women reported walking as a leisure-time physical activity[9] and, one in three older people reported walking outside the home on at least five days per week[13]. Among older people, unhurried walking is the main physical activity in the previous 90 days[14].

Not only is walking considered a good light to moderate exercise, it also can be used as a means of simply getting from one place to another for utilitarian purposes, such as shopping and connecting to public transport. The distance to amenities, the type of neighborhood, socioeconomic characteristics and walkability influence utilitarian walking[15].

The physical and mental health benefits of walking as a moderate intensity exercise are widely recognized. Light intensity physical activities, such as utilitarian walking, have shown positive effects on body composition parameters (lower body mass index and waist circumference), the reduction of C-reactive protein levels and insulin resistance, in addition to reducing the risk of mortality[8,16].

There is a growing consensus regarding the importance of encouraging sedentary older people to perform activities of any intensity[16,17]. However, the factors related to types of walking among older adults have been little explored. Understanding the sociodemographic factors, health conditions and functionality that can influence types of walking can help health professionals prescribe and guide walking as a way to increase the level of physical activity of older adults. Therefore, the aim of the present study was to investigate the association between utilitarian walking and walking as exercise, and between socio-demographic, clinical and functional covariates and these walking types.

METHODS

A cross-sectional exploratory study with community-dwelling older adults, aged 60 years and over, was conducted. The participants were registered at two reference centers for older adults in the city of São Paulo, in the state of São Paulo, Brazil. The sample was selected by convenience and the older adults were invited to participate while in the waiting room for ambulatory consultations. Data were collected between 2013 and 2014 and the two evaluators were previously trained.

The present study received approval from the Human Research Ethics Committee of the Universidade Cidade de São Paulo (protocol number

129.812). All the participants received explanations regarding the objectives and procedures of the study and agreed to participate by signing a statement of informed consent.

Participants were excluded if they had cognitive impairment (based on Mini Mental State Examination score, adjusted by schooling)[18], were unable to walk (temporary or permanent) or used a wheelchair, and had aphasia or any severe sensory dysfunction that impaired communication.

To assess physical activity level the self-reported Incidental and Planned Exercise Questionnaire – IPEQ-W for older adults[19] was used. This questionnaire estimates the frequency and duration of several levels of planned (exercise class, home exercises, walking, etc.) and incidental (household tasks, utilitarian walking, etc.) physical activities. There is a version of the IPEQ, the WA, which assesses the same issues with a recall time of three months (IPEQ-WA).

The final score is the total duration in hours per week, which is obtained by multiplying frequency and duration. The IPEQ-W can be divided into the following subdomains: incidental activities, walking activities, planned activities, planned walking activities and sports activities. For the present study, the total time spent on planned walking and on incidental or utilitarian walking was calculated.

The test–retest reliability of the original validation study of the IPEQ-W was assessed by the intraclass correlation coefficient (ICC) between the scores obtained in the initial survey and after one-week of follow-up. The following ICCs were obtained: 0.77 for comparison of total score; 0.89 and 0.26, respectively, for questions related to frequency and duration of walking as exercise; and 0.81 and 0.75, for utilitarian walking[19]. The IPEQ-W validity for walking was ascertained using its correlation with average moderate- to vigorous-intensity physical activity (MVPA) at low and medium cut-off points from an accelerometer and was 0.26 and 0.35, respectively[20].

To assess the reliability of the Brazilian version of IPEQ-W, we conducted a study with a sub-sample of 50 older adults and used the ICC[2,1] (95% CI) and the ICC[3,1] (95% CI) to test the inter-rater and the test-retest reliability, respectively. The ICC (inter-rater reliability) comparing planned walking (frequency and duration) was 0.88 (0.79-0.93) and 0.89 (0.80-0.93). The ICC comparing utilitarian walking was 0.87 (0.78-0.93) and 0.75 (0.57-0.86). The ICC (test–retest reliability) for planned walking (frequency and duration) was 0.86 (0.74-0.92) and 0.92 (0.86-0.95). The ICC (test-retest reliability) comparing utilitarian walking was 0.94 (0.89-0.96) and 0.82 (0.68-0.89). Overall, the test- retest and inter-rater reliability of the IPEQ-W ranged from substantial to excellent[21].

To characterize the sample we used a semi structured questionnaire that included sociodemographic questions (age, sex, income and living alone), number of self-reported diseases, health conditions and the regular use of medications. The use of five or more medications on a regular basis was considered polypharmacy.

The presence of depressive symptoms was assessed using the Geriatric Depression Scale (GDS). This scale consists of 15 questions that track the mood of individuals over the previous week. A final score above 5 points was considered positive for depressive symptoms. The scale has good sensitivity (81%) and specificity (71%)[22].

The level of disability was assessed using the World Health Organization disability assessment schedule (WHODAS 2.0)[23]. It is composed of 12 questions divided into six domains: cognition, mobility, self-care, getting along, life activities and participation. Each item ranging from 0 (no problem) to 4 (severe problem or unable to perform) was totaled. The total score ranges from 0 to 48 points, with a higher score indicating greater disability.

Mobility was assessed with the Timed Up-and-Go Test (TUGT)[24], which measures the time it takes an individual to rise from a standard chair with armrests, walk a distance of 3 m, turn, walk back to the chair and sit down. The participant was instructed to complete the task as quickly as possible, without running. The time spent to complete the task was computed, with a low time indicating better performance in the test. The reliability of the TUGT is 0.91.

To calculate the sample size, it was considered that rejecting the null hypothesis (H0) with a value of β=0.20 and α=0.05 and with an estimated correlation coefficient of r=0.250 would require a sample with 123 participants.

Descriptive analyses were carried out to characterize the sample. The average weekly hours of walking as exercise and utilitarian walking were compared in relation to the variables of interest using the Mann-Whitney test for variables with two categories and the Kruskal Wallis test for variables with three or more categories. Post hoc analysis was performed using pairwise comparisons, with the adjusted Kruskal Wallis test. Spearman rho's nonparametric correlations were calculated to investigate the association between walking as exercise and utilitarian walking and the variables of interest.

The criteria suggested by Schober et al. (2018)[25] for evaluating correlation strength is 00-0.10 (negligible),

0.10-0.30 (weak), 0.40-0.69 (moderate), 0.70-0.89 (strong) or 0.90-1.0 (very strong).

RESULTS

One hundred and forty eight older adults were included in this study (Figure 1). The average scores of participants were 10.4 ($\pm$3.5) seconds for the TUGT, 2.9 ($\pm$2.9) points for the GDS and 2.0 4.7 ($\pm$5.7) points for the WHODAS. The participants performed an average of 1.0 ($\pm$2.1) hours per week of walking as exercise, ranging from 0 to 10.5 hours and, on average 2.2 ($\pm$2.3) hours per week of utilitarian walking, ranging from 0 to 13.5 hours.

The comparison between covariates and hours per week of walking as exercise and utilitarian walking is shown in table 1. The correlation between walking as exercise and utilitarian walking and the variables of interest is shown in tables 2 and 3.

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┌─────────────────────────┐
│ Enrolled older adults   │
│        n=374            │
└─────────────────────────┘
             │
             │───────────────────►┌──────────────────────────────────┐
             │                    │ Excluded (n=24)                    │
             │                    │ Cognitive decline (n=14)           │
             │                    │ Severe visual impairment (n=3)     │
             │                    │ No ambulation (n=3)                │
             ▼                    │ Refused (n=4)                      │
┌─────────────────────────┐      └──────────────────────────────────┘
│       Included          │
│       (n=350)           │
└─────────────────────────┘
             │
             │───────────────────►┌──────────────────────────────────┐
             │                    │ Responded to the physical          │
             │                    │ activity questionnaire using the   │
             │                    │ version 'in the last 3 months'     │
             ▼                    │ n=202                              │
┌─────────────────────────┐      └──────────────────────────────────┘
│ Responded to the        │
│ physical activity       │
│ questionnaire using the │
│ version 'in the last    │
│ week'                   │
│       n=148             │
└─────────────────────────┘
```
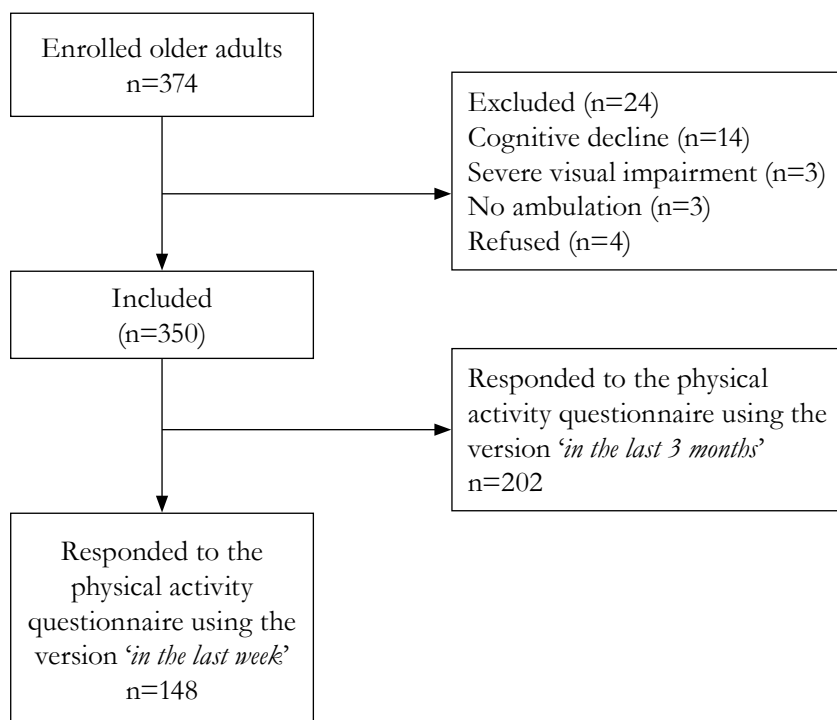
Figure 1. Study flowchart of participants who responded to the IPEQ-W (in the last week). Older adults who responded to the IPEQ-WA (in the last 3 months) were excluded. São Paulo, 2014.

Table 1. Comparison between walking as exercise and utilitarian walking in older adults receiving follow-up care at a reference center for older people, São Paulo, 2014 (N=148).

Variables	Total population N (%)	Walking (hours/week) Mean (95% CI)			
		Exercise	p-value	Utilitarian	p-value
Age					
60-74	103 (69.6)	1.2 (0.7 - 1.6)	0.132	2.4 (1.9 - 3.0)	0.014
75+	45 (30.4)	0.7 (0.2 - 1.1)		1.6 (1.2 - 2.0)	
Sex					
Women	126 (85.1)	1.1 (0.7 - 1.5)	0.343	2.2 (1.8 - 2.7)	0.563
Men	22 (14.9)	0.6 (0.0 - 1.3)		1.9 (1.1 - 2.7)	
Income (in R$)					
0.0 – 1.0	11 (7.4)	1.3 (0.0 - 3.4)	0.926	1.5 (0.9 - 2.2)	0.757
1.1 – 2.0	98 (66.2)	0.9 (0.5 - 1.3)		2.2 (1.6 - 2.7)	
2.1 – 3.0	20 (13.5)	1.1 (0.1 - 2.0)		2.3 (1.4 - 3.2)	
3.1 +	19 (12.8)	1.2 (0.0 - 2.5)		2.5 (1.6 - 3.3)	
Living alone					
Yes	38 (25.7)	1.3 (0.6 - 1.9)	0.397	2.6 (1.6 - 3.6)	0.199
No	110 (74.3)	0.9 (0.5 - 1.3)		2.0 (1.7 - 2.4)	
Stroke			0.631		<0.001
Yes	11 (7.4)	0.7 (0.3 - 1.8)		0.9 (0.4 - 1.4)	
No	137 (92.6)	1.0 (0.7 - 1.4)		2.3 (1.9 - 2.7)	
Depression			0.791		0.403
Yes	36 (24.3)	0.9 (0.2 - 1.7)		1.7 (0.9 - 2.5)	
No	112 (75.7)	1.0 (0.6 - 1.4)		2.3 (1.9 - 2.8)	
Hypertension			0.177		0.048
Yes	112 (75.7)	0.9 (0.5 - 1.3)		2.0 (1.6 - 2.4)	
No	36 (24.3)	1.4 (0.6 - 2.3)		2.9 (1.9 - 3.8)	
Diabetes			0.015		0.602
Yes	59 (39.9)	0.5 (0.2 - 0.9)		2.1 (1.4 - 2.7)	
No	89 (60.1)	1.3 (0.8 - 1.8)		2.3 (1.8 - 2.8)	
Heart disease			0.675		0.026
Yes	28 (18.9)	0.8 (0.2 – 1.8)		1.5 (0.9 – 2.1)	
No	120 (81.1)	1.0 (0.7 – 1.4)		2.3 (1.9 – 2.8)	
Osteoarthritis			0.926		0.827
Yes	28 (18.9)	0.7 (0.3 - 1.8)		0.9 (0.4 - 1.4)	
No	120 (81.1)	1.0 (0.6 - 1.4)		2.3 (1.9 - 2.7)	
Urinary incontinence			0.481		<0.001
Yes	28 (18.9)	0.7 (0.3 - 1.8)		1.1 (0.6 - 1.6)	
No	120 (81.1)	0.9 (0.6 - 1.7)		2.4 (2.0 - 2.9)	
Dizziness			0.076		0.008
Yes	46 (31.1)	0.6 (0.2 - 1.1)		1.6 (1.1 - 2.0)	
No	102 (68.9)	1.2 (0.7 - 1.6)		2.5 (1.9 - 3.0)	

Continuation of Table 1

Variables	Total population N (%)	Walking (hours/week) Mean (95% CI)			
		Exercise	p-value	Utilitarian	p-value
Sleep problems			0.671		0.042
Yes	34 (23.0)	1.1 (0.3 - 2.0)		1.6 (1.1 - 2.2)	
No	114 (77.0)	1.0 (0.6 - 1.4)		2.4 (1.9 - 2.8)	
Number of comorbidities			0.101		0.142
0	15 (10.1)	2.0 (0.2 - 3.8)		3.1 (1.5 - 4.7)	
1 - 2	69 (46.7)	1.2 (0.6 -1.7)		2.5 (1.8 - 3.1)	
3 or more	64 (43.2)	0.6 (0.2 - 1.0)		1.6 (1.2 - 2.0)	
Polypharmacy (≥5)			0.283		0.019
Yes	43 (29.1)	0.8 (0.1 - 1.4)		1.5 (1.0 - 2.0)	
No	105 (70.9)	1.1 (0.7 - 1.5)		2.5 (2.0 - 3.0)	
Perceived health			0.070		<0.001
Very good and good	76 (51.4)	1.4 (0.8 - 2.0)		2.8 (2.2 - 3.4)[a]	
Fair	61 (41.2)	0.6 (0.2 - 1.0)		1.6 (1.2 - 2.0)[b]	
Very poor and poor	11 (7.4)	0.5 (0.0 - 1.1)		1.2 (0.0 - 2.5)[c]	
WHODAS 2.0 (0-12)			0.052		<0.001
1st tercile	58 (39.2)	1.3 (0.7 - 1.9)		3.3 (2.5 - 4.1)[d]	
2nd tercile	42 (28.4)	1.4 (0.5 - 2.3)		1.7 (1.2 - 2.1)[e]	
3rd tercile	48 (32.4)	0.3 (0.0 - 0.5)		1.3 (0.9 - 1.7)[f]	

a≠b [$\chi^2 (2)$=24.88; p=0.002]; a≠c [$\chi^2 (2)$=39.56; p=0.012]; d≠e [$\chi^2 (2)$=24.49; p=0.014]; d≠f [$\chi^2 (2)$=34.33; p<0.001].

Table 2. Correlation between walking as exercise and utilitarian walking and variables of interest in older adults receiving follow-up care at a reference center for older people, São Paulo, 2014 (N=148).

Variables	Walking	
	Exercise	Utilitarian
Age, years	rho = - 0.131 p = 0.113	rho = - 0.171 **p= 0.037**
Income, R$	rho = 0.075 p = 0.363	rho = 0.126 p = 0.126
Education, years	rho = 0.111 p = 0.179	rho = 0.016 p = 0.847
Number of medications	rho = -0.105 p = 0.203	rho = - 0.234 **p = 0.004**
Number of comorbidities	rho = - 0.185 **p = 0.025**	rho = - 0.228 **p = 0.005**
TUGT, seconds	rho = - 0.201 **p = 0.014**	rho = - 0.265 **p = 0.001**
WHODAS 2.0, points (0- 48)	rho = - 0.201 **p = 0.014**	rho = - 0.328 **p < 0.001**
GDS, points (0 -15)	rho = - 0.174 **p = 0.034**	rho = -0.201 **p = 0.014**

Spearman rho correlation

Table 3. Correlation between walking as exercise and utilitarian walking and WHODAS 2.0 domain scores in older adults receiving follow-up care at a reference center for older people, São Paulo, 2014 (N=148).

Domains WHODAS 2.0	Walking	
	Exercise	Utilitarian
Cognitive	rho = - 0.192 **p = 0.019**	rho = - 0.207 **p = 0.008**
Mobility	rho = - 0.159 **p = 0.054**	rho = - 0.273 **p = 0.001**
Self-care	rho = -0.031 p = 0.711	rho = - 0.099 p = 0.233
Relationship	rho = - 0.190 **p = 0.021**	rho = - 0.190 **p = 0.021**
Life activities	rho = - 0.174 **p = 0.034**	rho = - 0.214 **p = 0.009**
Participation	rho = - 0.056 p = 0.498	rho = - 0.248 **p = 0.002**

Spearman rho correlation

DISCUSSION

The current study investigated the association between sociodemographic, clinical and functional factors and different types of walking. The time in hours per week spent walking as an exercise was lower among older adults who reported having diabetes, and the time spent on utilitarian walking was lower among older adults who reported hypertension, heart disease, strokes, urinary incontinence, dizziness, sleep problems, polypharmacy, who self-rated their health as fair, bad or very bad and had a worse level of functionality. In general, the correlation between the covariates and the types of walking varied from very weak to weak.

The World Health Organization, in a study on Global Aging and Adult Health conducted in six low and middle-income countries (LMICs), revealed that low levels of physical activity (<150 minutes of moderate to vigorous intensity) were associated with physical health problems, worse self-reported health and comorbidities, such as chronic back pain, sleeping problems, visual and hearing problems, stroke and chronic obstructive pulmonary disease. In addition, there was a score of 3% per unit of disability score measured by WHODAS 2.0 for low physical activity (OR=1.03, 95% CI 1.02-1.03).

In the present study, it was observed that of all diseases and health conditions, only diabetes negatively influenced walking as an exercise. Older people with diabetes spent less time walking as an exercise than older people without diabetes. This fact has also been observed in young people with diabetes (59.1±13.3 years), who were less active in terms of walking (with diabetes 90±225 vs. without diabetes 135±275 min week)[26]. Factors that can prevent the participation of persons with diabetes in walking as exercise can include fear of hypoglycemia and problems related to peripheral neuropathies[27]. This result is highly unfavorable, since there is substantial evidence that structured aerobic exercise is effective in improving glycemic control in patients with type 2 diabetes[28].

Studies show the influence of different health conditions on walking. The results of the present study showed that the older people who reported having a disease and/or negative health condition engaged in less time of utilitarian walking. For example, older people who report urinary incontinence and dizziness generally have lower levels of habitual walking[29], as they may feel uncomfortable and insecure when walking outdoors, due to the nature of the environmental and circumstantial unpredictability of activities outside the home. Furthermore, nearly

20% of older people reported dizziness while walking in the previous year, which may help to explain why they usually performed fewer hours per week of utilitarian walking[30]. Sleep problems, such as daytime sleepiness, also impair everyday activities, and are associated with poor self-rated health, obesity and depressive symptoms[31].

Excessive medication use is associated with poor gait performance. Each additional medication taken increases the risk of gait decline by 12% to 16%[32]. The adverse effects of some medications, such as antihypertensive drugs, can cause dizziness and orthostatic hypotension. Some medications can affect balance and gait control, resulting in less willingness and confidence in relation to walking outside the home.

Disability level negatively influenced utilitarian walking. However, a negative and weak correlation between utilitarian walking and the mobility domain of the WHODAS 2.0. Studies have observed that the prevalence of older people who engaged in utilitarian walking decreased among those using walking aids[33], poor balance, poor lower limb functionality and high disability levels in activities of daily living[13]. Having a functional limitation, particularly mobility limitation, can prevent people from walking.

The presence of comorbidities influenced the time spent on utilitarian walking more than the time spent on walking as exercise. However, the average number of hours per week of utilitarian walking was much higher than that spent on walking as exercise. This difference may have been due to the various barriers that older persons face when engaging in structured exercises, such as fear of suffering injuries, competing priorities, unsuitable climate, among others[17]. In contrast, utilitarian walking commonly occurs as part of activities of daily living, and is generally of low intensity, resulting in less discomfort. Almost 30% of older people walk for utilitarian purposes at least once a week[13].

Environmental factors can directly influence the performance of different types of walking. Neighborhood characteristics, residential density, better mobility, access to destinations and services and availability of green spaces can be considered key factors. Short distances to access goods and services, such as a bus and metro stop, hospital, shops and supermarkets are important for encouraging older adults to engage in utilitarian walks[13].

There is widespread recognition that health care practitioners play a critical role in increasing physical activity level amongst older adults, not only in increasing physical fitness but also in keeping older people as active as possible. Although exercise is a recognized treatment for multiple chronic conditions, its prescription is still neglected and commonly poorly addressed by clinicians. On its own, however, a recommendation to walk is insufficient if there is no personalized guidance and prescription, in addition to the care that should take into account barriers and facilitators over time[17].

Older adults can become more active, combining walking as exercise and utilitarian walking[13]. Positive results were observed in groups who received guidance in walking[34]. In addition to setting goals, the development of skills to increase self-efficacy when carrying out utilitarian walking, such as carrying bags, avoiding obstacles and walking in places with a lot of people, seem to be promising interventions[35].

Certain limitations of the present study should be acknowledged. Reported frequencies and duration of walking types are prone to recall bias and the investigation over a time frame of a week may not have captured a consistent pattern of walking activity. We interviewed older adults that were receiving follow-up care in two reference centers for older people that cover a specific geographical area of the city. However, these centers are located in large city, and are the referral points for approximately five million people with different socioeconomic and demographics profiles. The catchment area of the centres include various neighborhoods and built environments with different accessibility characteristics. While we interviewed a broad range of older people while they were waiting for medical, dental and rehabilitation appointments, they may not represent the entire population. Causal relationships could not be investigated due to the cross-sectional study design. Our sample size may not be sufficient to reject the null hypothesis for very weak correlations.

CONCLUSION

Utilitarian walking is the most common walking type used by the older people in their activities of daily living and should be encouraged by health professionals and public health managers as a way of increasing levels of physical activity and promote healthy aging. Diseases and unfavorable health conditions negatively influence walking as a physical activity. Strategies for assessing, intervening and monitoring the health of older people should be implemented as a way of minimizing barriers to utilitarian walking. Future research to identify predictors of less time spent in utilitarian walking and intervention protocols to assess the effectiveness of utilitarian walking should be conducted.

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REFERENCES

1. Bauman A, Merom D, Bull F, Buchner D, Fiatarone Singh M. Updating the evidence for physical activity: Summative Reviews of the Epidemiological Evidence, Prevalence, and Interventions to Promote "Active Aging". Gerontologist. 2016;56 Suppl 2:268-80.

2. United States. Department of Health and Human Services. Physical activity for americans. 2nd. ed. Washington, DC: Department of Health and Human Service;, 2018.

3. Mok A, Khaw KT, Luben R, Wareham N, Brage S. Physical activity trajectories and mortality: population based cohort study. BMJ. 2019;365:1-10.

4. Gobbi S, Sebastiao E, Papini CB, Nakamura PM, Valdanha Netto A, Gobbi LT, et al. Physical inactivity and related barriers: a study in a community dwelling of older brazilians. J Aging Res. 2012;2012:1-10.

5. Zaitune MP, Barros MB, Cesar CL, Carandina L, Goldbaum M, Alves MC. Factors associated with global and leisure-time physical activity in the elderly: a health survey in Sao Paulo (ISA-SP), Brazil. Cad Saúde Pública. 2010;26(8):1606-18.

6. Sparling P, Howard B, Dunstan D, Owen N. Recommendations for physical activity in older adults. BMJ. 2015;350:1-10.

7. Dos Santos CES, Manta SW, Maximiano GP, Confortin SC, Benedetti TRB, D'Orsi E, et al. Accelerometer-measured physical activity and sedentary behavior: a cross-sectional study of Brazilian Older Adults. J Phys Act Health. 2018;15(11):811-18.

8. Loprinzi P, Lee H, Cardinal B. Evidence to support including lifestyle light-intensity recommendations in physical activity guidelines for older adults. Am J Health Promot. 2015;29(5):277-84.

9. Dai S, Carroll DD, Watson KB, Paul P, Carlson SA, Fulton JE. Participation in Types of Physical Activities Among US Adults--National Health and Nutrition Examination Survey 1999-2006. J Phys Act Health. 2015;12 Suppl 1:128-40.

10. Ainsworth BE, Haskell WL, Herrmann SD, Meckes N, Bassett Jr. DR, Tudor-Locke C, et al. Compendium of Physical Activities [Internet]. Arizona: Arizona States University; 2011 [acesso em 26 maio 2020]. Disponível em: https://sites.google.com/site/compendiumofphysicalactivities/Activity-Categories

11. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. 2012;380(9838):247-57.

12. Sallis R, Matuszak J, Baggish A, Franklin B, Chodzko-Zajko W, Fletcher B, et al. Call to action on making physical activity assessment and prescription a medical standard of care. Curr Sports Med Rep. 2016;15(3):207-14.

13. Procter-Gray E, Leveille SG, Hannan MT, Cheng J, Kane K, Li W. Variations in Community Prevalence and Determinants of Recreational and Utilitarian Walking in Older Age. J Aging Res. 2015;2015:1-10.

14. Ramalho JR, Lima-Costa MF, Firmo JO, Peixoto SV. Energy expenditure through physical activity in a population of community-dwelling Brazilian elderly: cross-sectional evidences from the Bambui Cohort Study of Aging. Cad Saúde Pública. 2011;27 Suppl 3:399-408.

15. Hajna S, Ross NA, Joseph L, Harper S and Dasgupta K. Neighbourhood walkability, daily steps and utilitarian walking in Canadian adults. BMJ Open. 2015;5(11):e008964 [10 p.].

16. Fuzeki E, Engeroff T, Banzer W. Health benefits of light-intensity physical activity: a systematic review of Accelerometer Data of the National Health and Nutrition Examination Survey (NHANES). Sports Med. 2017;47(9):1769-93.

17. Perracini MR, Franco MRC, Ricci NA, Blake C. Physical activity in older people - Case studies of how to make change happen. Best Pract Res Clin Rheumatol. 2017;31(2):260-74.

18. Bertolucci PH, Brucki SM, Campacci SR, Juliano Y. The Mini-Mental State Examination in a general population: impact of educational status. Arq Neuropsiquiatr. 1994;52(1):1-7.

19. Delbaere K, Hauer K, Lord SR. Evaluation of the incidental and planned activity questionnaire (IPEQ) for older people. Br J Sports Med. 2010;44(14):1029-34.

20. Merom D, Delbaere K, Cumming R, Voukelatos A, Rissel C, Van Der Ploeg HP, et al. Incidental and planned exercise questionnaire for seniors: validity and responsiveness. Med Sci Sports Exerc. 2014;46(5):947-54.

21. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33:159-74.

22. Almeida OPA, Shirley A. Reliability of the brazilian version of the Geriatric Depression Scale (GDS) short form. Arq Neuropsiquiatr. 1999;57:421-6.

23. Ustun TB, Chatterji S, Kostanjsek N, Rehm J, Kennedy C, Epping-Jordan J, et al. Developing the World Health Organization Disability Assessment Schedule 2.0. Bull World Health Organ. 2010;88(11):815-23.

24. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc. 1991;39(2):142-8.

25. Schober P, Boer C, Schwarte LA. Correlation coefficients: appropriate use and interpretation. Anesth Analg. 2018;126(5):1763-8.

26. Huebschmann AG, Crane LA, Belansky ES, Scarbro S, Marshall JA, Regensteiner JG. Fear of injury with physical activity is greater in adults with diabetes than in adults without diabetes. Diabetes Care. 2011;34(8):1717-22.

27. Adeniyi AF, Anjana RM, Weber MB. Global account of barriers and facilitators of physical activity among patients with Diabetes Mellitus: a narrative review of the literature. Curr Diabetes Rev. 2016;12(4):440-8.

28. Delevatti RS, Bracht CG, Lisboa SDC, Costa RR, Marson EC, Netto N, et al. The Role of aerobic training variables progression on glycemic control of patients with Type 2 Diabetes: a systematic review with meta-analysis. Sports Med Open. 2019;5(1):1-10.

29. Lee AH, Hirayama F. Physical activity and urinary incontinence in older adults: a community-based study. Curr Aging Sci. 2012;5(1):35-40.

30. De Moraes SA, Soares WJ, Rodrigues RA, Fett WC, Ferriolli E, Perracini MR. Dizziness in community-dwelling older adults: a population-based study. Braz J Otorhinolaryngol. 2011;77(6):691-9.

31. Lima CA, Soares WJ, Bilton TL, Dias RC, Ferrioll E, Perracini MR. Correlates of excessive daytime sleepiness in community-dwelling older adults: an exploratory study. Rev Bras Epidemiol. 2015;18(3):607-17.

32. Montero-Odasso M, Sarquis-Adamson Y, Song HY, Bray NW, Pieruccini-Faria F, Speechley M. Polypharmacy, gait performance, and falls in community-dwelling oder adults: Results from the Gait and Brain Study. J Am Geriatr Soc. 2019;67(6):1182-8.

33. Winters M, Voss C, Ashe MC, Gutteridge K, McKay H, Sims-Gould J. Where do they go and how do they get there? Older adults' travel behaviour in a highly walkable environment. Soc Sci Med. 2015;133:304-12.

34. Kassavou A, Turner A, French DP. Do interventions to promote walking in groups increase physical activity?: a meta-analysis. Int J Behav Nutr Phys Act. 2013;10:1-8.

35. Salbach NM, Barclay R, Webber SC, Jones CA, Mayo NE, Lix LM, et al. A theory-based, task-oriented, outdoor walking programme for older adults with difficulty walking outdoors: protocol for the Getting Older Adults Outdoors (GO-OUT) randomised controlled trial. BMJ Open. 2019;9(4):e029393 [10 p.].