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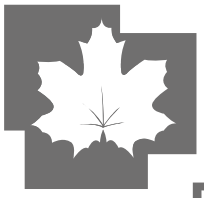

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Vaccine hesitancy and the challenges of dealing with the COVID-19 pandemic among older adults in Brazil

Dystopian tales that portray a huge economic, political and social crisis initiated by a rapidly spreading virus are common in literature and movies. It is not hard to associate these stories with previously documented experiences of pandemics in world history, or with prospective actions against new outbreaks. A notable common element among such narratives, despite their particularities, is the evident inequality with which different population groups are affected, in relation to the availability of and access to disease prevention and treatment measures.

For the scientific community, what happened in 2020 was not entirely unexpected, although it shook the world to its foundations. While the new reality caused by the COVID-19 pandemic and the deepening of inequalities had an enormous impact, it was not entirely surprising.

Representing 53% of deaths due to COVID-19 in Brazil in 2020, older adults (≥60 years) have emerged as one of the most vulnerable groups during the pandemic. A higher prevalence of chronic diseases and greater immune weakness against COVID-19 substantially increases the risk of death for this group, in comparison with other age groups[1]. In thinking of ways to reduce mortality and increase the visibility of the specific care needs of older adults, vaccination against COVID-19 for this age group has been provided and prioritized in several countries. It has therefore been understood globally as a fundamental strategy for promoting and protecting the health of older adults.

Brazil has one of the most complete and geographically comprehensive national immunization programs in the world. Over its four decades of existence, the National Immunization Program (or PNI), has accumulated successful experiences in campaigns of national scope and international recognition, but in recent years confidence in the system and vaccine coverage for some diseases has declined[2]. Without a campaign to inform the population, the arrival of new vaccines, especially those for COVID-19, may contribute to an increase in resistance to and refusal of vaccination among the population. Such resistance is conceptualized as "vaccination hesitancy", which means the refusal or delay in accepting vaccines, despite their availability in health systems. It is affected by the variables of *confidence, complacency* and *convenience*, and appears frequently in the history of vaccination[3].

Confidence involves issues such as vaccine efficacy and safety, as well as the reliability and competence of healthcare professionals, the healthcare system and legislators who decide when and which vaccines are needed. Complacency, meanwhile, occurs when the perceived risks of diseases preventable by vaccination are

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low, and vaccination is not considered important. Finally, convenience affects the decision to vaccinate due to variations in the practicality and ease of obtaining the vaccine, and involves issues such as the opening hours of vaccination stations, availability of doses and human resources[3].

Hesitant individuals form a heterogeneous group with varying degrees of indecision about specific vaccines or vaccination in general. They may accept all vaccines, but remain concerned about them; some refuse or delay some vaccines, but accept others; while other individuals are likely to refuse all vaccines[4].

Although it is understood that vaccines are excellent tools for the prevention of infectious diseases, especially when dealing with a pandemic, there are also a number of undefined issues, both in terms of the behavior of the virus and its globally spreading variants, and in relation to efficiency and safety data for certain age groups. In terms of the potential for immunization, vaccines work in several different ways, providing benefits to the individual and the community. Vaccination is, therefore, a disease control strategy designed and implemented to reach the population. An easily understood individual benefit is the prevention of infection in the person who is vaccinated. If the vaccine does not prevent infection, it can reduce the reproduction of the virus, triggering a milder form of illness and potentially reducing the individual's ability to transmit the disease.

The hitherto unprecedented creation of vaccines in under a year, as is the case with those designed to tackle COVID-19, the ignorance of a large part of the population about the technical and scientific procedures and protocols involved in the production of immunizers, and the deepening of feelings of fear and insecurity caused by the pandemic, have led to the emergence and strengthening of doubts and challenges regarding the vaccine. Take efficiency data as an example. The effectiveness of one of the vaccines approved in Brazil, CoronaVac, produced by the Butantan Institute, was announced as around 50% in different national media outlets. The standard interpretation of the general population, therefore, is that for every 100 vaccinees, only 50 are protected. However, the efficacy data is related to reducing the incidence of the disease, that is: with an efficacy of 50%, vaccination will reduce the incidence of the disease by 50%, compared to the incidence in the absence of the vaccine. In other words, the vaccine's effectiveness describes how many of every 100 unvaccinated people who became ill would not have gotten sick had they been vaccinated. Thus, the misappropriation of epidemiological terms, as well as the dissemination of false or inaccurate information on social networks, can generate a great deal of noise in communication, and compromise the understanding of vaccination.

The establishment of priority groups for vaccination is an important strategy, based on epidemiological indicators and classification by vulnerability. Even at a time when doses are unavailable for the entire population and there are disputes over who will be prioritized, concern about vaccination hesitancy must be taken into account to ensure that a lack of correct information does not impact the right of access to the vaccine. This situation is aggravated by the lack of an incentivizing and clearly coordinated strategy on the part of the federal government, which could assist the population with reliable information and the systematic clarification of the vaccine's importance and safety through a national advertising campaign.

Thus, the continuous assessment of hesitancy can, together with the monitoring of vaccination coverage, assist both in coping with the COVID-19 pandemic and in preventing new epidemics. In this sense, the next phases of vaccination will require federal, state and municipal governments to work in concert so that the population is vaccinated.

We note that, in addition to a strictly health-related agenda, the subject of the vaccine has become permeated by the geopolitical and economic interests of different nations, industries and interest groups. In this context, it is important that the protection of older adults is guaranteed by humanized and quality health care at all levels: primary, secondary and tertiary[5]. In the public system, as in supplementary or

private healthcare, it is necessary that these citizens have fully guaranteed access to care, and that effective adherence to vaccination and other strategies of care and assistance for their health must be ensured when dealing with the pandemic, and beyond.

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Prevalence of psychic suffering in old people: a community-based study

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Abstract

Objectives: To verify the prevalence of psychic suffering in an old population in the community and analyze its correlation with age, years of education, socioeconomic level, gender, reported morbidity, self-perceived health, visual self-perception, self-perception of hearing, and geriatric syndromes (frailty, fear of falling, functional capacity, and falls). *Method:* A cross-sectional study with 315 non-institutionalized old people living in Juiz de Fora, Minas Gerais, Brazil, in 2015. Data were collected through a household survey, and the psychic suffering can be observed in that old population with the use of the Patient Health Questionnaire (PHQ-4). The Pearson's chi-square test (χ^2) was used to verify the association between the outcome variable and the explanatory variables. The level of significance adopted in the study was 5%. Results: The prevalence of psychic suffering among the old people was 41.8% (95% CI 36.5–47.4%). There was an association between the *PHQ*-4 and gender (ϱ=0.001), reported morbidity (ϱ=0.020), self-perceived health (ϱ <0.001), visual self-perception (ϱ=0.001), self-perception of hearing (ϱ=0.034), functional capacity (ϱ=0.003), and fragility (ϱ=0.000). Conclusions: psychic suffering is a common condition among old people. Knowledge of the factors associated with this event can contribute to a health care model that encourages active and healthy aging.

Keywords: Aging. Health of the Elderly. Mental Health. Stress Psychological. Cross-Sectional Studies.

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INTRODUCTION

Human aging should not mean precarious living and health conditions. Numerous health problems of the old person tend to be chronic, and it is known that they are susceptible to early detection with effective control and monitoring, postponement, and prevention through the encouragement of healthy habits related to strategies and actions based on the paradigm of health production that, in addition to the absence of diseases, aims at guaranteeing the healthy aging of the old person[1,2].

However, longevity is not always congruent with healthy aging, especially in countries with high levels of income distribution such as Brazil, showing the social inequality that creates situations of social vulnerability such as precarious socioeconomic conditions, low self-esteem, and social esteem, and can affect a subject in different age groups, but they intensify with aging and worsening of health condition[3,4].

Social inequality is a serious social phenomenon responsible for processes of deprivation of rights and access to social goods and services, social exclusion, and precarious quality of life, and is considered an undoubted risk factor for triggering psychic suffering and mental disorders, a current possible relation as a result of the acceptance of the expanded concept of health and the notion of multidimensionality and social determination of the health-disease process in agreement with the principle of integrality recommended in the current public policy[5,6].

Thus, social suffering is the result of social inequality and inequity coupled with perverse experiments that can happen concomitantly with the aging process, bringing social isolation, loneliness, separation, loss, humiliation, stress, and physical pain, and contributing to the outbreak of psychic suffering. It is necessary to understand that it does not have a strict biological origin, a claim of the biomedical ideal that underlies the asylum model. In fact, it presents a complex biopsychosocial development concerning the perspective of the Psychiatric Reform[7-9].

It is essential to consider that psychic suffering is not a condition for aging. However, in this process, old people with greater frailty and less access to social resources and apparatus in their context may be more susceptible to mental disorders, susceptible to the onset of mild, moderate, or severe and persistent disorders, and responsible for important disruptions in their daily life, in sociality and their productive life[6.10].

Therefore, the present study aims to verify the prevalence of psychic suffering in an old population in the community and analyze its correlation with age, years of education, socioeconomic level, gender, reported morbidity, self-perceived health, visual self-perception, self-perception of hearing, and geriatric syndromes (frailty, fear of falling, functional capacity, and falls).

METHOD

The present study is part of an umbrella project entitled Health Survey of the Population of Juiz de Fora, Minas Gerais (ISPI-JF) which was designed to investigate the health profile, socioeconomic characteristics, and the determinants of the health-illness process of old people aged 60 or over of both genders and not institutionalized in the North Zone. Thus, to understand this research, it is essential to review the strategies and the methodological path of the macro project.

The ISPI-JF was fed with information through two waves of population-based multidimensional household surveys (2010/2011 and 2014/2015). At the beginning of the follow-up in 2010, the national prevalence of old people who suffered falls (30%) according to the literature was considered for the definition of the sample calculation, as it is the main objective of the research. Other parameters adopted for the development of the sampling plan were the confidence level of 95%, maximum desired error of 5%, losses due to refusal around 30%, correction for finite populations, and effect of the sampling plan equal to 1.5 (having the selection procedure adopted and the possible effects of stratification and clustering as a reference)[11,12,13].

The participants were selected by stratified and cluster random sampling in multiple stages. The census sectors configured the primary sampling units, and from a draw, they were grouped into

defined strata according to different types of health care to which the population of the sector was assigned in the territory, with the modalities being subdivided into primary care - whose services are covered or not with the Family Health Strategy (FHS) -, secondary care, or uncovered area. Then, the participants were chosen within each stratum, which took place independently and respecting the probabilities proportional to the size of the stratum and based on the data of the Demographic Census of 2000 for the resident population[11,12].

The population dynamics intrinsic to the four-year time frame between the two waves of the survey forged the need to use a new sample calculation, and the Oversample method was employed to preserve the representativeness of the probabilistic sample based on stratification and conglomeration. The initial parameter of the estimate considered the sample of the first wave and the data of the Census of 2010 from the Brazilian Institute of Geography and Statistics (IBGE) related to the population of the delimited area at the level of disaggregation of the census sector[11,12,14].

Oversample is a tool to allow to equalize the outputs of individuals on the panel without disrespecting the nature of the initial sampling. Therefore, it is necessary to comply with some requirements: (i) knowledge of the initial population; (ii) statistical treatment and different weighting for each group depending on the nature of the panel's withdrawal - the withdrawal groups were categorized into death, change of address without the possibility of identifying the new residence, travel lasting longer than the time to carry out the research, hospitalization according to the same parameter of duration and institutionalization; and (iii) appropriate selection of variables to balance the insertion of new participants. Age, gender, and education level were the variables used. In total, 423 old people comprised the sample of the survey[11,12,14].

Regarding the sample of the present study, it is worth mentioning that it comprised old participants in the second phase of ISPI-JF and who did not present cognitive decline (N=315), as indicated by the Mini-Mental State Examination (MMSE) - the instrument used to screen cognitive ability which identified 108 subjects with cognitive decline. MMSE was the only exclusion criterion for the sample. Thus, the current research is configured as a cross-section of the second wave of collection of ISPI-JF with a sample comprising 315 old people aged 60 or over of both genders, non-institutionalized, and resident in the North Zone of the city of Juiz de Fora (MG), Brazil[11,12].

For data collection, a semi-structured, standardized, and pre-tested questionnaire was used including scales widely used in research and the clinic practice[11,12]. The dependent variable was investigated by the Patient Health Questionnaire (PHQ-4) to allow tracking the psychic suffering in the last two weeks. It comprises four items scored on a Likert scale from zero (not once) to 3 (almost every day) - the higher the sum, the greater the symptoms. The total score ranges from 0 to 12 and suggests the following analysis to understand psychic suffering: 0 to 2 none; 3 to 5 mild; 6 to 8 moderate; 9 to 12 severe[15,16]. To calculate the prevalence, the dependent variable was dichotomized according to the scores of absent and present psychic suffering, with a cut-off point ≥3 points.

Frailty was assessed using the Edmonton Frailty Scale (EFS) adapted and validated for the Brazilian population. It comprises 11 items to assess the nine domains of cognition, general health, nutrition, mood, functional independence, social support, medication use, continence, and functional performance. The total score can vary from zero to 17 points: no frailty (0 to 4), apparently vulnerable (5 and 6), mild frailty (7 and 8), moderate frailty (9 and 10), and severe frailty (11 points or more) [17]. To assess the fear of falling, the Falls Efficacy Scale - International - Brazil (FES-I-BRAZIL) and the Lawton and Brody Scale were used to measure the functional capacity to perform the Instrumental Activities of Daily Living (IADL).

FES-I-BRASIL verifies the fear of falling based on the definition of perceived low self-efficacy to avoid falls during the activities of daily living. The scale includes sixteen activities with scores between 1 and 4 for each of them, whose lowest value indicates the old person who is not at all concerned about falling, and highest indicates extremely concerned

about the possibility of falling. The total values range from 16 points for individuals without any concern to fall to 64 points for extremely concerned individuals[18]. For the categorical analysis of the variable, the fear of falling was admitted as present (score >16 points) or absent (16 points) [11,12,18,19].

The Lawton and Brody Scale investigates nine instrumental activities: using the telephone, shopping, laundry, cooking their meal, taking care of the money, cleaning the house, doing housework, taking medication, and going to distant places, using some type of transportation - scores vary from 9 to 27 points, and the lower the score, the greater the degree of dependence[19]. For categorization purposes, this variable was dichotomized into dependent (<18 points) and independent (≥19 points)[11,12,19,20].

The Kappa index was used to verify the degree of intra- and inter-examiner agreement before the beginning of the survey. The coefficient observed was greater than 75%, being considered substantial or excellent. To guarantee the quality of the data collected, the field researchers were carefully monitored and evaluated during the development of the research. Another strategy used for this purpose was to reevaluate 10% of production using a new partial interview after the end of the collection.

Data were inserted by two researchers independently and subsequently confronted to reduce failures and inconsistencies. The characteristics of the sampling plan were considered for the development of the statistical analysis, including the categorization of explanatory variables, description of absolute and relative frequencies, the prevalence of the outcome with the respective confidence interval, and application of the Pearson chi-square test (χ^2) to analyze the association between independent variables and outcome. The level of significance adopted was 5%.

The research was approved by the Ethics Committee of Universidade Federal de Juiz de Fora under opinion No. 771/916. All Regulatory Guidelines and Rules for Research Involving Human Beings were followed in compliance with Resolution No. 466/2012 of the National Health Council. All old people participating in the present study signed the Informed Consent Form.

RESULTS

The sample comprised 66.3% women. The average age was 72.2 years (sd ± 7.3), and education was 4.3 years of study (sd ± 3.5). Among the survey participants, 46% declared themselves black or brown, 58.4% belonged to socioeconomic class C, 58.4% were married or lived in a common-law marriage, and 87.9% had a roommate. Morbidity was reported by 88.3% of old people, poor or regular perception of health by 43.5% of old people, 54.9% reported regular or poor sight, and 28.6% poor hearing. Table 1 presents the characterization of the sample.

The prevalence of psychic suffering was 41.8% (95% CI 36.5–47.4%), 22.2% at a mild level, 13.3% moderate, and 6.3% severe. Regarding geriatric syndromes, 24.3% presented frailty, functional disability was observed in 6.3%, fear of falling in 95.2%, 34.3% had falls in the year before the interview, and 31.5% of these reported having suffered more than one fall (Table 1).

The Pearson's chi-square test (χ^2) showed significant results ($p<0.05$) between psychic suffering and gender ($\varrho=0.001$), reported morbidity ($\varrho=0.020$), self-perceived health ($\varrho<0.001$), visual self-perception ($\varrho=0.001$), self-perception of hearing ($\varrho=0.034$), functional capacity ($\varrho=0.003$), and frailty ($\varrho=0.000$) - Table 2.

Table 1. Sociodemographic characteristics, general health profile, and geriatric syndromes (N=315). Juiz de Fora (MG), 2015.

Variable	Absolute Frequency (N)	Relative Frequency (%)
Sociodemographic Profile		
Gender		
Male	106	33.7
Female	209	66.3
Age (years)		
60 – 70	136	43.2
71 – 80	124	39.4
Over 80	55	17.5
Education (in years)		
Illiterate	29	9.2
1 – 4	196	62.2
5 or more	90	28.6
Race/skin color		
White	143	45.4
Black/brown	145	46
Yellow/indigenous	27	8.6
Socioeconomic status		
A or B	89	28.3
C	184	58.4
D or E	42	13.3
Marital status		
Married or common-law marriage	176	55.9
Widow/ed, separated, divorced, or single	139	44.1
Home arrangement		
Lives alone	38	12.1
Lives with a roommate	277	87.9
General Health Profile		
Referred morbidity		
No	37	11.7
Yes	278	88.3
Self-perceived health		
Excellent/Very good/Good	178	56.5
Regular/Bad	137	43.5
Visual self-perception		
Excellent/Very good/Good	142	45.1
Regular/Bad	173	54.9
Self-perception of hearing		
Excellent/Very good/Good	225	71.4
Regular/Bad	90	28.6

to be continued

Continuation of Table 1

Variable	Absolute Frequency (N)	Relative Frequency (%)
Geriatric Syndromes		
Falls		
No	207	65.7
Yes	108	34.3
Fear of falling		
No	15	4.8
Yes	300	95.2
Functional capacity to carry out IADL		
Independent	295	93.7
Dependent	20	6.3
Frailty*		
Does not present frailty	130	51%
Apparently vulnerable	61	23.9%
Mild frailty	42	16.5%
Moderate to severe frailty	22	8.7%
Psychic suffering		
None	183	58.1%
Mild	70	22.2%
Moderate	42	13.3%
Severe	20	6.3%

Source: Table prepared by the authors themselves. *Variable not investigated in the case of disapproved old people n=60 (19.05%) with significant errors in the first item of EFS and who did not have a caregiver.

Table 2. Association between explanatory variables and psychic suffering (N=315). Juiz de Fora (MG), 2015.

Independent variables	Patient Health Questionnaire (PHQ-4)				
	None n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	p-value
Gender					0.001
Male	183 (42.1)	70 (25.7)	42 (21.4)	20 (10.0)	
Female	106 (57.9)	52 (74.3)	33 (78.6)	18 (90.0)	
Age (years)					0.732
60 – 70	183 (39.3)	70 (50.0)	42 (47.6)	20 (45.0)	
71 – 80	72 (41.0)	35 (37.1)	20 (38.1)	9 (35.0)	
Over 80	36 (19.7)	9 (12.9)	6 (14.3)	4 (20.0)	
Education (in years)					0.145
Illiterate	15 (8.2)	7 (10.0)	4 (9.5)	3 (15.0)	
1 – 4	106 (57.9)	45 (64.3)	29 (69.0)	16 (80.0)	
5 or more	62 (33.9)	18 (25.7)	9 (21.4)	1 (5.0)	
Race/skin color					0.236
White	183 (43.2)	70 (55.7)	42 (45.2)	20 (30.0)	
Black/brown	87 (47.5)	29 (41.4)	18 (42.9)	11 (55.0)	
Yellow/indigenous	17 (9.3)	2 (2.9)	5 (11.9)	3 (15.0)	

to be continued

Continuation of Table 2

Independent variables	Patient Health Questionnaire (PHQ-4) None n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	p-value
Socioeconomic status					0.623
A or B	52 (28.4)	21 (30.0)	12 (28.6)	4 (20.0)	
C	107 (58.5)	43 (61.4)	23 (54.8)	11 (55.0)	
D or E	24 (13.1)	6 (8.6)	7 (16.7)	5 (25.0)	
Marital status					0.235
Married or common-law marriage	106 (57.9)	41 (58.6)	22 (52.4)	7 (35.0)	
Widow/ed, separated, divorced, or single	77 (42.1)	29 (41.4)	20 (47.6)	13 (65.0)	
Home arrangement					0.101
Lives alone	18 (9.8)	7 (10.0)	8 (19.0)	5 (25.0)	
Lives with a roommate	165 (90.2)	63 (90.0)	34 (81.0)	15 (75.0)	
Referred morbidity					0.020
No	30 (16.4)	5 (7.1)	2 (4.8)	0 (0.0)	
Yes	153 (83.6)	65 (92.9)	40 (95.2)	20 (100.0)	
Self-perceived health					<0.001
Excellent/Very good/Good	126 (68.9)	34 (48.6)	14 (33.3)	4 (20.0)	
Regular/Bad	57 (31.1)	36 (51.4)	28 (66.7)1	16 (80.0)	
Visual self-perception					0.001
Excellent/Very good/Good	94 (51.4)	27 (38.6)	20 (47.6)	1 (5.0)	
Regular/Bad	89 (48.6)	43 (61.4)	22 (52.4)	19 (95.0)	
Self-perception of hearing					0.034
Excellent/Very good/Good	141 (77.0)	48 (68.6)	25 (59.5)	11 (55.0)	
Regular/Bad	42 (23.0)	22 (31.4)	17 (40.5)	9 (45.0)	
Falls					0.919
No	120 (65.6)	46 (65.7)	29 (69.0)	12 (60.0)	
Yes	63 (34.4)	24 (34.3)	13 (31.0)	8 (40.0)	
Fear of falling					0.276
No	11 (6.0)	4 (5.7)	0 (0)	0 (0)	
Yes	172 (94.0)	66 (94.3)	42 (100.0)	20 (100.0)	
Functional capacity to carry out IADL					0.003
Independent	178 (97.3)	60 (85.7)	40 (95.2)	17 (85.0)	
Dependent	5 (2.7)	10 (14.3)	2 (4.8)	3 (15.0)	
Frailty*					0.000
Does not present frailty	100 (64.9)	23 (39.0)	6 (20.0)	1 (8.3)	
Apparently vulnerable	33 (21.4)	13 (22.0)	11 (36.7)	4 (33.3)	
Mild frailty	12 (7.8)	15 (25.4)	11 (36.7)	4 (33.3)	
Moderate to severe frailty	9 (5.8)	8 (13.6)	2 (6.7)	3 (25.0)	

Source: Table prepared by the authors themselves. *Variable not investigated in the case of disapproved old people n=60 (19.05%) with significant errors in the first item of EFS and who did not have a caregiver.

DISCUSSION

The main findings of the study related to the variables gender, referred morbidity, self-perceived health, visual self-perception, self-perception of hearing, functional capacity, and frailty which were associated with psychic suffering in community old people will be discussed herein. Among the variables mentioned above, frailty (ρ=0.000), self-perceived health (ρ <0.001), gender (ρ=0.001), and visual self-perception (ρ=0.001) presented a greater association with psychic suffering in the present study.

In the sample studied, 66.3% of participants are women. This can be related to the phenomenon known as the feminization of aging, resulting in a greater number of old women than men. This is because the female life expectancy is higher than that of men both in Brazil and in the world, as well as the greater demand for primary healthcare services by women[21]. Thus, it is necessary to consider some gender issues to discuss the prevalence of psychic suffering in old age.

Sales et. al.[22] found a strong connection between the female gender and depression resulting from the cultural dynamics that conditions women to the situation of vulnerability when compared to men during life. In addition to this data, Maximiano-Barreto and Fermoseli[23] found a higher prevalence of depression and anxiety symptoms in old women when compared to old men, which corroborates the findings of the present study.

Gender is an important social determinant of health inequities related to socio-cultural standards and values of a given society. Thus, the patriarchal, sexist, and misogynistic structure of society ends up imposing differences in the pattern of health and aging between women and men. When comparing active aging between both genders, Campos et. al.[24] note that it is worse for women because they have a higher degree of functional dependence, cognitive deficit, depression, worse family functioning, and a more negative perception of their health when compared to men.

Furthermore, although women live longer, they often experience old age in social isolation and precarious economic conditions resulting from a second-rate experience compared to men on which many depend financially and/or emotionally. To guarantee an independent and autonomous old age to old women, measures such as ensuring financial stability in old age, improving social inclusion, and ensuring care for old women seem to be effective to restore their psychological well-being[25].

The fast demographic and epidemiological transition in Brazil has led to an increase in chronic non-communicable diseases and functional and cognitive losses. Having that said, there is an epidemiological profile of multimorbidities associated with some type of psychic suffering that is not usually noticed in the healthcare routine[26].

The prevalence of psychic suffering in the studied population was 41.8%. Although the measurement of this outcome is of great relevance, there are still few studies assessing it in community old people. There is also a variety of screening instruments that limits comparisons between studies. In the present study, the PHQ-4 was used because it has some advantages such as easy application, low cost, and fast performance[15]. These characteristics are compatible with the conditions of the present study.

In another study also carried out with old community members in Recife (PE), 47.8% of them presented depressive symptoms in the assessment with the Geriatric Depression Scale (GDS)[27]. Fernandes et. al.[28] found a prevalence of 40% of depressive symptoms among the old people investigated using the same instrument in Teresina (PI). Anxiety symptoms were assessed in the study by Menta et. al.[29] in Porto Alegre (RS), with a prevalence of 9% from the use of the Mini International Neuropsychiatric Interview plus (MINIplus). When combined, depression and anxiety symptoms are directly related to psychic suffering[15,23,27] which were assessed using the PHQ-4 instrument in the present study.

The evaluation of self-perceived health has gradually become crucial in studies on aging, as it is considered an indicator of the quality of life and mortality. The old people who reported worse health conditions have a higher risk of mortality due to all causes assessed, such as heart disease and metabolic diseases, when compared to those who say they have

excellent health[30]. In the present study, a correlation was found between psychic suffering and negative self-perceived health, showing the possibility of suffering for those who report poor or regular health.

Communicating is an essential process for human development developed since birth and is relevant at all stages of life. The exchange of information in the face of aging has become a challenge due to the difficulties arising from the means of communication and the constant need for adaptations and readaptations with the advent of new technologies to achieve an effective dialogue. In this sense, the increased incidence of hearing loss and/or hearing problems in old people is a reality that causes or may cause emotional, social, and quality of life consequences[31].

When assessed in the community, self-perception of hearing has more intense outcomes because it disables, causes sensory deprivation, hinders access to health services, blocks family relationships, and contributes to the onset of signs and symptoms of depression and anxiety, especially when the socioeconomic conditions are unfavorable[31]. The findings of the present study corroborate the literature by showing that negative perception of hearing is related to psychic suffering.

Living and dealing with problems in the sensory system tends to generate anguish and sadness since such limitations change the individual's way of relating to society and the world. Regarding vision, the results show that psychic development is more severe when visual self-perception is classified as regular or poor. So, there are many interconnections; this condition leads to functional disability, frailty, favoring the onset of falls, and consequently psychic suffering. It should also be noted that the quality of life also tends to worsen because visual impairment implies loss of self-esteem, status, and motivation[32], aspects that are intertwined in the causality of psychic suffering.

In the face of so many obstacles, if living in old age is a challenge, this is intensified when a condition of functional disability develops. As for IADL, 6.3% of old people were classified as dependent, and it was found that the greater the degree of functional impairment, the greater the degree of psychic suffering. Functional disability can be a predisposing factor for symptoms such as fear, distress, and anxiety. It is also related to other adverse outcomes such as frailty, morbidity, and social isolation, thus increasing the chances of depression and anxiety[33].

Like other geriatric syndromes, frailty is multifactorial. It is characterized as a frequent syndrome involving psychological, social, and biological aspects related to the life path of the old person bringing consequences to the health conditions and corresponding to the main causes of morbidity[34].

The negative perception of health, functional disability, and history of falls expressly impact the complexity triggered by the frailty that worsens with the association of more determinants of the health-illness process. Similarly, several factors influence psychic suffering and are associated with its onset[19]. Among the variables investigated in the present study, frailty was the one with the highest degree of correlation with the outcome. Carneiro et. al.[35] carried out a study in Montes Claros (MG) and observed similar behavior. Among the old people assessed with frailty syndrome, 37.2% had psychic symptoms.

The development of psychic suffering is related to the aging process since changes in daily life and motor, physical, social, and psychological losses lead the old person to reflect on their role in society. In a study carried out in Várzea Grande (MT) with old people assisted by the FHS, the presence of depressive symptoms also revealed an association with the most fragile and vulnerable ones. Such results are like others in the literature reporting the onset of depressive symptoms in old people with frailty[19,27].

Regarding the aging process and the increased prevalence of psychic suffering among old people, it is necessary that the health care models are reviewed in the apparatuses of the Health Care Network of the Unified Health System's, so that aging with quality of life is ensured by the implementation of public health policies covering not only the health of the old person but above all the mental health of the population at individual and collective levels.

To better contextualize the discussion, it is important to remember that the present study was the result of a larger study - the Health Survey of the Old Population of Juiz de Fora -, with a different objective from this one, although it was carried out based on the methodology proposed for the aforementioned household survey. It is also important to consider that some limitations such as memory bias and information bias (due to self-reported information) may have influenced the inference about its findings.

CONCLUSION

The present study identified a prevalence of psychic suffering of 41.8% among old community members, and an association between the outcome and the variables gender, referred morbidity, self-perceived health, visual self-perception, self-perception of hearing, functional capacity, and frailty. The growing process of the Brazilian population aging with an evident prevalence of psychic suffering in the old population requires the understanding of this as a public health problem.

Thus, interventions are essential to ensure the healthy and active aging of old people. It is necessary to undertake intersectoral transformations with the initiative of the public authorities responsible for ensuring protection and social well-being aimed at valuing the old person and fostering their active participation in society. Said interventions will greatly serve to optimize strategies and actions of the management of healthcare models consistent with coping with the main problems affecting the old person.

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Indicators for evaluating long-term care facilities for old people: development and validation

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Abstract

Objective: Develop and validate a quality assessment matrix for long-term facilities for old people, using the integrated multidimensional model of quality and care as the theoretical framework. *Method:* This is a methodological study that selected 66 variables included in the census of the Unified System of Social Assistance, to assess the seven dimensions of quality proposed by the model. The modified Delphi technique was used for validation with the participation of 15 experts who used the *Survey Monkey*® online platform, until a minimum of 75% consensus was reached. 18 indicators were proposed and two validation cycles were needed until consensus. *Results:* In the first cycle, all indicators were considered relevant, represented the concept and demonstrated consistency with the theoretical dimension of quality. There was a need to review the calculation formula for two indicators, which was considered adequate by more than 75% of experts in the second validation cycle. *Conclusion:* The matrix proved to be valid and can be used in the process of evaluating and monitoring the quality of the facilities participating in the Unified Social Assistance System Census, contributing to define priorities for the permanent improvement of the care provided.

Keywords: Quality Control.
Homes for the Aged.
Indicators of Health Services.
Health Services for the Aged.

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INTRODUCTION

Population aging is a worldwide phenomenon resulting from the decrease in fertility rates and the increase in life expectancy associated with improvements in the population's living conditions[1]. This accelerated demographic transition requires attention to ensure better living conditions for old people[2,3].

Among the regulated support services for old people, the Long-Term Care Facilities for Old People (LTCF) stand out. These facilities incorporate care aimed at social and emotional life, the needs of daily life and health care[4]. Although a census carried out in the Brazilian territory has shown that less than 1% of the old people population live in LTCF[5], an increase in institutionalization is expected as a consequence of aging and family dynamics changes[3,6].

In the literature, there are several studies aimed at the analysis of LTCF[7-9], however, most of these studies have specific cuttings about the health of old people residents[10]. In Brazil, LTCF are regulated by the Collegiate Board Resolution - RDC nº 283 of September 26, 2005 (RDC - Anvisa)[4], which provides for the evaluation of services provided through some indicators: mortality and incidence rates of diarrhea diseases, scabies, dehydration, decubitus ulcer and malnutrition in old people. These outcome indicators have been used in evaluation studies that mostly adopt quality measures focused on medical care and clinical conditions of residents[6,7].

However, quality is a multidimensional concept, of an objective or subjective nature, which can vary according to the interest of groups or social actors and with the context and objectives of the evaluation[11]. For LTCF, the definition of quality is even more complex because it can be confused with regulation, in addition to being subject to contextual influence and resident conditions. The Integrated Multidimensional Model of Quality and Care for facilities focused on long-term care for old people[12] is a conceptual, multidimensional model developed specifically for Facilities focused on long-term care for old people, based on person-centered care. This model aggregates seven dimensions of quality defined based on the results of focus groups with professionals involved in the care of old people, family members and institutionalized old people. The adoption of this model[12] can guide the development of indicators that seek a more comprehensive assessment of the quality of LTCF.

In Brazil, since 2012, the Ministry of Social Development has instituted the Unified Social Assistance System Census (SUAS Census), which includes the collection of data on Brazilian governmental and non-governmental LTCFs (which do not have an agreement with the government). The generation of data in the scope of the SUAS Census aims to provide subsidies for the construction and maintenance of monitoring and evaluation indicators of the Unified Social Assistance System[13].

In this sense, taking the Integrated Multidimensional Quality model as a theoretical reference[12] and the need for systematic evaluation of LTCF10, this study aims to develop and validate an evaluation matrix composed of indicators created using the SUAS Census variables. It is expected that this study will generate interpretable information and reveal aspects to be prioritized for the permanent improvement of the care provided in LTCF.

METHOD

This is a methodological study of the development of an evaluation matrix composed of indicators conducted from November 2019 to March 2020. The indicators were constructed using variables collected by the SUAS Census, described in the Census instructions, for the year 2018, of free access on the website of the Ministry of Social Development of Brazil[14].

For the development of the Evaluation Matrix indicators, 66 variables from the SUAS Census were selected, considering aspects of quality according to the seven theoretical dimensions of the Integrated Multidimensional Quality model (Chart 1)[12].

Chart 1. Quality dimensions of the Integrated Multidimensional Model of Quality and Service and concepts. Columbia, Missouri, United States of America, 1999.

Quality Dimensions	Concepts
Central focus on residents, family, employees and community	This dimension includes the standards related to the service offered by these facilities to the community, addresses the needs of families that have members who need assistance services, recognizes the importance of the team of professionals and how the team is essential to take care of quality and meet individual needs of each old person, family members and the old people are recognized as the central focus of the Long-Term Care Facility (LTCF).
Human Resources	The LTCF must have a satisfactory number of professionals. It is important that there is a low turnover of professionals, supervision and training. The LTCF must recruit and retain responsive, compassionate, considerate, clean, well-prepared and involved employees.
Family involvement	The LTCF must involve family members in care, family members must have the opportunity to hold the team of professionals responsible for care and must participate in counseling and support groups.
Individualized care	The LTCF must guarantee basic care and minimize home incidents and injuries. It is necessary that they take care of the residents as people, offering good food and helping them to eat, engaging residents in activities;
Environment	The LTCF has a clean, odorless, quiet, spacious physical space with adequate furniture, lighting, ventilation, non-slip flooring, a safe and pleasant environment and accessibility.
Housing	The LTCF should give a feeling that the old people are in their own home, with the presence of volunteers, pets, children and plants. It should enable community involvement in the unit, with frequent visits by volunteers and children, members of churches and schools. It is important that profit is not the priority of these units.
Comunication	It is important to have communication systems in place to ensure that the needs, likes and dislikes of the old people are met. Good communication with family members and residents is essential. In quality facilities, the team really takes the time to engage residents in conversations.

Source: Rantz et al. (1999).

The SUAS Census Database is fed annually by a public agent, by filling out an electronic questionnaire containing 586 variables grouped in six blocks (identification; characterization; user characteristics; reception services; physical structure and location; people management). The evaluation matrix was built from the set of indicators. For each of the indicators, the dimension of quality to which it would be related, the objective, the SUAS Census variables used in the indicator's composition, the calculation formula, the way of calculating, interpreting and justifying the indicator were described.

The evaluation matrix was validated, using the modified Delphi technique. This technique allows experts to express their opinions on a given theme, through a participatory construction, until there is consensus, without contact between them[15]. A variation of the Delphi technique, it is the "modified" technique that proposes a limit of cycles until consensus[16].

For validation, the evaluation matrix was formatted using the Survey Monkey® online data collection software. A script was developed for the experts to record their considerations regarding the indicators. Prior to the beginning of the validation cycles, all the material (evaluation matrix and validation script) was subjected to a pre-test by two professionals with experience in caring for the institutionalized old people, asking them to evaluate the ease of use of the Survey Monkey® platform, the clarity of the guidelines for validation and the adequacy of the matrix format, as well as the questions proposed in the validation script.

Validation by the "modified" Delphi technique was proposed with the participation of 15 experts with the following professional profiles: Public Health (2), Gerontology (4), Health Surveillance (1), Statistics (1), Nursing (3) and representatives of LTCF (4).

The validation script made it possible for experts to express their opinion regarding the relevance of the indicator, whether it represented the content of the theoretical dimension of quality, and about methodological transparency in the construction of the calculation formula[17]. The following statements were made: 1) The "x" indicator is relevant for assessing the quality of the LTCF. 2) The "x" indicator makes it possible to evaluate its "objective", 3) The calculation method of the "x" indicator is easily understandable and reproducible, 4) The "x" indicator measures aspects of the "dimension x". For each statement, the expert should choose one of the following answers: 0 disagree, 1 disagree in part, 2 agree in part and 3 agree. In addition, for each indicator, a field was included with the following guidance: "Please insert your observations, criticisms or suggestions in relation to the evaluated indicator in this space". The Content Validity Index adopted was at least 75% of agreement among all experts[18]. This percentage was computed considering the answer options partially agree and agree.

The experts were invited to participate in the validation of the evaluation matrix by personal e-mail, with standardized text for everyone. The invitation contained clarifications about the study, a Free and Informed Consent Form, the Evaluation Matrix and the validation script, available only to those who consented to participate in the study. Invitees who did not consent were replaced by others with the same training criteria established in the study.

In the subsequent steps, the report with the result of the previous validation cycle was consolidated, showing the percentage of agreement for each indicator, as well as the set of comments obtained and the justifications and explanations about the changes made. This report was made available to experts, maintaining anonymity. The study is in accordance with Resolution No. 466/2012 and Resolution No. 510/2016, and was presented and approved by the ethics and research committee through opinion No. 3,143,674.

RESULTS

Two researchers participated in the pre-test phase. The comments received helped to make the information available on the Survey Monkey® online platform more clear. Also based on the researchers' suggestions, the description of each quality dimension was included in the evaluation matrix before each corresponding indicator. This inclusion sought to facilitate the evaluation of indicators by experts regarding the issues presented in the validation script.

In the 1st validation cycle, all indicators were considered relevant and adequate to represent the dimension of quality proposed by more than 75% of the experts, as shown in Table 1. Regarding the calculation method, the experts considered that 78% of the indicators had formulas that are difficult to understand; however, they recognized methodological transparency and the possibility of reproduction, validating them in the first cycle of analysis, except for the method of calculating indicators 1 and 5. A new wording for the method of calculating the indicators considered difficult to understand was carried out and brought to the analysis of the experts in the 2nd validation cycle. As for indicators 1 and 5, new calculation formulas were developed, giving greater methodological transparency and the possibility of reproduction.

In addition, in view of the considerations made by the experts in the 1st validation cycle, two variables considered similar to indicator 15 were aggregated. For indicator 16, the exclusion of the variable "registration or not of the Facility in the council for the rights of old people" was suggested, as it presents low representativeness in relation to the proposed dimension. In addition, the variable "the unit accepts to receive a transvestite, transsexual, transgender old person" was inserted in the calculation formula for indicator 1, as suggested by an expert.

The changes made and evaluated in the 2nd validation cycle were in relation to the calculation method, with regard, mainly, to the wording of the calculation formula. The methods for calculating the indicators, after being modified, were approved by more than 75% of the experts with the exception of the exclusion of the variable "registration or not of the Facility in the council for the rights of old people" from the calculation of indicator 16 (Table 2). The experts did not justify the reason for the non-approval of the proposal made in relation to indicator 16, however, as it was an indicator already

validated in the 1st validation cycle, it was decided to maintain the calculation method presented in its initial version.

Chart 2 presents the validated Evaluation Matrix, composed of 18 indicators arranged in the first column, according to the respective dimensions of quality of the Integrated Multidimensional Model of Quality[12], the SUAS Census variables used and the calculation formula for calculating the indicator and, finally, parameters for the interpretation of the indicators.

Table 1. Content Validity Index of the indicators obtained in the 1st validation cycle in terms of relevance, objective evaluation, calculation method and measurement of aspects of the quality dimension. Belo Horizonte, Minas Gerais, Brazil, 2020.

Dimensions / Indicators		Content Validity Index (%)			
		Relevance	Objective evaluation	Calculation method	Measurement of aspects
Dimension 1- Central focus on residents, family, employees and community					
Indicators	1- Access without excluding differentiations	93.80	87.50	25.00*	93.75
	2-Presence of coordinator at the facility	87.60	93.75	87.50	93.75
	3-Valuing the team of professionals	93.80	87.50	81.25	93.75
	4- Attention to the family of the old person.	87.60	93.75	87.50	93.50
Dimension 2- Human Resources					
Indicators	5 - Ratio of caregivers per old person	93.80	87.50	68.75*	81.25
	6- Low turnover of professionals	100.00	100.00	93.75	93.75
	7 - Permanent education	93.80	93.75	87.50	93.75
Dimension 3- Family Involvement					
Indicator	8- Favoring the Family Bond	93.80	93.75	87.50	93.75
Dimension 4- Individualized Care					
Indicators	9- Socialization	93.80	93.75	81.25	81.25
	10 - Health care management.	93.80	93.75	87.50	93.75
	11 - Multiprofessional team in the health area.	93.80	93.75	87.50	87.50
Dimension 5- Environment					
Indicators	12 - Professionals for leisure activities	93.80	93.75	87.50	87.50
	13- Physical structure	93.80	93.75	87.50	93.75
	14- Accessibility.	87.50	87.50	81.25	87.50
Dimension 6- Housing					
Indicators	15- Existence of materials and equipment that encourage culture.	93.80	93.75	81.25	87.50
	16- Social profile of the facility	87.50	93.75	87.50	81.25
	17- Occupancy rate	87.60	93.75	81.25	87.50
Dimension 7- Communication					
Indicator	18- Openness to dialogue	93.80	93.75	81.25	93.75

*Content Validity Index < 75%

Table 2. Changes made in the calculating method of the indicators based on the suggestions given by the experts in the 1st validation cycle and Content Validity Index for this criterion obtained in the 2nd validation cycle. Belo Horizonte, Minas Gerais, Brazil, 2020.

Indicators	Changes made to the indicators and evaluated by experts in the 2nd validation cycle	Content Validity Index (%) for Calculation Method
1	a) Inclusion of the variable "the unit accepts to receive Transvestite, Transsexual, Transgender old people"; b) Alteration of the calculation formula considered by experts to be difficult to understand. New proposed calculation formula: Number of variables with affirmative answers, divided by the total number of variables in the indicator, multiplied by 100. Equation: {(number of affirmative variables / 6) * 100} Best result: 100%.	a) 100.00 b) 100.00
2	Change in the wording of the calculation formula	90.00
3	Change in the wording of the calculation formula	90.00
4	Change in the wording of the calculation formula	90.00
5	New proposed calculation formula: Number of caregivers with a workload greater than or equal to 40 hours per week divided by the number of old people residents (Best result: ≥0.05)	90.00
8	Change in the wording of the calculation formula	90.00
9	Change in the wording of the calculation formula	90.00
10	Change in the wording of the calculation formula	90.00
11	Change in the wording of the calculation formula	90.00
12	Change in the wording of the calculation formula	90.00
13	Change in the wording of the calculation formula	90.00
14	Change in the wording of the calculation formula	90.00
15	Change in the wording of the calculation formula. Union of two variables, with variable "b" having the following wording: b)Presence of educational and cultural or educational games and hobby materials.	90.00
16	Change in the wording of the calculation formula: Exclusion of the variable "registration or not of the Facility in the council for the rights of old people".	72.00*
17	Change in the wording of the calculation formula	90.00
18	Change in the wording of the calculation formula	90.00

*Indicator with CVI <75%, therefore not yet considered with valid content in the 2nd validation cycle

Chart 2. Evaluation Matrix dimensions of quality, indicators, SUAS census variables, calculation formula and parameters for interpretation. Belo Horizonte, Minas Gerais, Brazil, 2020.

Quality Assessment Matrix of Long-Term Care Facilities for Old People			
Dimensions / indicators	SUAS Census Variables	Calculation formula	Parameters for interpretation
Dimension 1	Central focus on residents, families and communities		
1 Access without excluding differentiations	a) The unit accepts to receive an old person with a mental disorder; b) The unit accepts to receive older refugees / immigrants; c) The unit accepts to receive an old person with a history of homelessness; d) The unit accepts to receive old people from indigenous communities or from traditional communities (example: quilombola, gypsies, riverside dwellers); e) The unit accepts to receive old people with physical, sensory or intellectual disabilities; f) The unit accepts to receive Transvestite, Transsexual, Transgender old people.	{(number of affirmative variables/6)*100}	The bigger the better
2 Presence of coordinator at the facility	a) LTCF has a higher education coordinator/technician responsible, with a minimum workload of 20 hours, with a formal bond to coordinate the unit, according to RDC 283/2005; b) LTCF has a coordinator/technician responsible for the unit.	{(number of affirmative variables/2)*100}	The bigger the better
3 Valuing the team of professionals	a) Number of professionals with a working relationship with the facility [private sector employee, outsourced, press/ cooperative/service provider worker, statutory servant or public employee]; b) Number of professionals with and without working bond with the facility.	{(a/b)*100}	The bigger the better
4 Attention to the family of the old person	a) Performs psychosocial care of the families of the people receiving care (family guidance); b) Promotes meetings with groups of users' families; c) Promotes family contact and participation in the user's life.	{(number of affirmative variables/3)*100}	The bigger the better
Dimension 2	Human Resources		
5 - Ratio of caregivers per old person	Number of caregivers with a workload of 40 hours per week or more; b) Number of old people residents.	{(a/b)}	RDC nº 283/2005 establishes, at least, a caregiver with 40 hours per week for a group of 20 old people. Best result ≥0.05
6- Low turnover of professionals	a) Number of professionals who work at the facility for 1 year or more; b) Total number of professionals working at the facility.	{(a/b)*100}	The bigger the better
7 - Permanent education	a) Existence of lectures, workshops, training and qualification of workers in the unit; b) Existence of training in the field of geriatrics (Aging or Rights and care for old people).	{(number of affirmative variables/2)*100}	The bigger the better

to be continued

Continuation of Chart 2

Quality Assessment Matrix of Long-Term Care Facilities for Old People			
Dimensions / indicators	SUAS Census Variables	Calculation formula	Parameters for interpretation
Dimension 3	Family Involvement		
8 Favoring the Family Bond	a) The unit promotes coexistence services and strengthens bonds for the old people and their families (weight 0: no; weight 1: yes); b) The unit welcomes users with family ties (weight 0: no; weight 1: yes); c) LTCF visits are permitted (weight 0: no; weight 1: only on specific dates; weight 2: monthly, biweekly and 1 to 2 days or 3 to 6 days a week; weight 3: daily).	{(Sum of variables a, b and c weights/5)*100}	The bigger the better
Dimension 4	Individualized care		
9 Socialization	a) LTCF promotes activities with the participation of the community; b) Accompanies the old person to retrieve documents; c) Carries out tours with users; d) Promotes the participation of the people received in services, projects or activities existing in the community.	{(number of affirmative variables/4)*100}	The bigger the better
10 Health care management	a) Use of Individual Service Plan; b) Use of medical records in the unit; c) Makes technical reports of the cases being monitored; d) Conducts case discussions with other network professionals.	{(number of affirmative variables/4)*100}	The bigger the better
11 Multiprofessional team in the health area.	a) Presence of a psychologist for psychosocial care (individual or group in the unit); b) Presence of a nurse in the unit; c) Presence of a nutritionist in the unit; d) Presence of a physiotherapist in the unit; e) Presence of a doctor in the unit.	{(number of affirmative variables/5)*100}	The bigger the better
Dimension 5	Environment		
12 Professionals for leisure activities	a) Number of higher education professionals for leisure activities (educator / occupational therapist); b) Number of old people residents.	{(Number of professionals for leisure activity for 12 hours per week / number of old people residents)}	RDC nº 283/2005 establishes, at least, a professional of 12 hours per week for physical, recreational and cultural activities for a group of 40 old people. Best result: ≥0.025.

to be continued

Continuation of Chart 2

Quality Assessment Matrix of Long-Term Care Facilities for Old People			
Dimensions / indicators	SUAS Census Variables	Calculation formula	Parameters for interpretation
13 Physical structure	a) Existence of dormitories for a maximum of 4 people;	{(number of affirmative variables/9)*100}	The bigger the better
	b) Existence of bathrooms in the same number as bedrooms;		
	c) Existence of an external recreation area;		
	d) Existence of kitchen for food preparation, with or without pantry;		
	e) Existence of a laundry room;		
	f) Existence of a cafeteria/dining room;		
	g) Existence of a living room;		
	h) Existence of an administration room or meeting room;		
	i) Existence of room for collective activities.		
14 Accessibility	a) Main access adapted with ramps and the existence of an accessible route from the sidewalk to the interior of the unit according to ABNT;	{(number of affirmative variables/9)*100}	The bigger the better
	b) Main access adapted with ramps and the existence of an accessible route from the sidewalk to the interior of the unit;		
	c) Bathrooms adapted for people with disabilities or reduced mobility;		
	d) Bathrooms adapted for people with disabilities or reduced mobility according to ABNT;		
	e) Accessible route to the bathroom;		
	f) Accessible route to the bathroom according to ABNT;		
	g) Accessible route to dormitories and spaces for collective use;		
	h) Accessible route to dormitories and spaces for collective use according to ABNT;		
	i) Equipment/Furniture/materials suitable for people with disabilities or dependence (Assistive Technologies).		
Dimension 6	Housing		
15 Existence of materials and equipment that encourage culture.	a) Presence of bibliographic collection; b) Presence of educational and cultural materials; c) Presence of sporting goods; d) Presence of educational and hobby games; e) Presence of television.	{(Number of variables with affirmative answers/5)*100}	The bigger the better
16 Social profile of the facility	a) Presence of an agreement or term of partnership with the government; b) The facility is of a governmental nature; c) The facility is registered with the Council for the Rights of Old People; d) The facility receives a provision from a public entity for physical structure, HR, equipment/materials or transportation; e) Presence of old people with Continued Benefit at the facility (disabled or not).	{(Number of variables with affirmative answers/5)*100}	The bigger the better
17 Occupancy rate	a) Number of people admitted to the unit; b) Maximum service capacity.	{(a/b)*100}	≤100%

to be continued

Continuation of Chart 2

Quality Assessment Matrix of Long-Term Care Facilities for Old People			
Dimensions / indicators	SUAS Census Variables	Calculation formula	Parameters for interpretation
Dimension 7	Communication		
18 Openness to dialogue.	a) The unit organizes or promotes discussions with the old people about the unit's routines; b) The unit holds meetings with family members of the old people.	{(Number of variables with affirmative answers/2)*100}	The bigger the better

DISCUSSION

This study presents an important quality assessment tool for LTCF, containing 18 indicators in the seven theoretical dimensions of the Integrated Multidimensional Model of Quality[12], elaborated from the perception of the subjects involved in the care of old people, their families and providers[12]. The study selected a set of variables to represent the concepts and develop the indicators, which were constituted in summary measures with information about the LTCF regarding the dimensions of quality.

The elaborated matrix will allow comparisons for evaluation and planning over time, in annual evaluation cycles, according to the SUAS census, guiding actions to improve care. The indicators were considered relevant, clear, with an understandable calculation formula, allowing reproducibility. They can be analyzed and compared, considering the LTCF as a unit of analysis or other levels of aggregation, such as municipalities, states or regions. RDC 283/2005, although it is absent in some definitions of care, was taken as a reference of legal requirement to verify related indicators.

To measure the dimension "Central Focus on the Community, Residents, Family and Professional Team", four indicators were established. The "Access without excluding differentiations" indicator seeks to reveal the exercise of the welcoming function of the LTCF and its social role before the community, mainly because in several states of the federation there are no public LTCFs[4]. Still in this dimension, the "Ratio of Professionals with a Work Link" indicator reveals the percentage of professionals who have standardized work at the facility, with regulated workload and function. The work team is essential to ensure quality and meet the individual needs of each old person and formal work represents the respect and appreciation of the team[12]. The "Attention to the Family of the Old Person" indicator recognizes the importance of family participation in caring for the old people. There is evidence that active family engagement is associated with health care for old people with favorable quality[19].

The "Human Resources" dimension points to the need for LTCF to maintain a satisfactory number of professionals, low turnover, presence of supervision and training. Thus, the "Ratio of caregiver per old person" indicator observes the minimum existence of caregivers required by RDC 283/2005. The RDC defines this ratio considering the levels of dependence of the old people for daily activities. In this study, due to the unavailability of the levels of dependence of the old people in the Census-SUAS, the ratio of 1 caregiver for every 20 old people (Ratio≥0.05) was considered a minimum condition required by the RDC to indicate the ability to provide assistance. The "Low turnover of professionals" indicator points to the existence of a condition that favors the link between professionals and the old people[12], due to the worker remaining in the same LTCF. Still in this dimension, we sought to ascertain, through the "Permanent Education" indicator, the existence of actions that qualify the service offered by the facility, through deepening, discussing, updating knowledge, developing competencies and skills of professionals in the areas related to aging. The permanent education activity is recognized as a potential to qualify the assistance provided in LTCF[4]. Evidence shows that educational interventions carried out with nursing teams focusing on specific skills (communication

with old people; care for terminally ill patients; care for individuals with dementia) can improve the quality of care for residents, functional capacity and well-being of old people[20-22].

"Family Involvement" reinforces the importance of the family as co-responsible for care, emotional, instrumental and social support. The appreciation of family participation highlights the LTCF's concern with the emotional and mental health of the old people, recognizing that psychosocial health can contribute to the quality of life and well-being of the old people, in addition to minimizing the feeling of abandonment[23]. The "Favoring the Family Bond" indicator observes the existence of actions to strengthen the bond between old people and their families, the reception of people with the same degree of kinship and the frequency of visits allowed in the facility.

The "Individualized Care" Dimension addresses aspects of the provision of necessary health care and the rescue or maintenance of old people in society. The "Socialization" indicator provides information on the participation of the old people in community actions. There is evidence that social support networks contribute to the well-being of old people[24]. Another indicator that makes up this dimension is the "Health Care Management", which seeks to portray the availability of tools and work processes (individual care plan, use of medical records, reports and discussion of cases) for health care in the facility. The annual update of the Health Care Plan is a requirement for the operation of LTCF in Brazil, according to RDC 283/2005. This plan must be "compatible with the principles of universalization, equity and integrality"; indicate "the health resources available to each resident, at all levels of care, whether public or private, as well as references, if necessary", in addition to providing "comprehensive health care for the old people, addressing promotion aspects, protection and prevention" and contain "information about incident and prevalent pathologies in residents". The discussion of cases favors the unique therapeutic plan appropriate to the needs and the degree of functional dependence of the old people, guaranteeing attention to essential needs (medicines, food, personal hygiene, changing positions) and preventing health problems.

The "Multiprofessional Team in the Health Area" indicator demonstrates the availability of health professionals with diversified backgrounds working at the facility. The existence of a multi-professional team can qualify care, expanding the understanding of phenomena and the interpretation of health from different angles of the multiplicity of its organic, social and cultural nature[25]. A systematic review indicated that a multidisciplinary team and professionals specialized in caring for old people (nurses or doctors) can contribute to improving the health responses of the old people in LTCF[26]. However, in Brazil, there is no legal requirement for a minimum number of professionals. The "Professionals for Leisure Activities" indicator observes the existence of professionals for physical, recreational and cultural activities in the facility for a number of 40 old people, as regulated by RDC 283/2005.

The "Environment" dimension concerns aspects related to physical space, hygiene, odors, furniture, accessibility, lighting and ventilation. To measure this dimension, two indicators were established: "Physical Structure" and "Accessibility", which address the necessary requirements for housing and the safety of the old people, as provided for in the RDC. In turn, the information regarding odors, hygiene, lighting and ventilation did not compose indicators, as the SUAS Census does not include variables in this regard.

The "Housing" Dimension involves aspects related to the feeling of living in a home, valuing the presence of people from the community, pets, personal objects and highlights that profit should not be the priority of these units. The importance of creating an environment like home has been a recurring theme in the literature[27]. Some variables were identified to indicate the orientation of care so that the old people feel at home. However, it is assumed that these indicators do not address all the complexity of this dimension. The "Social profile of the facility" indicator seeks to portray the support received from the government, the presence of old people with the benefit of continued provision, registration in the council for the rights of old people, removing or not the profitable interest of the LTCF. The "Existence of materials for culture and leisure in the facility" indicator shows

the presence of equipment that favors interaction between residents, the preservation of habits and culture, such as reading. These actions favor well-being, minimize stress and contribute to the health of the old people[28]. The "Occupation Rate" seeks to present situations that translate into violations of basic rights, such as the presence of overcrowding, that is understood as violence perpetrated against the old people[29].

The "Communication" Dimension involves verbal and non-verbal actions of the LTCF with families and residents in order to meet the needs of the old people[12]. Through the "Openness to dialogue" indicator, it is possible to observe the presence or absence of discussions about the routines with the old people and the holding of meetings with their families. These efforts align with the person-centered care plan and trends that support patient participation in decision-making and move away from paternalistic models of healthcare in which they are passive spectators[30,31]. Additionally, the lack of listening is reported as one of the forms of violence suffered by the old people and their families in LTCF[29].

The validation of the Evaluation Matrix using the Delphi technique relied on the experts' contribution, especially with regard to improving the methodological clarity and transparency of the indicators, which are fundamental attributes for the legitimacy of the indicators in the social and political sphere, which allow greater understanding by the population[17]. The experts, professionals with training and experience in different areas of knowledge, attested to the validity of the indicators, that is, they recognized that they can measure aspects of quality proposed by the Integrated Multidimensional Quality model[12]. The Evaluation Matrix built from the variables available in the public data of the SUAS Census, collected periodically, will favor the conduct of systematic and continuous evaluations of the quality of LTCF in the national territory, allowing for temporal comparisons and monitoring of policies and actions implemented in these care spaces. As a limitation of this study, we highlight the lack of participation of three experts in the 2nd validation cycle and the restriction of the information contained in the SUAS Census, limiting the evaluation of all concepts presented in the theoretical dimension.

CONCLUSION

The matrix proved to be valid and can be used in the process of evaluating and monitoring the quality of Long-Term Care Facilities for old people participating in the Unified Social Assistance System Census, which can be extended to other existing institutions, contributing to reveal aspects to be prioritized for the permanent improvement of the care provided.

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Experiences of the old people living alone: arrangements, choices and challenges

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Abstract

Objective: to analyze reports about the experience of the old people living alone. *Method:* a clinical-qualitative trial carried out with 18 old people in a city in the countryside of Rio Grande do Norte, Brazil, from September to December 2016. For data collection, a semi-directed interview was carried out with open questions, free observation, and self-observation simultaneously. The material produced was analyzed using the qualitative content analysis described by Turato. *Result*: Four categories were developed, namely: 1) Happiness and misfortunes of living alone: choices or impositions? 2) Redefinition of family arrangements: what is the place of the old person? 3) Sociability and health care: strategies for coping with loneliness?, and 4) Desire for transcendence and the exercise of spirituality: mechanisms of resilience? The categories helped identify feelings and experiences of the old person about living alone, how family relationships go, in addition to the care perspectives they cultivate, possible situations of need, or dependence. *Conclusion*: the experiences of the old person living alone directly reflect the adaptations and challenges permeating the aging process, whether in making individual choices, combining family relationships, the daily experiences of sociability and interpersonal interaction, or even the intersubjective production of self-care. The need for greater

Keywords: Health of the Elderly. Loneliness. Emotional Adjustment. Qualitative Research.

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attention and sensitivity on the part of health professionals and services to this group is understood, as well as their feelings, perceptions, and experiences as a strategic element to guarantee psychosocial care for the old person.

INTRODUCTION

The phenomenon of human aging is understood as a complex and multidimensional process contextualizing several factors, among them, the biological, psychological, social, and cultural ones[1]. This broad perspective on aging associated with demographic and epidemiological changes brings new configurations of production and spatial organization to social groups.

In the past, family groups had several generations living in the same house, but today there is a growing number of old people living alone[2]. In some situations, the choice of living alone may reflect the search for autonomy and privacy, not necessarily meaning being away from the family contact and care. When an old person forms a single-person household, a set of interests and needs converge linked to their personal history, social relationships, and the various decisions made during their life.

On the other hand, living alone can stress the problem of abandonment or the lack of an option to live with other family members, which can lead to greater health risks and social isolation, less social support, and low quality of life[3].

Old people living alone face complex situations in their daily lives, such as difficulty in carrying their household chores, dealing with the physiological limitations of the body, family relationships, faltering memory, and fixed income that sometimes decreases, among others. At the same time, they live with social demands related to behavior and functional independence[4].

Circumscribing the scenarios and challenges of the old people involving the intersubjective process of aging and its reflexes on living alone, the following research question was outlined: *what are the perceptions and experiences of the old person about living alone?* It is understood that the experiences of this group can help health professionals and services to implement psychosocial care for the old person to promote healthy aging. Also, few studies are exploring the reasons for these housing arrangements and the formulation of strategies to overcome them[3].

Thus, the present study aims to analyze reports on the experience of old people living alone.

METHOD

The method adopted was the Clinical-Qualitative Research (MCQ), which Turato[3] describes as based on the appreciation of the researcher's clinical, psychodynamic, and existentialist approaches. Then, the MCQ assumes that data collection is carried out by semi-directed interviews with open, in-depth questions, and free observation and self-observation simultaneously[5]. Thus, the guiding question of the study was, "what are the perceptions and experiences of the old person about living alone?

An acclimatization and acculturation phase was carried before data collection with frequent visits to the healthcare service as a way of knowing the care routines, as well as accessing information to map the old people living alone.

After this first stage of identifying the subjects, the Community Health Agents (CHA) started to monitor them during the first home visits and established the first link with this population. Subsequently, an agenda of at least two home visits carried out individually was established as a strategy to strengthen the ties with the old person and apply the constitutive criteria of the sample. The survey carried out at the healthcare service pointed to a total of 64 old people living in a single-person household in the urban area of the municipality of Portalegre, RN, Brazil.

Sampling was established by the exhaustion criterion consisting of approaching all subjects eligible for the study. The inclusion criteria adopted

were individuals aged 60 years or over who lived alone 24/7, registered in the Family Health Strategy in the urban area of the municipality of Portalegre, RN, with adequate physical, emotional, and intellectual conditions that would not impair the validity of the information expected for clinical-psychological interviews. That is, if there were difficulties in verbalizing, incessant weeping, and changes in the thought processes expressed in disconnected speeches, the interview would be discontinued and the symptom considered by the researcher, but it did not happen.

When the visits started, 35 participants had some kind of company (day or night), 2 were alcoholics, and 1 had a diagnosis of mental disorder, being therefore excluded from the research. During the acculturation stage, 4 old people traveled and 2 moved to the rural area of the same municipality, so they were also excluded, which resulted in a total of 20 potential respondents; of these, 2 refused to participate in the research. In the end, a sample of 18 participants was obtained.

The interviews were conducted from September to December 2016 at the old person's own home; they all were recorded, transcribed, and underwent a Qualitative Content Analysis following the five steps described by Turato[3]: Initial material preparation; Pre-analysis; Categorization and Subcategorization; External Validation, and Presentation of Results.

Following the ethical precepts of the subjects' autonomy, privacy, and confidentiality as recommended by Resolution 466/2012 of Conselho Nacional de Saúde (CNS - the Brazilian National Health Council), the research project was submitted to the Research Ethics Committee (REC) of Universidade do Estado Rio Grande do Norte (UERN) with a favorable opinion on its execution - CAAE nº 53359416.3.0000.5294 - on May 9, 2016.

RESULTS

The socio-demographic profile of the participants was evenly distributed in terms of gender; eight were divorced, four widowed, and six single; the age ranged from 60 to 78 years; they were all catholic and retired, and the number of children varied from none to 24; most had up to 4 years of study.

After using the technique of Qualitative Content Analysis, four categories emerged, namely:

Happiness and misfortunes of living alone: choices or impositions?

Tranquility and freedom to do whatever you want in a space that is yours alone are the justifications presented by most old people about the advantages of living in a single-person environment, keeping their individuality, autonomy, and independence.

> "I live alone, but thanks to God I am well, I eat well, I don't feel sad. [...] I go out, I go wherever I want, [...] the house is mine, no one will throw me out [...], and so I live." E1

Even with many reports of good acceptance in a single-person environment, some yearn for a company so that the aging process is more pleasant.

> "Once I spent the day hospitalized in another city, I was alone with God. Then how do I feel? It's sad! I live because God wants me to. At the expense of medications. There are days when I cry so much that I feel I will lose my mind. And there are days when I disguise it." E3

> "I don't think living alone is ideal for anyone. [...] What about loneliness? It's too bad to sleep alone. It's nice to have someone to talk to. [...] My luck is that I have a TV to know about stuff." E15

The old people said that living in a single-person environment is difficult/bad, but they have been looking for ways to constantly interact with other people, especially with family and friends (neighbors). However, even those who denied loneliness have admitted to miss having company at certain times in their lives, or having someone who could be present when they were sick or feeling bad.

> "If there's one thing I think is bad in life it is living alone, eating alone, and sleeping alone. [...] The life of people who live alone is bad, they

> have no one to talk to, to sleep with. So, my life is filled with loneliness, I think it's very sad, and it makes me upset." E8

> "These are the negative points: [...] getting sick during the night, and having no one to call, no one to help. [...] We get used to it little by little, or rather, we don't get used to it, it simply happens and we live it." E9

Redefinition of family arrangements: what is the place of the old person?

Family relationships were reported by many old people as good when they can keep active contact with relatives with frequent visits or phone calls expressing concern, affection, attention, and respect for them. These affection relationships are considered as positive and are understood by the old person living alone as a kind of support, helping them face the difficulties of everyday life, thus contributing to withdraw the feelings of loneliness due to the abandonment that can arise in old age.

> "Thank God my children are all good to me. This phone is for me to talk to them at any time. [...] They come to visit me (those who live nearby). And I visit them. If I tell them, *'come live with me'* they do. But I don't want it, they all have children. I have 14 grandchildren [...] sometimes my house is crowded." E6

In contrast to the expression of these good feelings, there were reports in which the feeling of loneliness and abandonment could be clearly perceived when they emphasized the absence/distance of the family, lack of attention, concern, and affection towards them. It seems that family conflicts may be underlying this state of loneliness of the old people, and they are enhanced by other elements.

> "My son only comes here when he is drunk to ask for money." E1

> "I feel very sad because my two children live in São Paulo. I have sisters [...] but they do not get in contact with me, do not care about me. I also do not care because neither is better than the other. [...] I have cousins here, but they don't come to my house. [...] So, I find myself very abandoned by my family. [...] My brother-in-law once said, *'I'd like it so much if you came to our house to spend a couple of days, but your sister is very weird.'* I asked, *'when you arrive from here, does she ask about me?'* He said, *'no.'* [...] One of my grandsons lives on the corner. He last came here about 2 years ago." E3

> "My daughter abandoned me; she left only a note saying, *'mom, I'm leaving you, don't come after me.'* She left me alone in that big house with that boy (the disabled brother, a very tall boy) in my arms. [...] I cried, and he would say, *'don't cry mommy, she left us because she wanted to; she thought it was better to leave than to stay with us.'* [...] After a while, he died [...]. I was not lucky at all; even the handicapped, they all died with me. There was no sister to come and help me when I needed." E4

Sociability and health care: strategies for coping with loneliness?

Without the full support of the family, the old people bet and rely on ties of friendship with neighbors to fill their needs, lack of care, and the feeling of loneliness they have to deal with.

> "Thank God, until now, everyone here knows me, [...] the neighbors are good to me [...] If I need it, [...] if I get sick and need to call one or the other, they will help me, then they will call my aunt." E1

> "My neighbor has a copy of the key. I say, *look, if it is 7 o'clock and I don't wake up nor open the door, you can come in, I may be dead in there.* Because today to die it's enough to be alive. I may have a heart attack, a stroke, anything, and I already have health problems." E3

In addition to the neighbors' support, the old people also mention other significant elements of the single-person environment. TV, radio, the Bible, books, and going to church seem to be strategies for coping with feelings of loneliness.

> "I entertain more with the TV. Sometimes I go to church, not that much, but I go to church. I love soap operas [...] we know it's not true, but while we're watching, we're deluded, right? It's better than just bad news." E9

> "I take care of my plants, my house, my food, I take walks, I go to church, to my sister's house in another neighborhood; [...] all of this helps me spend my time." E11

A frequent concern expressed in the reports is regarding their monthly income, which has proved to be insufficient for their expenses. Thus, the old people consider spending with subsistence, with themselves and with others, and medication priorities, with cultural and leisure activities being at a secondary level.

> "I have to get my retirement because I live alone, and everything I want here I have to pay for: to change a light bulb, paint the house, change the sink, [...] my medicines. The money is almost not enough for so many expenses." E3

> "My late wife's salary pays for some vegetables, and I send it to my children who plant and cannot afford it. Then, the money I get, I send them. [...] And I struggle to survive with mine, and I don't owe anyone a penny. God will help me, why am I going to starve?" E10

The neighbors are also substitutes for a first search in the family. When they are there for the old people, there is a feeling of gratitude for the old person. On the other hand, when the feeling of loneliness is socially perceived, the old person becomes more susceptible to the verticalized, and sometimes authoritarian, power relationships of the health team.

> "Everything I need, I go to the community clinic. But I'm not well served there. Sometimes they are very good, but others that are boring, disgusting. [...] Gosh, boring as hell. Sometimes I even ask, *'aren't you here for that?'*[...] If you get sick, God bless you, but everything has an end, right? (to get sick, to die). Blessed are those who die of a heart attack, it is a lot of happiness. Jesus could give me this blessing. I'm not afraid to die, I'm just afraid of getting sick." E17

Another cause of anguish is the possibility of future dependence for self-care, where expectations of proximity to the family or the remuneration of third parties for this purpose are divided.

> "When I'm older or get sick, let it be the way God intended, the way I deserve it. So many people can't struggle like that. I raised a niece and a nephew, they are the ones who talk to me the most. It is not possible that they will abandon me when I need them." E16

> "What I think the most is that in a while there will be someone to take care of me, to use my card to get the money, these things." E12

Desire for transcendence and the exercise of spirituality: mechanisms of resilience?

Religion has been considered as a potential source of personal meaning and psychological well-being, with a greater emphasis on accepting and overcoming the difficulties that the single-person environment entails. Thus, we can observe in the old people's responses that this practice also contributes to healthy aging.

> "I am resigned to everything, to the life God has given me. [...] My happiness is a chaplet I hold from dawn and dusk, it's my shield. [...] Aging is too good, you've lived, you've experienced, you've suffered, you've enjoyed... I've already enjoyed, I've already partied, I've already played, I've already loved, I've already done a lot. Not bad things, but I have already enjoyed my life so much. But I am no longer at the age to party, I will live my old age, and if God gives me some health and Saint Lucy cleans my eyes, I can live. And I will do very well because I trust them." E8

DISCUSSION

The choice to live in a single-person environment for the old person may be related to situations in their current life context such as the widowhood process, divorce, or even the absence of close relatives. It is understood that changes in the composition and configuration of the family bring direct reflexes among its members, especially when children or others leave home and start living alone.

There are also cases in which the old person has the possibility of living with family members.

However, they choose to live alone. This can be justified by the search for greater autonomy, privacy, and living in an environment of greater tranquility, aspects pointed out by the study participants as the main advantages for them to live alone.

The search for individuality is more successful when the old person has the cognitive function and good performance in daily activities preserved, they have the support of family or friends, with better health conditions, income, access to healthcare services, and their color is white [6,7].

On the other hand, in situations of dissolution of homes due to divorce or separation of the couple (forced or not) as a result of marital crises that end up bringing demotivation to the old person to seek a new relationship, and in most cases they choose to go on without a life partner[2]. In addition to that, negative feelings are identified, as revolt, resentment, sadness, and others that directly interfere with their psychological and emotional state.

Living alone can trigger an increased feeling of loneliness, in some cases leading to a psychopathological condition of depression. Sometimes, the fear of helplessness because of accidents or unexpected illnesses when they are alone at home is identified in the individual, as well as uncertainty about the future, considering the fear of who will take care of them in case of need[8].

One of the main challenges in aging is the individual's ability to adapt to adverse situations and maintain their quality of life. In this context, the family is an excellent point of support, considering the symbolic and cultural value that it represents in all social strata, being responsible for caring and protecting its members, among other responsibilities[9]. For the old people, being cared for by the family is a cultural symbolism present in the idea of generational care historically disseminated as a form of retribution and gratitude for the affection and care offered by them throughout their lives.

It is known that the family influences the monitoring and promotion of healthy aging, whether in encouraging autonomy to perform activities in the old person's daily life or the warmth and support offered for their biopsychosocial well-being[10]. The feeling of being supported by family members is not restricted to the presence or physical contact, but also to "being close" in terms of actions that show concern, attention, or care, such as an unexpected phone call, a message via mobile messaging applications, and calls to smartphones, reinforcing the presence and contact.

Neighbors were also identified by the study participants as important facilitators in the process of sociability. In this sense, the old person's positive perception of support from neighbors and friends is directly related to their good health[11]. Interpersonal integration and coexistence increase the sense of living in a community among people, being an important way of sociability among those involved.

Attention is drawn to the fact that people who live alone get away from family life over time when compared to those who live with other people. However, living alone often favors getting closer to friends and expanding fraternal ties, including neighbors, leading to greater involvement in regular social activities[3,12].

Spirituality is another element with a central dimension in the lives of most old people. As age advances, there is an increase in spirituality, which becomes an important source of emotional support, with repercussions in the areas of physical and mental health[13]. Religious practices and beliefs seem to contribute decisively to the well-being of old age[14].

Added to this scenario is the use of information and communication technologies (ICT) and other media in the daily life of the old person. It is understood that the spread of ICT contributes to decreasing loneliness, favoring access to information, and new possibilities for interaction with other people, being also a source of entertainment in leisure time.

The coexistence group in the third age is another strategy of integration and social inclusion aimed at this age group, being present in most Brazilian municipalities. The group experience encourages the recovery of autonomy, living with dignity and within the scope of being healthy in this phase[15]. However, the old people participating in the present study showed a more fearful attitude to these spaces.

In the context of health care, it is observed that old people with low income have greater difficulties in managing their financial expenses. In general, the monthly income is used exclusively to cover expenses with food, medicine, and other fixed bills; leisure expenses or even self-care (going to the beauty salon, buying clothes, etc.) are not a priority.

When going to the healthcare service or searching for medical assistance, a certain degree of dependence on the part of the old person is identified, requiring someone to accompany them at these times. When the feeling of loneliness is experienced more intensely, dependence becomes more noticeable, thus requiring the figure of another person or company to give attention, affection, and support in carrying out basic daily activities, such as cooking, doing the laundry, chatting, and even taking their medicines at the right time[16].

Even with family support in situations of fragility or dependence due to illness, most old people fear the moment when they will not be able to live in a single-person household. If, on the one hand, there was an expectation regarding being cared for by a family member, having to hire a caregiver, or even go to a retirement home, on the other hand, the feeling of uncertainty towards the future was identified, although everyone hopes to continue living a healthy life[17].

In the scenario of public health policies in Brazil aimed at the old person, challenges and distortions are still evident in the field of State responsibilities and support for this age group that ends up being assumed from an individual or family perspective[18]. Among the study participants, there were reports of poor service and lack of care by professionals in the healthcare services of the community network.

The need for greater awareness of professionals in the scenario of care for the old person who lives alone is reinforced given the specific needs of this group, seeking to strengthen the health care tools related to active and qualified listening, the creation of ties, home care, and psychosocial care, which are essential in promoting healthy aging[19].

As a limitation of the present study, the findings are not generalized. However, the findings obtained raise new ideas on the theme, with possibilities of application to other groups of this age group experiencing realities close to those of the participants.

CONCLUSIONS

The single-person household arrangement in the context of old people is a complex and multifaceted social phenomenon considering the intersubjective aspects present in individual experiences throughout life. It was observed that living alone for the study participants directly reflects the adaptations and challenges faced in the aging process, whether in making individual choices, combining family relationships, the daily experiences of sociability and interpersonal interaction, or even the intersubjective production of self-care.

Although single-person households can represent an achievement in terms of autonomy and independence with advancing age, old people living alone become more vulnerable in terms of health and illness. Researching this reality allowed us to know more comprehensively the meanings and experiences of this particular group, identifying the different ways to deal with this phase as well as the conditions related to health and self-care.

It is understood that the elements found in the present study bring important discussions to health professionals, and reinforce the need to promote more appropriate and sensitive care to the needs of old people in a single-person household and to pay attention to the psychosocial aspects involved. Due to the negative psychic impacts for people who age living alone in the reality studied, it is recommended to develop future studies to analyze this phenomenon more comprehensively using psychometric instruments to account for the intended scope, as well as the influence of the social class and race in that group.

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Ability to evaluate physical performance tests to identify low muscle mass in middle-aged and older women

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Abstract

Objective: To verify the ability to evaluate physical performance tests in the identification of low muscle mass (MM) in middle-aged and old women. *Method:* This cross-sectional study was carried out with 540 middle-aged (40-59 years old) and old women (≥60 years old) in the municipalities of Parnamirim and Santa Cruz in the state of Rio Grande do Norte, Brazil. MM, handgrip strength, knee extension, and gait speed were evaluated. Low MM was defined by skeletal muscle mass index lower than the lower 20% for each age group. The following tests were used: Student's t, chi-square, ROC curve analysis to calculate the area under the curve, and cutoff point of each test in the discrimination of participants with low MM. $P<0.05$ and CI of 95% were considered. *Results*: For the middle-aged group, the handgrip and knee extension strength showed moderate sensitivity (71.6% and 72.5%, respectively) and specificity (59.4% and 56.0%, respectively) in the identification of low MM. For the old women, gait speed and handgrip strength showed good sensitivity (77.8% and 81.6%, respectively) and moderate specificity (51.4% and 64.5%, respectively). The discriminatory capacity of gait speed for middle-aged women and knee extension strength for old women were unsatisfactory. *Conclusion*: Muscle strength measurements are useful for low MM screening in middle-aged women, while handgrip strength and gait speed tests are useful for older women.

Keywords: Mass Screening. Women. Sarcopenia. ROC curve. Muscle strength.

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INTRODUCTION

Sarcopenia is a process known as age-related decrease in muscle mass (MM)[1], a condition affecting great part of the old people worldwide with an overall prevalence estimated at 17% for older Brazilians,[2] and 10% of the world's older population[3]. It can be clinically defined as a geriatric syndrome characterized by the progressive and generalized decline in muscle mass and function[4]. It is associated with several adverse health consequences[5]. It has been reported that its manifestation in old people increases the risk of mortality by 3.6 times, with this risk being increased to 4.4 in individuals aged 79 years or older. Sarcopenia also increases the risk of functional disabilities by 3 times and predisposes the old person to be 2.4 times more prone to suffering falls, in addition to increasing the length of hospital stay by 1.6 times[5].

During aging, there is a gradual process of loss of MM,[6] and a consequently a decrease in strength[7] that tends to accelerate in older ages[6], giving rise to the sarcopenia process. Said accelerated loss is shown to be associated with aging. It occurs at younger ages in women than in men, being observed in them during menopause[8], still in the middle-age. This contributes to making them more susceptible to physical limitations and disabilities at earlier ages compared to men[9]. However, although the sarcopenia process, associated factors, and diagnostic criteria are widely described in the literature for different populations, few studies proposed to investigate these aspects in younger populations, such as middle-aged women. In view of the association between sarcopenia and the occurrence of adverse outcomes, there is a concern that its occurrence is identified as soon as possible, so that it is possible to prevent the associated risks before the condition has been developed.

Different diagnoses of sarcopenia are reported in the literature, and there is a consensus in the literature that sarcopenia is only clinically important when associated with reduced muscle strength or function[1,10]. Thus, physical performance tests are widely used along with MM identification methods to identify the presence of sarcopenia in the old people[1,10] .

Handgrip strength and gait speed are the most used physical performance tests to classify sarcopenia in old people[1] . Said tests are simple and easy to apply, and can be used both in the research context and in clinical practice. However, the use of said measures to identify sarcopenia and its relation with low MM in younger populations, particularly in the middle-aged ones, is still not well established, and there is doubt whether said measures are useful to screen sarcopenia in this population. In turn, measuring the knee extension strength seems to be a useful method for assessing muscle strength in populations of different age groups, including middle-aged people[11] and old people[12]. However, its use as a screaning method for sarcopenia does not seem to be the focus of previous studies.

Knowing simple methods to allow screening sarcopenia is a challenge for professionals and researchers, especially in environments where the availability of resources is scarce, such as in rural areas or in those with difficult access to health technologies. Identifying valid methods for assessing low MM, and consequently for screening sarcopenia particularly in groups of middle-aged people can contribute to making it possible to detect sarcopenia early and implement more effective rehabilitation strategies. Thus, the present study aimed to assess the ability of simple physical performance tests to identify low MM in middle-aged and old women from a low-income population.

METHOD

The present study is a cross-sectional analytical observational study. It is part of an ongoing longitudinal research entitled *The influence of menopausal status and hormone levels on functionality, muscle strength and body composition: a longitudinal study.*

The study population comprises women aged 40 to 80 years living in the municipalities of Santa Cruz (RN) and Parnamirim (RN) located in the state of Rio Grande do Norte, Brazil. The sample initially comprised 568 women, 381 of whom evaluated between September 2014 and July 2015 in Parnamirim (RN), and 208 from April to August 2016 in the city of Santa Cruz (RN). The sample

was obtained by convenience after disclosure of the research in Basic Healthcare Units and community centers in the municipalities, and comprised 434 middle-aged women (40 to 59 years old) and 134 women between 60 and 80 years old. Considering the prevalence of low MM of 20%, an area under the estimated curve of 0.68 with type I error of 5% and power of 80%, the minimum sample size required for the objective proposed in the present study would be 104 participants in each age group.

The inclusion criteria for the study were age between 40 and 80 years, be a resident in the cities of the study (Santa Cruz, RN or Parnamirim, RN), with no cognitive alterations identified by four or more errors in the Leganés Cognitive Test, and/or no neurological and degenerative diseases, fractures in the limbs or any other condition preventing or compromising data collection. Twenty-eight middle-aged participants were excluded from the study because they did not perform the electrical bioimpedance analysis, with the final sample being 540 women (406 between 40 and 59 years old, and 134 between 60 and 80 years old). The maximum sample age was limited to 80 years since after that age the prevalence of disability and cognitive impairment increases significantly[13] which makes it difficult to follow the data collection protocol with a low risk of bias.

Data was collected by trained interviewers (undergraduate and graduate students in physiotherapy) using a structured questionnaire developed for this study. For the training, specific instructions were given about applying the research questionnaires and standardizing the procedures. The entire investigation team also received printed material with instructions for consultation during data collection, if necessary. Data collection followed the standardized protocol, as described below.

Initially, data such as age (years), education (years of study), and family income (Brazilian real) was collected. Weight (Kg) and height (m) were also measured by the interviewers using a digital anthropometric scale and a stadiometer attached to it (WELMY®, W100H, model R-110), respectively.

The skeletal muscle mass (SMM) was evaluated by electrical bioimpedance with the portable body mass analyzer InBody R20®[14,15]. The device uses eight electrodes, two of which positioned on each foot, and two others on each hand. The equipment measures the bioimpedance in a segmented way at two frequencies - 20 kHz and 100 kHz - using an applied current of 250 μA.

For the evaluation, the volunteers were requested to wear light clothing, not to eat or exercise at least two hours before the test, and to go to the bathroom to empty the bladder prior to the analysis[15]. The women were positioned over the feet electrodes on the surface of the digital scale of the device, and were requested to hold the other electrodes that are attached to a bar. During the test - which lasts from forty seconds to one minute on average - the volunteer was requested to remain in the same position (upright) without making any movement nor talking.

From the assessment, the body composition was automatically calculated based on the prediction equations of the equipment manufacturer. For the present study, the appendicular Skeletal Muscle Mass (ASMM) measure was used to calculate the Skeletal Muscle Mass Index (SMMI), and consequently to assess the presence of low MM.

The SMMI was calculated by dividing the sum of the SMM of the four limbs in kilograms by the height in meters raised to the second power (SMMI = appendicular SMM / height^2). After obtaining the SMMI, women were classified according to the presence of low MM if they presented the SMMI below the 20th percentile of the sample according to the age group. A cutoff point of <6.07 kg/m^2 was considered for middle-aged women, and <5.51 kg/m^2 for old women. To evaluate the handgrip strength, a Saehan® hydraulic hand dynamometer was used, which provides a record of muscle strength in the unit of kilograms/strength (Kgf). A dynamometer was used in the dominant hand for the measurement, with the volunteer in the sitting position, with adducted shoulder in neutral rotation, elbow flexion at 90° with the forearm and wrist in neutral positions[16]. Sustained contractions of five seconds were requested, with an interval of one minute between measurements. The arithmetic mean of three consecutive measurements was considered[17].

The knee extension strength was assessed using a portable dynamometer (Hoggan® Health Industries, UT, USA), model MicroFET2, which records muscle strength in kilograms/strength (Kgf). The volunteers were seated on the assessment stretcher with their legs hanging down and hands on their thighs[12], and the dynamometer was positioned on the distal segment and anterior to the leg. After being positioned for the test, they were requested to give three maximum isometric contractions of five seconds, with an interval of one minute between measurements. The arithmetic mean of the three measures was used for the analysis.

Gait speed was assessed following the protocol of the *Short Physical Performance Battery* (SPPB)[18] adapted for the Brazilian population[19]. A space of four meters was marked with adhesive tape for the test, and the volunteer was asked to walk from the initial mark to the final mark in their usual gait. The examiner demonstrated it first, and stayed beside the volunteer during the test. Time was measured in two attempts, with the shortest time being used to calculate gait speed in meters per second.

Descriptive statistics for all variables were presented according to age groups, and the comparisons were analyzed using the Student's t-test (continuous variables) and the chi-square test (categorical variables). The means of the physical performance variables were presented according to the variable of low MM and the other covariates, and compared using the Student's t test.

The ROC (*Receiver Operating Characteristics*) curve analysis was used to calculate the area under the curve (AUC) and the cutoff point of each physical performance test that best discriminates participants with and without low MM. In all stages of the data analysis, $p<0.05$ and 95% CI were considered.

The study was approved by the Ethics and Research Committee of Universidade Federal do Rio Grande do Norte (Approval number: 1,875,802). The participants were previously informed about the objectives and procedures of the study. The study accepted participants who agreed and signed the Free and Informed Consent Form (ICF) according to resolutions 510/2016 and 466/12 of the National Health Council, which regulates research with human beings.

RESULT

Table 1 shows the characteristics of the sample stratified by age (40-59 years; 60-80 years). The final sample consisted of 540 participants, 406 of whom were middle-aged women and 134 were old women. The average age was 54.51 (±8.88) years.

The average in the physical performance tests according to the covariates and stratified by age can be seen in Table 2. In both middle age and old women groups, a significantly lower performance was observed in the tests for handgrip strength and knee extension strength of women presenting low MM compared to those who did not.

However, a significantly worse performance for gait speed was also seen in the group of old women. However, the same was not observed for middle-aged women.

The AUC values, cutoff points, sensitivity and specificity of physical performance tests on the ability to identify low MM in middle-aged and old women are shown in Table 3. For the middle-aged group, a cutoff point of 26.33kgf in the handgrip strength and 22.07kgf in the knee extension force showed moderate sensitivity (71.6% and 72.5%, respectively) and specificity (59.4% and 56.0%, respectively) in the identification of low MM.

In the group of old women, a cut-off point of 0.84 m/s in gait speed and 22.67Kgf in handgrip strength showed good sensitivity (77.8% and 81.6%, respectively) and moderate specificity (51.4% and 64.5%, respectively) in the prediction of low MM. The discriminatory ability of gait speed in middle-aged women and knee extension strength in old women was unsatisfactory.

Table 1. Sociodemographic, anthropometric characterization and body composition (N=540). Santa Cruz and Parnamirim, RN, 2018.

Variables	Groups		*p*-value
	Middle age (40-59 years)	Old women (60-80 years)	
	Mean (SD)	Mean (SD)	
Age	50.30 (±4.66)	67.26 (±5.99)	<0.001[a]
Weight (kg)	69.07 (±12.07)	65.71 (±12.96)	<0.001[a]
Height (m)	1.54 (±0.05)	1.51 (±0.06)	<0.001[a]
Years of education*	8.79 (±4.18)	5.00 (±4.29)	<0.001[a]
Average family income*	1,972.47 (±1,595.90)	2,124.18 (±1,833.92)	0.36[a]
SMMI (Kg/m^2)	6.80 (±0.89)	6.30 (±0.97)	<0.06
Variables	Groups		*p*-value
	Middle age (40-59 years)	Old women (60-80 years)	
	N (%)	N (%)	
Education			
Less than elementary school	146 (36.0%)	103 (76.9%)	<0.001[b]
Between elementary and high school	188 (46.4%)	18 (13.4%)	
More than high school	71 (17.5%)	13 (9.7%)	
Family income*			
<3 minimum wages	124 (30.6%)	34 (25.4%)	0.24[b]
≥3 minimum wages	281 (69.4%)	100 (74.6%)	
Low muscle mass			
No	235 (80.0%)	107 (79.9%)	0.52[b]
Yes	81 (20.0%)	27 (20.1%)	
Total	406 (75.2%)	134 (24.8%)	

BMI: Body mass index; SMMI: Skeletal Muscle Mass Index; a-*p*-value: Student's t test, b-*p*-value: Chi-square test; *1 lost value

Table 2. Average of physical performance tests according to the covariates stratified by age (N=540). Santa Cruz and Parnamirim, RN, 2018.

	Middle age (40-59 years)					
	Handgrip strength (Kgf) Mean (SD)	*p*	Knee extension force (kgf) Mean (SD)	*p*	Gait speed (m/s) Mean (SD)	*p*
Low muscle mass						
Yes	24.21 (±4.11)	<0.001	19.80 (±5.91)	<0.001	0.98 (±0.19)	0.39
No	27.46 (±5.26)		23.50 (±8.00)		1.00 (±0.17)	
	Old women (60-80 years)					
	Handgrip strength (Kgf) Mean (SD)	*p*	Knee extension force (kgf) Mean (SD)	*p*	Gait speed (m/s) Mean (SD)	*p*
Low muscle mass						
Yes	21.38 (±2.52)	0.001	16.44 (±5.53)	0.04	0.77 (±0.17)	0.02
No	24.75 (±4.85)		19.32 (±6.64)		0.86 (±0.19)	
	Full sample					
	Handgrip strength (Kgf) Mean (SD)	*p*	Knee extension force (kgf) Mean (SD)	*p*	Gait speed (m/s) Mean (SD)	*p*
Low muscle mass						
Yes	23.50 (±3.96)	<0.001	18.95 (±5.97)	<0.001	0.93 (±0.21)	0.06
No	26.79 (±5.29)		22.47 (±7.89)		0.96 (±0.19)	

Table 3. Areas under the ROC curves (AUC), cutoff points, sensitivity and specificity of physical performance tests on the ability to identify low muscle mass in middle-aged and old women. (N=540). Santa Cruz and Parnamirim, RN, 2018.

Performance tests			Middle age (40-59 years)	
	Cut-off point	Sensitivity	Specificity	AUC (95%CI)
HGS (Kgf)	26.33	71.6%	59.4%	0.68 (0.63-0.73)
Knee Extension Force (Kgf)	22.07	72.5%	56.0%	0.64 (0.59-0.69)
Gait Speed (m/s)	0.96	52.5%	59.3%	0.54 (0.49-0.59)
Performance tests			Old women (60-80 years)	
	Cut-off point	Sensitivity	Specificity	AUC (95%CI)
HGS (Kgf)	22.67	81.6%	64.5%	0.74 (0.66-0.81)
Knee Extension Force (Kgf)	22.09	92.6%	32.1%	0.62 (0.53-0.70)
Gait Speed (m/s)	0.84	77.8%	51.4%	0.64 (0.56-0.72)

HGS: Handgrip strength.

DISCUSSION

For a test to be considered suitable to detect a particular condition, it must have reasonably accurate sensitivity and specificity. Sensitivity will inform the test's ability to identify positive cases, that is, those who present the condition, while specificity will identify negative cases[20]. According to the results, the handgrip test has a good ability to identify low muscle mass (MM) in both middle-aged and old women. However, the results also showed low accuracy in gait speed tests for middle-aged women (low sensitivity and specificity), and knee extension strength for old women (low specificity) in the ability to detect low MM.

Thus, in the present study, handgrip strength was the one with the best ability to assess low MM, as it obtained good results of sensitivity and specificity for both age groups. Grip strength is considered a measure of global strength assessment[21], being widely used along with MM to define sarcopenia in different populations[1,10], in addition to being known as a good predictor of negative health outcomes[22].

In a 2015 review, Bohannon[22] addressed the clinical and prognostic value of grip strength, and identified the test as an important predictor of mortality, disability, complications and increased length of hospital stay, capable of providing information on nutritional status, MM, and general health status, supporting its routine use as a useful predictor in view of being a practical, valid, easy to measure, and reproducible method.

Regarding the knee extension strength, the results of the present study showed that this measure presents satisfactory results of sensitivity and specificity for identifying low MM only among the middle-aged group. For the group of old women, although the mean strength of knee extensors was significantly lower for those with low MM, this measure did not present good performance in relation to its accuracy as a predictor of low MM in this group. Knee extension strength is a measure closely related to lower limbs function in different everyday activities[12,23].

It is known that with aging there is a decrease in activities requiring the use of these members, which can result in a decrease in force[24]. Thus, the old women in the present study may have already reached such low levels of muscle strength that this test is no longer able to discriminate the sarcopenic old women from the non-sarcopenic ones, since both groups already present marked strength deficit of the lower limbs. As middle-aged women still preserve functional activities with the lower limbs to a greater degree by walking, running, and going up ramps and stairs in their daily lives, it is believed that they also have greater preservation of muscle strength in this segment. Thus, it is expected that the muscle weakness identified is better related to a condition of alteration of their normal health status, such as low MM, thus making this test more appropriate for the prediction of sarcopenia in middle-aged women.

In contrast to the knee extension force which had better discriminatory capacity for the middle-aged group, gait speed presented better low MM detection capacity in older women. Slow gait is the most consistent alteration related to aging, and it is influenced by a number of conditions occuring most commonly with aging, such as reduced muscle strength, balance, and postural stability, and increased fear of falling[25]. Thus, during the aging process, alterations in gait speed seem to occur at a more advanced stage in the process of changing the functionality of the lower limbs and at older ages, being hardly identified at earlier ages as in middle age[26]. Thus, it is possible that the differences in gait speed during middle age are not large enough to be detected among younger people, which makes this test inadequate for screening sarcopenia in this age group.

Although physical performance tests are considered practical and valid to detect the presence of sarcopenia in middle-aged and old women, few studies were found investigating the discriminatory capacity of these measures in the identification of sarcopenia[27,28]. Previous studies showed both similar and divergent results from the present study. In a study carried out by Looijaard et al.[28] in 2018, the authors investigated the capacity of isolated physical

performance measures including gait speed and grip strength to identify sarcopenia in a population of 140 old outpatients. The study presented low precision values, concluding that these tests are not able to predict sarcopenia in the old person. The results found can be attributed to a high multimorbidity found in this population, which could have affected the performance measures.

The study by Pinheiro et al.[27] in 2015 using the chair stand test in a population of old women showed the good accuracy of the test, indicating its use as a good prediction tool to screen old women at risk of developing sarcopenia.

Like Pinheiro et al.[27], Fillippin et al.[29] carried out another study in 2017 showing good results for the physical tests in the detection of sarcopenia. In this study, the performance measure used to predict sarcopenia in a population of old people of both genders was the *Timed Up and Go* (TUG) test, which presented adequate sensitivity for the prediction of sarcopenia and screening of the condition.

The most accessible screening methods for low MM that are validated and described in the literature are based on algorithms, questionnaires, screening grid, and prediction equations, and it is not yet determined which of these tools is the best one to predict sarcopenia[30]. Identifying fast, low-cost, easy-to-apply methods and/or tools to identify individuals with low MM for sarcopenia definition is a major challenge for clinicians and researchers.

In this context, this study allowed the identification of simple physical performance tests with adequate precision to identify low MM, and consequently sarcopenia both in middle-aged women and in old women in a low-income population in northeastern Brazil. Said measures are easily applicable tools in different contexts, including basic health units, community centers, and the residence of the old person. Thus, by showing adequate validity standards for screening and early diagnosis of low MM, they can be used by health professionals and researchers when other more sophisticated diagnostic methods are not available. Similarly, due to the ease of use and low cost, these measures may be useful even in the assessment of sarcopenia in population-based health surveys. The identification of sarcopenia by validated measures is extremely important so that appropriate prevention and rehabilitation strategies can be based, thus reducing the risk of negative health events.

The present study has some limitations. The sample comprised only women in northeastern Brazil, which should be taken into account when inferring these results to other populations. Although the sample was created by convenience, the socioeconomic characteristics are similar to those of middle-aged and old women in the population of both cities of study, according to the demographic census data[31]. Another point that should be considered is the use of electrical bioimpedance to evaluate skeletal muscle mass and identify sarcopenia. Although it is not considered the gold standard method for this evaluation, it is a useful and reliable tool for body composition assessment, both in middle-aged populations[32] and in older people[33], being commonly used both in research and clinical practice. Finally, it should be considered that the results presented here may vary according to some characteristics of the sample. This becomes clear with the observation of the cutoff point of grip strength identified in the present study for the sample of old women which was higher than that presented by international consensus on sarcopenia[1,10], but similar to that of other international studies[34,35]. It is possible that some characteristics of the population such as the practice of physical activity, presence of comorbidities, and the body mass index influence the results found, and this should be the focus of future researches.

CONCLUSION

The results of the present study suggest that physical performance measures are useful for identifying low muscle mass (MM) in middle-aged and old women in a low-income population. However, the analysis of sensitivity and specificity of the measures showed that the results are different when taking into account the age group evaluated. For middle-aged women, the measurements of muscle strength, whether by handgrip strengh or knee extension, are useful for screening low MM, while among older women handgrip strength and gait speed

tests were useful for this purpose. As these physical performance measures are low cost and simple to apply, they can be used in different environments and help professionals identify sarcopenia in women, enabling appropriate interventions for each group. Other studies are needed to evaluate the applicability of such measures in populations of different socioeconomic contexts.

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Frailty of old people treated in secondary health care: associated factors

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Abstract

Objective: To evaluate the association between sociodemographic, economic, clinical, and behavioral characteristics and the degree of frailty of old people treated in secondary health care. *Method:* Cross-sectional, analytical study carried out between May and September, 2018 with 376 old people treated at a Center of Medical Specialties of Belo Horizonte (MG, Brazil) selected by the random systematic sampling method. Data was collected by interviews and tests to assess the frailty phenotype, being analyzed using descriptive statistics, bivariate, and multivariate analysis using the Proportional Odds Model. *Results:* The prevalence of frailty was 25.3%. The variables significantly related to the greater chance of presence of frailty in the old people were female gender, low education, hospitalization and falls in the last 12 months, use of walking aid and absence of physical activity. *Conclusion:* The knowledge on the factors associated with frailty allows to improve the planning of health actions and to intervene in the modifiable factors related to frailty, thus preventing its onset, the occurrence of negative events resulting from this syndrome, or even reversing its stage. The results demonstrate the importance of managers of the secondary health care services implementing a methodology to identify frailties in old people, as well as a health care model for the fragile old person to follow and monitor their clinical conditions.

Keywords: Health of the Elderly. Frail Elderly. Frailty. Secondary Care.

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INTRODUCTION

Frailty among old people has emerged as an important concept in gerontology and geriatrics. However, there is no consensus on its definition in the literature, nor standard diagnostic criteria to be used in clinical practice and in epidemiological research[1].

The most common definition in the literature[2] and which is a reference for the present study is in line with the model implemented by Fried et al[3] conceptualizing frailty as a geriatric clinical syndrome involving a physiological state of increased vulnerability to stressors, being supported by a triad of alterations related to the human aging process: sarcopenia, dysregulation of the neuroendocrine system, and dysfunction of the immune system[3].

Frailty is a worrying condition because it is related to negative health outcomes for the old person[4]. Regarding the factors associated with the frailty syndrome, the most frequent ones pointed out by national and international literature are falls[4], comorbidities[5], medication intake[6], hospitalization[4], loss of functional capacity[4], and old age[7].

The early identification of the predictive characteristics defining the frailty syndrome is important for the development of health care policies, implementation of appropriate interventions aimed at treating or even reversing the onset of the syndrome, thus reflecting on improvement in the quality of life of the old person and on prevention of adverse events caused by frailty[8].

Studies addressing the prevalence and factors associated with frailty carried out in different contexts, such as the basic health unit,[9], hospitals[10], long-term institutions[11] and in geriatric and gerontology outpatient clinics[12-13] were observed in the Brazilian literature, which allows understanding the health conditions of a variety of old people in different contexts reflecting percentages of individuals considered fragile[14]. However, there is a scarcity of studies with old people in the context of secondary health care, especially in services which do not offer specific care to the old person.

In view of the results found in the national literature, there is a high prevalence of frailty in the old population treated in geriatric and gerontology outpatient clinics - between 20.0% to 56.0%[12-13,15-16]-, which explained the need to expand the study of prevalence and associated factors in a specialty outpatient clinic not offering specific care to the old population.

In addition to the scarcity of scientific publications and the high prevalence of frailty in geriatric and gerontology outpatient clinics, it is observed that health care professionals who work in reference services of secondary health care are unaware of specific assessment instruments to treat the old person. Thus, it is expected that the present study can contribute to promote changes in the assistance for old people in need of care in secondary health care units for the treatment of different comorbidities. The professional practice shows that the old person is often seen in these services without any more specific geriatric assessment-, which somehow ends up not revealing the health problems extremely specific to aging, such as the condition of fragility.

Given this context, the question is, "what is the prevalence of frailty in old people and the factors associated with this syndrome in an outpatient clinic in Minas Gerais (MG), Brazil?" The hypothesis of the present study is based on the following issue: The prevalence of frail old people seen in a specialty outpatient clinic in Minas Gerais is similar to the prevalence of frailty found in old people seen in geriatric and gerontology outpatient clinics, as well as the factors associated with frailty related to falls, comorbidities, medication intake, hospitalization, loss of functional capacity, and old age.

Therefore, the objective of the present study is to evaluate the association between sociodemographic, economic, clinical, and behavioral characteristics and the degree of frailty of old people seen in the context of secondary health care.

METHOD

This is a cross-sectional and analytical study carried out in a Medical Specialties Center (CEM) of a large philanthropic hospital in Belo Horizonte (MG, Brazil) which has its own management and a

contract with the Municipal Health Department of Belo Horizonte (MG, Brazil).

This outpatient clinic was opened in 2007 and aims to offer interdisciplinary care to users of the Unified Health System (SUS) referred by the Basic Health Units of Belo Horizonte and by the Health Departments of municipalities in Minas Gerais, in addition to post-discharge patients from the main Hospital of which the outpatient clinic is part.

Around 6,000 people circulate there daily, including users, caregivers, and health professionals. The institution offers 31 medical specialties, in addition to the multi-professional team comprising nursing, psychology, nutrition, social work, speech therapy, physiotherapy, and dentistry. It also offers 18 types of exams and small outpatient surgeries and laboratory care.

The individuals who participated in the study were aged 60 years or over, from Belo Horizonte or other cities in Minas Gerais, treated at CEM from May to September 2018, and with cognitive ability identified by the cut-off points of the Mini Mental State Examination (MMSE), according to Bertolucci et al[17]. Individuals with neurological diseases preventing them to answer questionnaires, carry out the tests, and who presented any complications on the day of the appointment or exam were excluded.

The sample was defined by the systematic random sampling method. Thus, at the end of each day, the information on all the old people scheduled for the following day was listed to avoid absences of users in the first appointments referred by the Appointment Central, Municipal Oncology Commission, and the Hospitalization Center, since they send the list of users scheduled for the following day on a daily basis.

The old people were included in a list, numbered according to the time of the appointment or exam, and were selected following the sampling interval, which defines the interval between a selected individual and the next individual to be included in the study. To define the sample size, an observational study was carried out at the institution to account for the number of users who met the necessary requirements for carrying out the research.

Therefore, the population size (N) equal to 17,620 old people, a proportion (p) of 50% for frailty in a specialty outpatient clinic, a 95% confidence interval expressed by $Z^2_{\alpha/2}$=1.96, and a maximum tolerable sampling error of estimation ε=0.05 were considered. Thus, the measured sample had a total of 376 individuals.

The interviews were carried out by three researchers previously trained in the place where the old person waited for treatment after explaining the research objectives, benefits, and harms, reading and signing two copies of the Informed Consent Form (ICF).

Data was collected using a specific questionnaire for this study. The instruments used were the MMSE[17], Katz Scale[18], Lawton and Brody Scale[19].

The cognitive screening was evaluated by the MMSE, which is widely used and validated in Brazil. This questionnaire comprises questions grouped into categories and represented by groups of specific cognitive functions, such as temporal and spatial orientation, immediate memory, attention and calculation, evocation memory, language, and visual constructive capacity. A total score is derived from the sum of the scores of the categories[17].

The Katz Scale assesses six basic activities related to self-care: bathing, dressing, going to toilet, transferring, feeding, and continence. The final score gives the individual's degree of dependence. Old people who were independent in the six activities were classified as independent, old people who were dependent on one to five activities were classified as partially dependent, and those who were dependent on the six items evaluated were considered as totally dependent[18].

The Lawton and Brody Scale comprises more complex items in daily living, and independence in carrying them out is directly related to the ability of living an independent community life. Based on this scale, the old people were classified as independent when they scored above 27 points, those with a maximum score of 26 points were classified as dependent[19].

To assess the presence of the frailty syndrome, tests and questions were carried out to identify the five items described as components of the frailty phenotype proposed by Fried et al.,[3] being them unintentional weight loss, decreased muscle strength, self-reported fatigue and/or exhaustion, slow gait speed, and low level of physical activity.

It was considered unintentional weight loss when the old person declared weight loss greater than or equal to 4.5kg in the last 12 months. The decrease in muscle strength was verified by the hand grip strength obtained with the test of the hydraulic dynamometer *Saehan*, model 5001, where the old person grasped it three times. The highest value was considered, adjusted according to the gender and body mass index, and old people presenting a score below the expected value above fulfilled the criterion for frailty syndrome.

Fatigue and/or exhaustion was measured using two questions from the Brazilian version of the depression scale of the *Center for Epidemiological Studies - Depression CES-D17*. "Feeling the need to make an effort to carry out usual tasks" and "Unable to finish tasks". The score was given as (0) never/rarely, (1) sometimes, (2) often, (3) always. Old people who chose numbers 2 or 3 in any of the questions met the criterion for frailty[20].

The slowness in gait speed was calculated by the time spent to walk 4.6 meters, with three measurements being taken and considering the average value adjusted according to gender and height[21].

The low level of physical activity was assessed by the reduced version of the instrument Minnesota Leisure Time Activity Questionnaire, which was translated and adapted for Brazill[22]. The instrument estimates the weekly caloric expenditure from the report of the old person regarding physical activities performed in the last two weeks prior to the assessment. The cut-off value was adjusted by gender, with women scoring for frailty with expenditure <270 kcal, and men with expenditure <383 kcal[3].

Those old people who scored positive on three, four or five items were considered frail, those who scored positive on one or two items were pre-frail, and those who did not score on any item were not frail[3].

The data obtained was tabulated, grouped, and analyzed by descriptive statistics, and the frequency of each of the items of the frailty phenotype in the study sample was calculated based on that. A bivariate analysis was carried out to assess the association between independent variables and frailty using the Pearson's Chi-Square Test and the Fisher's Exact Test.

The variables that were associated with the dependent variable in the bivariate analysis presenting *p*-value ≤0.20 were considered significant, thus included in the ordinal logistic regression model as independent variables. Some of these variables were grouped for a better analysis of the model.

The Proportional Odds Model (POM) was used for the multivariate analysis since the frailty response variable comes from continuous variables that were subsequently grouped.

The study complied with the ethical and legal precepts guiding research involving human beings set out in Resolution No. 466/2012 of the National Health Council, and No. 510/2016 of the National Health Council of the Ministry of Health, being approved by the Research Ethics Committee of Universidade Federal de Minas Gerais under Opinion No. 2,689,601 and by the Ethics Committee of Santa Casa de Belo Horizonte under Opinion No. 2.833.608.

RESULTS

The sample comprised 376 old people, with 62.0% being females. The mean age was 69.88 years (standard deviation ±7.38), with a predominance of old women aged 60 to 64 years, accounting for 29.2%. Regarding education, 48.2% had between one and four years of study, and 18.6% were illiterate.

The most frequent morbidity groups were cardiovascular with 32.0%, and metabolic/hormonal with 14.4% of old women. Regarding the number of morbidities, 71.5% had one to four morbidities.

Regarding the use of medication, 45.2% of old women made use of polypharmacy**,** with medication

acting on the cardiovascular system were 46.6%, on the digestive system and metabolism were 17.3%, and on the nervous system were 12.5%, the most frequent ones.

Regarding hospitalization in the last 12 months, the prevalence was 33.2%, ranging from one to ten hospitalizations. The average number of falls was 2.4, with 23.7% of the old women having at least one fall in the last 12 months. Of the old women interviewed, 11.2% used some kind of walking aid, with the cane being the most prevalent one.

Regarding the practice of physical activity, only 33.5% of the old people performed some kind of physical activity, with 21.3% having a frequency of two to six times a week.

Regarding the functional capacity of the participants, 96.6% were independent for the basic activities of daily living. It was found that among the six variables evaluated, continence was the one with the highest percentage of partially or totally dependent old people, with 38.0% of old people, and the feeding variable was the one with the highest percentage of independent old people, with 100.0% of the sample.

Regarding instrumental activities of daily living, it was observed that 68.6% of old people presented partial dependence. The variable in which the participants had the highest percentage of dependence (partial or total) was travel, with 48.4% of old people, while the variable with the highest percentage of independence was the use of the telephone, with 90.1%.

The prevalence of frailty according to the frailty phenotype was 25.3%, among pre-frail old people it was 59.0%, and among the non-frail people it was 15.7%.

Regarding the prevalence of each component of the frailty phenotype, it was observed that the low level of physical activity was the variable in which more old people scored for frailty, accounting for 59.0% of them, followed by low muscle strength with 50.5%, self-reported fatigue and/or exhaustion with 30.3%, slow gait speed with 20.2%, and unintentional weight loss in the last 12 months was the least prevalent variable among the five with 18.6%.

There was an association between sociodemographic, economic, clinical-behavioral variables and frailty, as shown in the Table below (Table 1).

The variables that were shown to be associated with frailty in the multivariate analysis, being possible predictors of it, were gender, education, hospitalization and falls in the last 12 months, use of a walking aid device, and physical activity (Table 2).

The chance of an old woman belonging to a group of greater frailty is approximately 1.9 times greater compared to old men.

The old person who does not have education is 2.9 times more likely to belong to a class of greater frailty, and old people with one to four years of education have 2.0 times more chance compared to those old people who have more than five years of education.

The chance of an old person who does not practice physical activity to belong to a group of greater frailty is approximately 7.1 times greater than that of old people who practice physical activity.

Table 1. Distribution of old people according to the frailty phenotype and the sociodemographic, economic, clinical, and behavioral factors and functional capacity analyzed (n=376). Belo Horizonte, MG, 2018.

Variables	Frailty Phenotype			*p-value*
	Frail (n = 95)	Pre-Frail (N=222)	Not Frail (n = 59)	
	n (%)	n (%)	n (%)	
Gender				
Female	69 (72.6)	133 (59.9)	31 (52.5)	0.027*
Male	26 (27.4)	89 (40.1)	28 (47.5)	
Age group (years)				
60-69	51 (53.7)	112 (50.4)	41 (69.5)	0.000*
70-79	23 (24.2)	87 (39.2)	17 (28.8)	
80 and over	21 (22.1)	23 (10.4)	1 (1.7)	
Place of Birth				
Countryside of Minas Gerais	64 (67.4)	157 (70.7)	45 (76.3)	0.273**
Belo Horizonte and the metropolitan region	17 (17.9)	48 (21.6)	9 (15.2)	
Others	14 (14.7)	17 (7.7)	5 (8.5)	
City of residence				
Belo Horizonte and the metropolitan region	76 (80.0)	182 (82.0)	49 (83.0)	0.875**
Countryside of Minas Gerais	19 (20.0)	40 (18.0)	10 (17.0)	
Race/color				
Brown	62 (65.3)	121 (54.5)	32 (53.4)	
White	17 (17.9)	69 (31.1)	19 (32.8)	0.016*
Black	16 (16.8)	32 (14.4)	8 (13.8)	
Marital status				
Married/common-law marriage	32 (33.7)	100 (45.1)	35 (59.3)	
Widow/er	36 (37.9)	72 (32.4)	9 (15.2)	0.013*
Divorced / Single	27 (28.4)	50 (22.5)	15 (25.5)	
Home arrangement				
Lives with family	83 (87.4)	179 (80.6)	52 (88.1)	0.194*
Lives alone	12 (12.6)	43 (19.4)	7 (11.9)	
Religion				
Catholic	63 (66.0)	138 (62.2)	43 (72.9)	0.291**
Evangelic	27 (28.7)	64 (28.8)	15 (25.4)	
Others	5 (5.3)	20 (9.0)	7 (1.7)	
Education (years)				
Zero	27 (28.4)	34 (15.3)	9 (15.3)	
1-4	51 (53.7)	106 (47.8)	24 (40.7)	0.001*
≥ 5	17 (17.9)	82 (36.9)	26 (44.0)	
Retirement				
Yes	64 (67.4)	168 (75.7)	45 (76.3)	0.271*
No	31 (32.6)	54 (24.3)	14 (23.7)	
Pensioner				
Yes	25 (26.3)	44 (19.8)	7 (11.9)	0.422*
No	70 (73.7)	178 (80.2)	52 (88.1)	

to be continued

Continuation of Table 1

Variables	Frailty Phenotype			*p-value*
	Frail (n = 95)	Pre-Frail (N=222)	Not Frail (n = 59)	
	n (%)	n (%)	n (%)	
Currently working				
Yes	9 (9.5)	42 (18.9)	11 (18.6)	0.103*
No	86 (90.5)	180 (81.1)	48 (81.4)	
Individual income (minimum wage)				
< 1	11 (11.6)	26 (11.7)	7 (11.9)	
1-3	82 (86.3)	192 (86.5)	49 (83.0)	0.681**
≥ 4	2 (2.1)	4 (1.8)	3 (5.1)	
Morbidity				
Yes	95 (100.0)	219 (98.7)	59 (100.0)	0.735**
No	0 (0.0)	3 (1.3)	0 (0.0)	
Number of morbidities				
Zero	0 (0.0)	3 (1.4)	0 (0.0)	
1-4	56 (59.0)	161 (72.5)	52 (88.1)	0.001**
≥ 5	39 (41.0)	58 (26.1)	7 (11.9)	
Use of medication				
Yes	90 (94.7)	198 (89.2)	56 (94.9)	0.159*
No	5 (5.3)	24 (10.8)	3 (5.1)	
Number of medications				
Zero	5 (5.3)	24 (10.8)	3 (5.1)	
1-4	36 (37.9)	105 (47.3)	33 (55.9)	0.041*
≥ 5	54 (56.8)	93 (41.9)	23 (39.0)	
Body mass index (Kg/m^2)				
< 22	17 (17.9)	32 (14.4)	6 (10.2)	
≥ 22 e ≤ 27	28 (29.5)	96 (43.2)	28 (47.4)	0.128*
> 27	50 (52.6)	94 (42.4)	25 (42.4)	
Hospitalization (last 12 months)				
Yes	49 (51.6)	64 (28.8)	12 (20.3)	<0.000*
No	46 (48.4)	158 (71.2)	47 (79.7)	
Number of hospitalizations (last 12 months)				
Zero	46 (48.4)	158 (71.2)	47 (79.7)	
1-5	48 (50.5)	63 (28.4)	12 (20.3)	<0.000**
6-10	1 (1.1)	1 (0.4)	0 (0.0)	
Falls (last 12 months)				
Yes	31 (32.6)	51 (23.0)	7 (11.9)	0.021*
No	64 (67.4)	171 (77.0)	52 (88.1)	
Number of falls (last 12 months)				
Zero	64 (67.4)	171 (77.0)	52 (88.1)	
1-4	29 (30.5)	47 (21.2)	7 (11.9)	0.048**
≥ 5	2 (2.1)	4 (1.8)	0 (0.0)	

to be continued

Continuation of Table 1

Variables	Frailty Phenotype			*p-value*
	Frail (n = 95)	Pre-Frail (N=222)	Not Frail (n = 59)	
	n (%)	n (%)	n (%)	
Uses walking aid device				
Yes	32 (33.7)	10 (4.5)	0 (0.0)	<0.000**
No	63 (66.3)	212 (95.5)	59 (100.0)	
Walking aid device				
Does not use	63 (66.3)	212 (95.4)	59 (100.0)	
Cane	11 (11.6)	5 (2.3)	0 (0.0)	<0.000**
Others	21 (22.1)	5 (2.3)	0 (0.0)	
Alcohol consumption				
Never drank	43 (45.2)	94 (42.4)	21 (35.6)	
Had already drank	41 (43.2)	76 (34.2)	22 (37.3)	0.093*
Currently drinks	11 (11.6)	52 (23.4)	16 (27.1)	
Frequency of alcohol consumption				
No	43 (45.2)	94 (42.3)	21 (35.6)	
Rarely	29 (30.5)	53 (23.9)	17 (28.8)	0.358*
1-7 x/week	23 (24.2)	75 (33.8)	21 (35.6)	
Volume of alcohol consumption (glasses)				
Zero	43 (45.3)	94 (42.3)	21 (35.6)	
1-3	36 (37.9)	73 (32.9)	24 (40.7)	0.442*
≥ 4	16 (16.8)	55 (24.8)	14 (23.7)	
Smoking				
No	53 (55.8)	110 (49.6)	24 (40.7)	
Ex-smoker	32 (33.7)	89 (40.1)	32 (54.2)	0.137*
Current smoker	10 (10.5)	23 (10.3)	3 (5.1)	
Cigarette consumption/day				
Zero	53 (55.8)	110 (49.6)	24 (40.7)	
< 10	15 (15.8)	43 (19.3)	14 (23.7)	0.353*
≥ 10	27 (28.4)	69 (31.1)	21 (35.6)	
Years of tobacco consumption				
Zero	53 (55.8)	110 (49.6)	24 (40.7)	
1-10	7 (7.4)	22 (9.9)	8 (13.6)	0.432**
> 10	35 (36.8)	90 (40.5)	27 (45.7)	
Physical activity				
Yes	9 (9.5)	72 (32.4)	45 (76.3)	0.000*
No	86 (90.5)	150 (67.6)	14 (23.7)	
Frequency of physical activity (x/week)				
Zero	86 (90.5)	150 (67.6)	14 (23.7)	
1	5 (5.3)	8 (3.6)	2 (3.4)	<0.000**
2-7	4 (4.2)	64 (28.8)	43 (72.9)	

to be continued

Continuation of Table 1

Variables	Frailty Phenotype			
	Frail (n = 95)	Pre-Frail (N=222)	Not Frail (n = 59)	*p-value*
	n (%)	n (%)	n (%)	
Katz Scale Classification				
Independence	83 (87.4)	221 (99.5)	59 (100.0)	
Partial dependence	10 (10.5)	1 (0.5)	0 (0.0)	0.000**
Important dependence	2 (2.1)	0 (0.0)	0 (0.0)	
Lawton and Brody Scale Classification				
Independence	13 (13.7)	80 (36.0)	24 (40.7)	
Partial dependence	81 (85.2)	142 (64.0)	35 (59.3)	0.000**
Total dependence	1 (1.1)	0 (0.0)	0 (0.0)	

Source: Data from a Medical Specialties Center in Belo Horizonte developed for research purposes; the Minimum Wage in 2018 was R$954.00; Significant tests at 0.05; *Chi-square test; **Fisher's exact test.

Table 2. Ordinal logistic regression model of proportional chances, with frailty as the answer (n=376). Belo Horizonte, MG, 2018.

Covariate	B	OR	Wald test *(p-value)*	Score Test *(p-value)*
Gender				
Male		1.00		
Female	-0.62	0.54	7.02 (0.008)	
Education (in years)				
Zero	-1.05	0.35	10.48 (0.001)	
1 to 4	-0.72	0.49	8.17 (0.004)	
≥ 5		1.00		
Hospitalization in the last 12 months				
Yes		1.00		
No	0.77	2.16	9.92 (0.002)	9.81 (0.200)
Fall in recent months				
Yes		1.00		
No	0.54	1.72	4.17 (0.041)	
Walking Aid Device				
Yes		1.00		
No	2.33	10.28	30.69 (0.000)	
Physical activity				
Yes		1.00		
No	-2.00	0.14	51.88 (0.000)	

Source: Data from a Medical Specialties Center in Belo Horizonte developed for research purposes; OR: Odds Ratio; *Deviance* Test (*p*-value=0.547).

DISCUSSION

National studies carried out in geriatric and gerontology outpatient clinics showed similar results to those found in the present research (25.3% of frail old people) as in Belém (PA), where the prevalence was 23.0%[12], Juiz de Fora (MG) with 20.0%[13], Porto Alegre (RS) with 31.0%[16]. In a study carried out in an outpatient clinic in Campinas (SP), the prevalence of frailty was higher, with 56.0%[15].

Among the three classifications proposed by Fried et al.[3], the highest prevalence observed in the present study was of pre-frail old people with 59.0% of the total respondents, as well as most studies carried out in outpatient clinics.

A longitudinal study using the database of the Health, Well-Being and Aging (SABE) Study followed 1,399 old people who comprised the sample after four years with the aim of evaluating the progression of the frailty syndrome. It showed that almost 51.0% of the old people who were frail at the study onset progressed to the condition of pre-frailty. Among pre-frail old people at the study onset, most remained in this condition, but about 28.0% became non-frail, not scoring in any other component of the syndrome[8].

The frailty syndrome is preventable and reversible[23]. Therefore, it is important that health care teams assess the physical and functional conditions of the old people identifying the condition of pre-frailty or even the syndrome already installed. In view of the result of these assessments, they shall plan health actions aimed at this population group to maintain autonomy and independence[24].

Secondary health care plays an essential role in resolving and comprehensively providing care, expanding access to specialized appointments and procedures, articulating the points of the Health Care Network[25].

Public health care services need to adapt to the aging population, considering the specific characteristics and needs of the old person[26], and have a new perspective no longer on the disease but on the functionality and identification of the risks of frailty.

Several studies carried out in different contexts and countries bring the association of frailty with gender, with the syndrome being more prevalent in women[3,5]. Regarding the physiological aspect, women are more prone to the development of sarcopenia, which is an intrinsic risk to the development of frailty, and to presenting less muscle strength compared to men[3].

The present study showed a significant association between frailty and education, with most frail old people having no or low education (one to four years). Other authors emphasize the significant influence of education on the frailty syndrome[3,27].

According to the Brazilian Institute of Geography and Statistics, old people are the segment of population with the lowest level of education and the highest rate of illiteracy. The different educational levels are related to different health habits and opportunities for social mobility, among others[28]. Health professionals need to identify the educational level of the old person and adapt the measures of guidance and education for self-care according to the level of understanding of this population[29].

The present study and others were also associated frailty with hospitalization in the last 12 months [30]. Hospitalization predisposes old people to exposure to other diseases and adverse events that can further weaken their health. Therefore, it is of utmost importance to carry out strategies to prevent the frailty syndrome or to reverse it, which could decrease the likelihood of the old person being hospitalized and the other negative consequences that hospitalization can cause.

According to the reference used[3], frailty is associated with falls of the old person. A systematic review covered 19 studies with a population of 40 to 6,724 old people, aimed to analyze the prevalence of falls and the frailty syndrome, and the association between them. The prevalence of falls of the frail old person varied between 6.7% and 44.0%, and there was evidence that falling is associated with frailty, with an association of 1.8 (95% CI, 1.51-2.13)[31].

In addition to the physical consequences and increased likelihood of hospitalizations, falling of old people brings repercussions on their functionality and autonomy. It is important that health care

professionals, especially those working in primary and secondary care, discuss measures to prevent falls with the old people and their families to avoid it and its consequences.

Another factor associated with frailty addressed in some studies is the use of a walking aid device. A longitudinal study carried out with 5,450 old people in which frailty was identified according to the criteria of Fried et. al.[3] found that 93.0% of frail individuals had mobility difficulties versus 58.0% of non-frail individuals. Among those with mobility difficulties, 71.0% of frail old people and 31.0% of non-frail old people said they have had some help. Of those with difficulties, 63.0% of frail and 20.0% of non-frail individuals used a cane; the use of other aid devices was uncommon[32].

The difficulty to walk and the need for a walking aid device are factors directly related to the physical dimension of frailty, such as sarcopenia, and it is possible that frail old people report difficulties to walk and the need for a walking aid device for locomotion[33].

In the present study, the relation between frailty and lower frequency of physical activity was observed. According to a study, the sedentary behavior was a significant predictor of frailty development, with the risk of progressing to physical frailty increasing by 36.0% for each additional hour in sedentary habit[34].

It is observed that at the level ~~of~~ the primary health care, there is a greater incentive for actions aimed at preventing and promoting health such as practicing physical activities, compared to secondary health care. In addition, patients who are treated at this level of care have a more complex health profile with greater limitations, a fact that can contribute to a less incentive to practice physical activity by professionals.

Knowing the factors associated with frailty in old people allows actions to be taken to prevent or minimize the negative effects of the syndrome, although there are some factors that cannot be modified[30]. The study showed some weaknesses regarding the care of old person in the scope of secondary health care, which has a significant volume of treatment at SUS in the entire state of Minas Gerais, especially regarding the specific competences for the care of the old person. The results presented showed a prevalence of frailty and significant pre-frailty, and some factors associated with frailty that can be modified if they are approached by trained professionals, which was little known in this type of service.

Investments, planning, and implementation of a model of care for the fragile person and the identification of fragility in secondary health care services are necessary. Users of services at this level of health care already have some comorbidity, and therefore it is important that they are monitored to minimize the condition of fragility and the various negative impacts on the old person, their family members, and the health system.

The fact of results referring only to the context in which they were carried out are a possible limitation to the study. We strongly emphasize the approach of a population treated at a service comprising the secondary health care with an expressive volume of care.

CONCLUSION

Among the sociodemographic, economic, clinical, and behavioral characteristics analyzed, it was found that the variables female gender, low education, hospitalization and falls in the last 12 months, use of a walking aid device, and absence of physical activity were associated with fragility.

The identification of factors associated with frailty is important to support the planning of health actions at all levels of care, seeking to guarantee the integrality and continuity of care, intervening in the modifiable factors that are related to frailty to prevent its installation, the occurrence of negative events resulting from this syndrome or even reverse its stage.

Secondary health care is responsible for early diagnosis, control of modifiable factors related to frailty, and monitoring of negative events resulting from this syndrome.

This study demonstrated a high prevalence of frail and pre-frail old people, accounting for

84.3%. Considering some factors associated with frailty that can be modified, in addition to the consequences that the frailty syndrome can bring to the old person, their family, and the health system, it is necessary that these aspects are addressed in secondary health care, which plays an essential role in the care of the individual.

The results presented demonstrate the importance of managers of the secondary health care services implementing a methodology to identify frailties in old people, as well as a health care models for the fragile old person to follow and monitor their clinical conditions.

Thus, the relevance of the development of assistance models at this level of care is emphasized, with the insertion of multidimensional assessment instruments for the old people, which can be incorporated to the early detection of old people in conditions of pre-frailty and fragility. We believe that the results of the present study may raise new questions about care for the old person in the context of secondary health care, with the perspective of expanding gerontic-geriatric care, as well as the development of longitudinal studies to assess significant outcomes related to frailty.

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Nutritional status of old people with Parkinson's disease and its associated factors: an integrative review

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Abstract

Objective: Identify the factors associated with the Nutritional Status of old people with Parkinson's disease (PD) through an integrative literature review. *Method:* The databases LILACS, MEDLINE, BDENF, Scielo and Pubmed were used with no filters for year of publication nor study design. We included the studies with old population (age ≥60 years) in Portuguese, English or Spanish. Studies not addressing the subject, publications not available in full, and those that did not answer the guiding question were excluded. In addition to the associated factors, information regarding the objectives, study design, investigated sample, instruments for nutritional assessment, and main results were extracted. The methodological quality of the studies was assessed by the instruments *Critical Appraisal Skill Program* and *Agency for Health care and Research and Quality*. To summarize the associated factors, the percentage of studies whose intergroup analysis, association or correlation was significant for the expected outcome was considered. *Results*: The final analysis resulted in 8 papers. The factors associated with the Nutritional Status among the PD-related clinical variables were duration and severity of the disease, motor symptoms, and cognitive function. Regarding the clinical-nutritional variables, they were associated with body fat, biochemical parameters, physical, domestic and mobility activities, energy intake, and eating habits. *Conclusion*: Weight loss in PD is a complex and multifactorial consequence, and the early diagnose of nutritional changes in these patients is essential. Further studies in this population are necessary in order to better understand this process of weight loss in old patients with PD.

Keywords: Health of the Elderly. Nutritional Status. Nutritional Assessment. Parkinson's Disease.

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INTRODUCTION

Neurodegenerative diseases such as Parkinson's disease (PD) - the second most common one among people aged 60 and over - become frequent with the aging process, and the number of cases tend to double by 2050[1].

PD has an incidence of 0.5% to 1% for people aged 65 to 69 years, and 1 to 3% for those aged 80 and over[2-4]. It is caused by the reduction of the neurotransmitter dopamine, of slow progression, in the central nervous system (CNS), characterized by four basic components: bradykinesia, rest tremor, stiffness, and postural instability resulting from the impairment of the nigrostriatal pathway[5,6]. Motor symptoms can progressively lead to severe disability, and together with non-motor complications can contribute considerably to alterations in the nutritional status during the course of the disease[7-9].

About 3% to 60% of PD patients are at risk of malnutrition[10]. Weight loss in these patients is related to increased energy expenditure due to high muscle activity characterized by tremors, stiffness, and dyskinesias induced by levodopa, in addition to low food intake due to the presence of anorexia, depression, cognitive impairment, and gastrointestinal symptoms (dysphagia, nausea, reflux, constipation, and delayed gastric emptying), resulting in increased satiety and reduced nutrient absorption. The person also becomes more dependent on others due to the impairment for the activities of daily living,[11-13] which may lead to the progression of malnutrition[10].

Malnutrition in PD patients impairs the quality of life, as well as increases the rate of morbidity and mortality[14]. The factors associated with the nutritional status are well defined in the old population[15]. However, in the old population with PD there is a lack of evidence on the impact of malnutrition, and a reduced number of studies. Therefore, due to the importance of malnutrition in old people with PD, the growth of the old population, and the impact on the Nutritional Status, the present study aims to identify the factors associated with the Nutritional Status of old people with PD through an integrative literature review.

METHOD

This is an Integrative Literature Review. In order to do so, six steps were followed: 1 - identification of the subject and development of the guiding question for the research; 2 - establishment of criteria for inclusion and exclusion of studies; 3 - definition of the information to be extracted from the selected studies and their further categorization; 4 - evaluation of studies included in the review; 5 - interpretation of the results; 6 - presentation of the review and synthesis of knowledge[16]. For the first step, the following guiding question was created: What is the published scientific evidence on factors associated with the Nutritional Status in old people with PD?

Then, we established the eligibility criteria for the search and selection of articles between November 2019 and January 2020 on the Virtual Health Library (VHL) portal. In this portal we could search the relevant publications simultaneously in the three main scientific databases in the national and international fields: LILACS (Latin American and Caribbean Literature in Health Sciences), MEDLINE (International Literature in Health Sciences) and BDENF (Nursing Database). We also searched in Scielo (electronic library *Scientific Electronic Library Online*) and PubMed (*National Library of Medicine and National Institutes of Health).*

The articles included should address factors associated with Nutritional Status in old people with PD. No filters were used for the year of publication and study design. We included the studies with old population (age criterion ≥60 years) in Portuguese, English or Spanish. References to the papers selected were considered for inclusion ("reverse search" strategy). Two independent reviewers extracted data and checked the agreement of the selection of the studies, and validated the final list made by a third reviewer.

Studies with the presence of other parkinsonian syndromes, other neurological diseases, absence of definition of age of the subjects in the study, publications not available electronically free of charge, studies of the types dissertation, thesis, book/book chapter, editorial, newspaper article, integrative or systematic literature review, letter to

the editor, reflective study, experience report, and congress summary were excluded. The papers were searched using the keywords indexed to the Health Sciences Descriptors (DeCS) - "diet", "diet regime", "nutritional status", "nutrition status", "nutritional assessment", and "Parkinson's disease" - and to the*Medical Subject Headings* (MESH) - "factors", "nutritional assessment", "nutritional status", "nutritional", "diet", "Food Regime", "Parkinson", "Parkinson disease", "parkinsonism". The Boolean operator of choice was *"AND"* and *"OR"*.

For the methodological critical analysis of the papers included, two instruments were used to allow the evaluation of different study designs: 1- *Critical Appraisal Skill Programme* (CASP)[17] (adapted), and 2- *Agency for Health care and Research and Quality* (AHRQ)[18].

The original CASP[19] considered eight specific tools for the evaluation of different delineations of study such as reviews, cohorts, clinical trials, and cross-sectional studies, among others. In the present review, an instrument adapted from CASP was used, which included 10 items to be scored, including: 1) objective; 2) adequacy of the method; 3) presentation of theoretical and methodological procedures; 4) sample selection criteria; 5) details of the sample; 6) relationship between researchers and subjects (randomization/blinding); 7) respect for ethical aspects; 8) rigor in data analysis; 9) property to discuss the results, and 10) contributions and limitations of the research. In the end, the studies were classified as level A (score between 6 and 10 points), being considered of good methodological quality and reduced bias, or level B (up to 5 points), meaning satisfactory methodological quality, but with considerable risk of bias[17].

The AHRQ divides the studies into six levels according to the level of evidence: (1) systematic review or meta-analysis; (2) randomized clinical trials; (3) clinical trials without randomization; (4) cohort and case-control studies; (5) systematic review of descriptive and qualitative studies, and (6) single descriptive or qualitative study[18].

To summarize the associated factors, the percentage of studies whose intergroup analysis, association or correlation was significant for the expected outcome was considered. The percentages presented refer to the number of studies whose results were significant divided by the total number of studies[20]. When the number of significant studies is greater than the total number of studies, which indicates an association factor with nutritional status, it receives a positive code "+". In the case of a tie or analysis of only one significant study, there is no consensus on the association between the factor and the nutritional status. These studies received a "?" code. And the cases with no study with a significant result or a minority of studies with a significant result, the factor receives a negative code "-"[20,21].

RESULTS

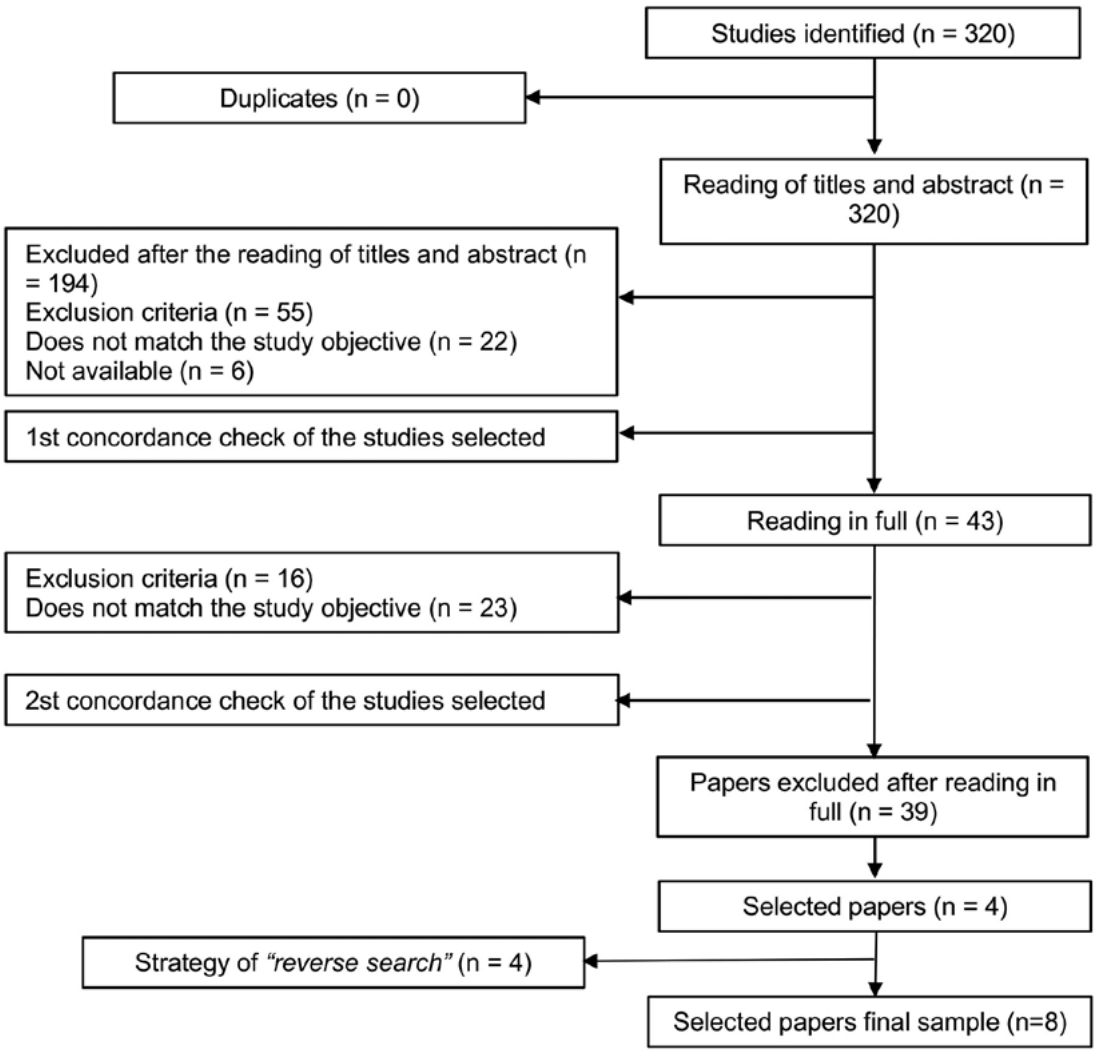
Five databases were analyzed using a combination of keywords related to the topic. The search results are summarized in Table 1.

We found 320 papers. However, 316 were not eligible, resulting in eight papers for final analysis, with four papers selected through reverse search (Figure 1). Regarding the exclusion criteria for the Medline database, six papers were excluded after the reading of the title and abstract (75%) because they were not related to the subject, and two because they were not studies with the old people (25%). During the first check for the agreement of the studies selected in Pubmed, 53 papers met the exclusion criterion, of which 188 were excluded after the reading of the title and abstract (62.17%) because they were not related to the subject, with three systematic reviews (5.66%), 13 integrative reviews (24.52%), 19 (35.84%) which were not studies with old people, and 18 (33.96%) were studies in animal models. In the second concordance check, 16 studies were not carried out with old people.

Table 1. Databases analyzed and number of papers comprising the study sample. Recife, PE, 2020.

Database	Combination of keywords	Papers found	Papers meeting the inclusion criteria	Papers meeting the exclusion criteria	Sample
LILACS	("diet" or "diet regime") and ("nutritional status" or "nutrition status") and ("nutritional assessment") and ("Parkinson's disease")	0	0	0	0
MEDLINE		8	0	8	0
BDENF		0	0	0	0
SCIELO		0	0	0	0
PUBMED	("factors") AND ("nutrition assessment" or "nutritional status" or "nutritional" or "diet" or "Food Regime") AND ("parkinson" OR "parkinson disease" OR "parkinsonism")	312	4	308	4
TOTAL	-	320	4	316	4

Source: Prepared by the authors.



Source: Prepared by the authors.

Figure 1. Flowchart of the study selection process. Recife, PE, 2020.

All papers in the final sample were published in English and in foreign journals. As for the years of publication, half of the papers were published between 2004 and 2008, and the other half between 2009 and 2017. The study sites comprised five European countries (87.5%), and 1 (12.5%) in the United States of America.

All studies were classified as level A in methodological quality using an instrument adapted from CASP[17]. An evaluation using the AHRQ[18]showed that four papers were Case-Control studies - level four of evidence[22-25], one was a prospective cohort - level four of evidence,[26] and three were cross-sectional observational studies - level six of evidence[27-29]. None of the studies employed a qualitative approach. The main information from the papers included in the present review is shown in Table 2.

The factors associated with the Nutritional Status of old people with PD extracted from the studies in the present review are shown in Table 3.

Table 2. Compiled description of each study included in the integrative review. Recife, PE, 2020.

Author, place and year	Study design, objective, and instruments used to determine the Nutritional Status	Sample	Main results related to the Nutritional Status of old people with PD
Lorefält et al.[22], Sweden, 2004	Case-control study. Objective: to find the factors underlying weight loss in patients with PD using the following instruments: DXA, indirect calorimetry, and respiratory quotient.	n = 28 patients with PD (18 women / 10 men) 28 healthy controls matched by gender and age (± 5 years) n = 26 PD patients treated with l-dopa for a minimum of 2 years. Evaluated twice / one year interval.	During the 1-year interval, there was a reduction in both body weight (from 0.5-8.0 kg/year), and in BMI 24.2 ± 2.8 to 23.2 ± 3.5, and in fat mass. But 10% of patients who lost weight had a BMI <22kg/m^2.
Lorefält et al.[23], Sweden, 2005	Case-control study. Objective: to investigate eating habits and nutrient intake in old patients with or without PD, in addition to checking if there was weight loss, using the following instruments: Food Record for three consecutive days and Calculation of energy and nutrient intake.	n = 26 patients with PD (17 women / 9 men) 26 healthy controls matched by gender and age (± 5 years) Evaluated twice / one year interval.	There was no significant difference between the number of food events per day by the groups in relation to weight loss In the 1-year interval, the number of complete meals prepared decreased to all patients, as well as the activities of daily living in need of help with food Regarding energy requirement in the group with weight loss which had increased needs, the consumption of calories was insufficient. But in the group without weight loss, the caloric requirement reduced The weight loss group had a higher consumption of fat and protein.

to be continued

Continuation of Chart 2

Author, place and year	Study design, objective, and instruments used to determine the Nutritional Status	Sample	Main results related to the Nutritional Status of old people with PD
Lorefält et al.[24], Sweden, 2009	Case-control study. Objective: to evaluate leptin levels in PD patients and its possible role in weight loss using the following instruments: DXA and Assessment of body fat mass.	n = 26 patients with PD (17 women / 9 men) 26 healthy controls matched by gender and age (± 5 years)	Serum leptin correlated with body weight, both in the first year and in the second year in all female PD patients; however, it did not occur in male patients. In women with PD with and without weight loss, serum leptin levels decreased significantly between one and two years. Serum leptin levels were correlated with body mass in all female and male participants. The body fat mass in PD patients decreased by 1.4 kg between the 1st and 2nd years. Both in the 1st year and in the 2nd year, body fat mass was lower in patients with weight loss Leptin levels were low in both PD patients and controls.
Cheshire and Wszolek[25], USA, 2005	Case-control Study. Objective: to compare the weight loss of PD patients with controls and patients with ET or without neurological disease, and observe whether this difference preceded the symptomatic onset of PD using BMI.	n = 100 patients with PD; n = 24 patients o f a subgroup of PD with pre-morbid data (pre-PD); n = 50 patients with ET; n = 50 cases of CS.	BMI was on average 9% lower in PD than in the comparison groups with ET or control with CS. A similar reduction in BMI occurred prior to diagnosis in 24 cases of PD.
Barichella et al.[26], Italia, 2008	3-year cohort study. Objective: to monitor the Nutritional Status of PD patients using MNA.	n = 61 patients with PD (37 men / 24 women) There were 2 losses after 3 years	Body weight and BMI decreased significantly between 2004 and 2007. There was an increase from 22.9% (8 patients) in 2004 to 34.3% (12 patients) in 2007 with Nutritional Risk (score ≤23), according to MNA.
Jaafar et al.[27], England, 2010	Cross-sectional study. Objective: to evaluate the prevalence of malnutrition in people in the community with PD and the associated factors using the following instruments: BMI, MUST, MUAC, TSF and HGS.	N = 161, n = 123 patients with PD, 82 with nutritional data collected (34 men / 48 women).	15% of patients had malnutrition (BMI <20 Kg/m^2) 23.5% of patients had a medium or high risk of malnutrition, according to MUST. In women, low weight (BMI <20 kg/m^2) was associated with greater unintentional weight loss, lower values of MUAC, TSF and HGS. Said associations were not found in men.
Van Steijn et al.[28], Netherlands, 2013	Cross-sectional study. Objective: to assess the prevalence of (risk of) malnutrition in Dutch PD patients, as well as their risk factors using the following instruments: MNA, BMI, CNAQ and Oral Nutritional Supplement.	N = 140 patients with PD, n = 102 (54 men / 49 women) Divided into 2 groups: Normal (79) and at risk of malnutrition (23).	MNA 2% of patients had malnutrition (score <17); 20.5% of patients had risk of malnutrition (17 ≤ score ≤23.5). BMI 2% of the patients had malnutrition (BMI <20 kg/m^2). The risk group had less appetite (CNAQ), used more oral nutritional supplements, and was more dependent on care compared to the normal group (KATZ).

to be continued

Continuation of Chart 2

Author, place and year	Study design, objective, and instruments used to determine the Nutritional Status	Sample	Main results related to the Nutritional Status of old people with PD
Tomic et al.[29], Croatia, 2017	Cross-sectional study. Objective: to determine the prevalence of malnutrition and factors influencing patients with PD using MNA.	n = 107 patients with PD; n = 96 patients with PD (57 men / 39 women) Age in three groups (40-60 years, 60-80 years, and >80 years); n = 74 (60 - 80 years); n = 10 (>80 years).	MNA 60 - 80 years old: 83.3% with Risk of Malnutrition; 75% with Malnutrition >80 years old: 3.7% with Risk of Malnutrition; 0 Malnutrition.

PD: Parkison's disease; DXA: Dual X-ray absorptiometry; BMI: Body mass index; ET: essential tremor; CS: cervical spondylosis; MNA: Mini Nutritional Assessment; MUST: Malnutrition Universal Screening Tool, MUAC: Mid-upper arm circumference; TSF: Tricipital Skinfold; HGS: hand grip strength; CNAQ: Nutrition Board Questionnaire on Appetite; KATZ: Index of Independence in Activities of Daily Living. Source: Prepared by the authors.

Table 3. Compiled description of the factors associated with the Nutritional Status of old people with Parkinson's disease. Recife, PE, 2020.

Category	Associated factors	Papers related to the associated factors	% of studies reporting it factor association	Codes
Personal variables	Age	25, 26, 27 *p<0.01, 29 *p= 0.041	2/4 (50%)	?
	Gender	22 *p<0.0001, 24 *p<0.05, 26, 27	2/4 (50%)	?
PD-related clinical variables	Disease stage	27, 28, 29 *p= 0.017	1/3 (33,33%)	-
	Medication	22*p<0.01, 24*p=0.05, 28,29	2/4 (50%)	?
	Disease duration and severity	24*p<0,001, 25, 26 *p=0,0096, 27*p=0,006, 28, 29 *p=0,017	4/6 (66,66%)	+
	Motor symptoms	22*p<0.01, 23*p<0.01, 25, 27, 29 *p<0,001	3/5 (60%)	+
	Non-motor symptoms	23*p<0,01, 25, 27,29	1/4 (25%)	-
	Cognitive function	22*p<0.01, 23*p<0,05, 27, 29 *p=0,004	3/4 (75%)	+
Clinical-nutritional variables	Body fat	22*p<0,01, 23*p<0,01, 27*p<0,05	3/3 (100%)	+
	Biochemical parameters	24*p<0.001, 29*p= 0.018	2/2 (100%)	+
	Physical, domestic and mobility activities	22*p<0.01, 23*p<0,05, 28*p<0.001	3/3 (100%)	+
	Energy Intake	22*p<0,05, 23*p<0,05	2/2 (100%)	+
	Resting energy expenditure (REE)	22 *p<0.01	1/1 (100%)	?
	Respiratory quotient	22 *p<0.01	1/1 (100%)	?
	Eating Habits	23*p<0,05, 25, 26 *p=0.0009, 28*p=0.008, 29	3/5 (60%)	+
	Use of alcohol and tobacco	27	0/1 (0%)	-
	Gastrointestinal symptoms	25, 28	0/2 (0%)	-

+: Factor associated with nutritional status; - or ?: Lack of consensus on the association of the factor; *Study with significant association or whose parameter evaluated was significant. Source: Prepared by the authors.

DISCUSSION

Malnutrition is a disorder affecting a large part of the old population[30], also presenting a high prevalence in patients with PD. It was observed that 62.5% of the old population with PD had malnutrition or risk of malnutrition, according to the MNA[31]. In view of this high frequency, the importance of an earlier and more careful look at the nutritional condition of these patients is demonstrated. In addition, factors associated with the Nutritional Status were found among the clinical variables related to Parkinson's disease and among the clinical-nutritional variables.

Among the personal variables, age and gender, there were no associations. However, it is worth mentioning that although few studies measure these associations, there seems to be a relation between increased age and worsening of the Nutritional Status, a fact that can be explained by the physiological changes inherent to aging associated with a neurodegenerative disease, which can lead to the worsening of the Nutritional Status. Regarding females, there may be a connection with more nutritional disadvantages due to hormonal factors influencing the metabolic regulation[22].

According to the clinical conditions related to Parkinson's disease, disease duration and severity, motor symptoms, and cognitive function stood out. Regarding time, it was observed that an average of six to nine years was associated with a decrease in the BMI value (BMI <20kg/m^2)[27] and with a reduction in the score of MNA[26]. Although this result has been found, time is related to the severity of the disease because the years added from the diagnosis culminate in the progression of the disease, since it has no cure.

Corroborating these findings, a study[32] compared the two groups based on the median BMI of PD patients, verifying that the lower the BMI (<22kg/m^2), the greater the duration of the disease, the greater the severity of motor aspects of daily life and motor complications, and the greater the equivalent dose of levodopa (LED). It is suggested that weight loss is related to the increase in energy expenditure as the disease progresses[26,32], as generated by dyskinesias, not being compensated by adequate intake, both in quantitative and qualitative terms[28].

Regarding inadequate food intake, it is important to consider possible alterations in swallowing. Oropharyngeal and esophageal dysphagia are very common in PD and affect more than 80% of individuals[33], reflecting the underlying motor deficiencies and the extent of the disease progression[34]. It is also associated with reduced quality of life, social isolation, dehydration, malnutrition, and aspiration pneumonia[35]. The latter is one of the leading causes of death in PD[36]. Changes related to dysphagia have a direct influence on the nutritional status, since changes in food consistency and the difficulty of ingestion itself can hinder dietary adjustments[36].

As PD progresses, there is a worsening of the motor symptoms such as tremor, stiffness, and dyskinesias, which can contribute to increased energy expenditure. One possible explanation is that increased energy expenditure can play a role in the early stage, and increased caloric intake is a compensation for weight loss. In the early stages of PD, increased energy expenditure would be the main cause, while in the advanced stages the main determinant of weight loss would probably be a decrease in energy consumption[37].

Motor disorders can impel the old person to social isolation, loss of will for daily activities, dependence on others for activities of daily living, loss of autonomy, and consequently reduced quality of life[38]. Increased disability in daily tasks such as shopping, cooking, and eating may exacerbate the symptom effect of nutritional impact and life situation on food intake[39].

Intellectual decline and cognitive disorders may also be present in PD, usually intensifying with the progression of the disease, especially in the old people[40]. Thus, these old people may lose their sense of self-control, self-efficacy, and often present symptoms of depression[41], favoring changes in eating behavior with low food intake and higher occurrence of malnutrition[42].

Regarding the clinical-nutritional variables, we emphasize body fat, biochemical parameters, physical, domestic and mobility activities, energy intake, and eating habits.

A study[43] found that the higher the stage of the disease, the lower the amount of total fat (body, visceral, and subcutaneous), as well as lower levels of leptin, a hormone produced mainly by adipocytes or fatty cells directly related to fat production. In addition, a reduction in body weight associated with the time of diagnosis of the disease also suggests that in addition to the alteration in fat distribution in PD patients, there is a reduction in subcutaneous adipose tissue and an increase in the ratio of visceral fat. This altered redistribution may be associated with weight loss,[43] and may also be influenced by the aging process that entails changes in body composition[44].

Another study observed that PD patients had a progressive reduction in body weight, BMI, and increased protein and calorie intake, with reduction in REE, level of physical activity, and calculation of total energy expenditure. The increase in calorie intake is assumed to be secondary, but it is not enough to compensate for the increase in energy requirements associated with stiffness and dyskinesias[45].

Gastrointestinal dysfunctions in PD are well-recognized problems because they are an initial symptom in the pathological process that eventually results in PD. Gastrointestinal symptoms may result from central or enteric nervous system involvement, or these symptoms may be side effects of antiparkinsonian medications. Sialorrhoea, dysphagia, nausea/gastroparesis, constipation, and defecation dysfunction may occur,[46] and when associated with depression and/or dementia may contribute to weight loss in PD patients[47].

Among the limitations observed in this review, we can emphasize the small number of studies addressing PD in old people, as well as the insufficiency of papers in the Brazilian population and longitudinal studies. One difficulty found was the lack of longitudinal studies following the patient since before diagnosis, which is a finding, so we encourage future research with longitudinal studies given its importance, since some studies show that weight loss is continuous and may present before the onset of the disease.

CONCLUSION

The variables that were associated with the Nutritional Status of old people with PD were the clinical conditions related to PD represented by the disease duration and severity, motor symptoms and cognitive function, and among the clinical-nutritional variables were body fat, biochemical parameters, physical activity, domestic activity and mobility. The personal characteristics of age and gender were not associated with the Nutritional Status. However, there seems to be a relation with increased age and the disadvantages of female aging.

In view of the above, it is suggested that weight loss in PD is a complex and multifactorial consequence. It is not a beneficial phenomenon, and has several clinical and prognostic consequences with increased morbidity and mortality. Thus, the early diagnosis nutritional changes in PD patients with specific nutritional tools such as MNA is of paramount importance in the routine of healthcare services in order to prevent malnutrition and improve their quality of life.

Further studies in this population are also necessary, as well as studies in the Brazilian population, in order to better understand this process of weight loss in old patients with PD.

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Morbidities and associations with self-rated health and functional capacity in the older people

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Abstract

Objectives: To investigate the relationship between diseases and self-rated health / functional capacity between gender and in different educational levels. *Methods:* A cross-sectional study was conducted with follow-up of 419 older adults who participated in the FIBRA Study, which investigated frailty in aged individuals. Socio-demographic variables, chronic non-communicable diseases, self-rated health and functional capacity were evaluated. Chi-square test or Fisher's exact test were used to test associations between the number of diseases and self-rated health and functional capacity, with the significance level set to 5%. *Results:* Negative self-rated health was significantly associated with the number of chronic diseases in the overall sample, among women and in both schooling categories. Having partial or total dependency on at least one or more instrumental activities of daily living (IADLs) showed a significant association for number of chronic diseases in the overall sample, among women and among individuals with 0 to four years of schooling. *Conclusion:* The chronic diseases seem to have a negative impact on self-rated health, especially in women and in relation to years of schooling, and they seem to have a functional disability in relation to instrumental activities of daily living, especially in women and the old people with 0 to 4 years of schooling.

Keywords: Activities of Daily Living. Health of the Elderly. Epidemiological Studies. Morbidity. Self-Assessment.

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INTRODUCTION

Approximately 80% of all deaths are attributed to chronic non-communicable diseases (CNCDs) in parts of southeast Asia and Latin America and the Caribbean, Mauritius and Seychelles, such as cardiovascular disease, respiratory disease, neoplasms and diabetes[1]. According to Oliveira and colleagues on their study with ten years of follow-up, the major cause of death among the oldest people was circulatory diseases, which are CNCDs[2]. Due to the aging of the population, there is an accumulation of chronic diseases that can be a predictor of negative self-rated health and functional disability[3].

Individuals that can do their daily living activities independently and with autonomy have a good functional capacity. In other words, autonomy and independence are essential attributes for the functonality[4]. Independent functional status should be maintained as long as possible in life, as lower functional capacity is associated with greater rates of hospitalization, institutionalization and mortality[5]. The presence of chronic disease is one of the factors that have a negative impact on functional capacity and studies involving younger and older adults confirm the inverse association between these variables[6,7]. A longitudinal study with old people above 80 years old revealed a negative association among chronic diseases and dependence on daily living activities, besides a higher risk of mortality[7]. Brito et al found statistically significant associations between the reduction in functional capacity and the occurrence of chronic diseases, physical inactivity and self-rated poor health among individuals older than 60[8].

A negative self-perception of one's health is related to lower functional capacity. Self-rated health has been widely used as a health indicator since the 1950s[9]. In a study conducted in Brazil, the prevalence of poor self-rated health increased with age from 1.8% among 19-to-29-years-old people to 13.7% among those aged 70 years or more and the chance of poor self-rated health showed a fivefold increase greater among those with at least one CNCD[10]. However, when studying the oldest people (≥80 years), the individuals underestimated their self-rated health in relation their clinical conditions[11]. Studies report that older population rate their health as good despite the presence of chronic conditions[12]. Subjective variables, such as resilience, can be forms to positive coping with the occurrence of chronic diseases[13].

Subjective health and functional capacity are extremely important aspects of quality of life and the prevention of morbidity / mortality among the oldest old[14]. The self-rated health is an indicator of health and a measure of health inequalities. It is an important indicator of the relationship between health and disability based on socioeconomic inequalities. There are theories that try to explain the impact of population aging on health. In addition, it is necessary to take into account other factors such as gender and educational levels, and social stratum to understand the evolution of morbidity and its relationship with self-rated health and lower functional capacity. The aim of the present study was to investigate the relationship between diseases and self-rated health / functional capacity between gender and in different educational levels.

METHODS

A cross-sectional study was conducted with secondary data on older adults who participated in the *Fragilidade dos Idosos Brasileiros* (Frailty among Brazilian Older Adults - FIBRA Study), which investigated frailty in individuals aged 65 years or older who lived in seven Brazilian cities. In 2008 and 2009, 3,478 older adults were interviewed, 1,284 of whom lived in the city of Campinas (state of São Paulo, Brazil) and in the Ermelino Matarazzo District in the city of São Paulo, Brazil. In 2015, a follow-up study was designed with the older adults from Campinas and the Ermelino Matarazzo District who had participated in the 2008-2009 FIBRA study. Data collection took place in 2016 and 2017 and the final sample was composed of 419 participants. Figure 1 displays the number of older adults in each step of the study. The volunteers received information regarding the objectives of the study and signed an informed consent. The FIBRA study received approval from the Human Research Ethics Committee (CAAE 49987615.3.0000.5404 and 92684517.5.1001.5404). The present study received approval on December 11th, 2018 (certificate number: 3.071.453) and was also registered with Brazil Platform (C.A.A.E. 02184418.7.1001.5404).

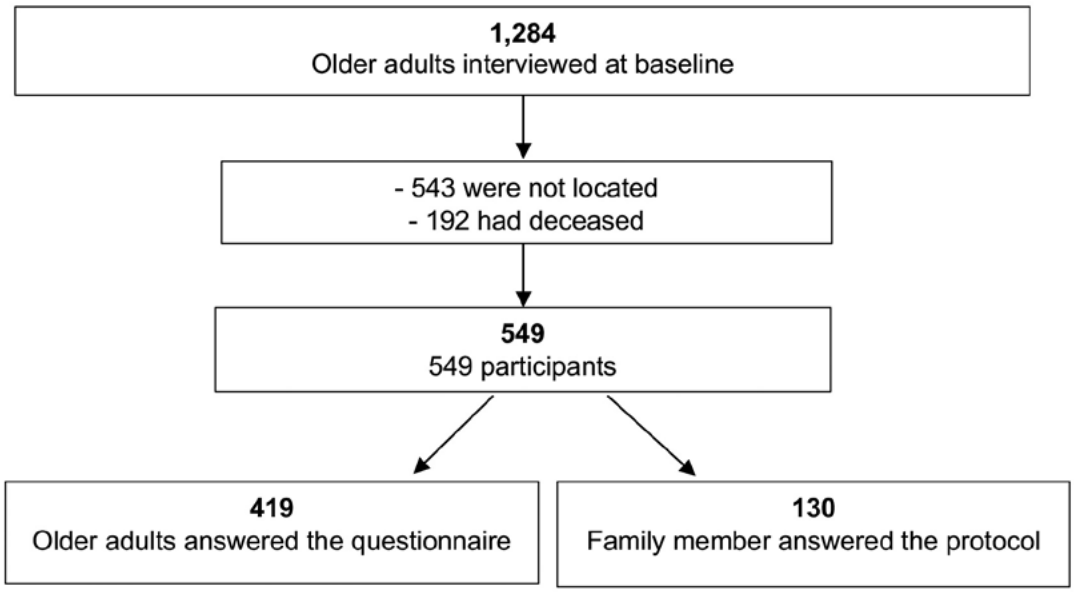


Figure 1. Flowchart of final sample. FIBRA Study 2016/17.

Older adults aged 70 years or older living in urban areas who had participated in the first wave of the 2008/2009 FIBRA Study[15] between 2016 and 2017 were recruited. Visits were made by pairs of trained researchers and interviews were held in a single session lasting an average of 80 minutes.

Prior to the interview, the researchers explained the nature of the study and the procedures involved to the older adults and families. The volunteers agreed to participate by signing an informed consent. The following were the exclusion criteria: memory or spatial orientation or communication deficits suggestive of cognitive impairment; permanent or temporary inability to walk (the use of a gait-assistance device was accepted); localized loss of strength or aphasia due to a stroke; severe movement, speech or affectivity impairment associated with advanced Parkinson's disease; severe hearing or vision impairment; and being under terminal stage.

Four hundred nineteen individuals who agreed to participate and scored above the cutoff points established by Brucki on the Mini Mental State Examination according to schooling (17 for illiterate individuals and those with no formal schooling, 22 for those with one to four, 24 for those with five to eight years and 26 for those with nine or more years of schooling)[16,17] were included in the present study.

Socio-demographic characteristics: sex (female and male), age (80 to 84 years and 85 or older), schooling (0, 1 to 4 and 5 or more years of study) and income (categorized in quintiles of the observed distribution);

Chronic non-communicable diseases: nine dichotomous items addressing whether a physician had ever made a diagnosis of heart disease, systemic arterial hypertension, stroke (ischemic or hemorrhagic), diabetes mellitus, cancer, arthritis/rheumatism, depression, lung disease or osteoporosis. The number of diseases was then counted for each participant and dichotomized as none to one and two or more chronic diseases.

Self-rated health: determined based on the answer to the following question: *In general, would you say your health is very good, good, fair, poor or very poor?* For the analysis, the answers were grouped as good/very good and very poor/poor/fair.

Functional capacity: evaluated based on self-reports regarding the performance of instrumental activities of daily living (IADLs); those who reported

requiring partial or complete assistance for the execution of one or more IADLs were considered dependent. The activities in question were listed on the Lawton scale[18,19], such as: using the telephone, using transportation, shopping, food preparation, housekeeping, responsibility for their own medications and handling finances. The interviewee reported being completely independent, requiring some assistance or being complete dependent on the assistance of others for each of the activities on the list. Those who reported requiring partial or complete assistance to perform one or more IADL on the Lawton scale were considered dependent.

Descriptive analysis was performed for the characterization of the sample using absolute and relative frequencies. Percentage distributions and 95% confidence intervals were estimated. Associations between the number of chronic diseases and both self-rated health and functional capacity were tested using either the chi-square test or Fisher's exact test, with the significance level set to 5% ($p< 0.05$).

RESULTS

Four hundred nineteen older adults participated in the present study. Most participants were women (69.9%), were 80 years old or older (55.9%), with one to four years of schooling (58.2%), two or more chronic diseases (67.3%) and self-rated health as good/very good (53.0%). Independence regarding IADLs was found in over half of the sample (50.4%). The characterization of the sample is shown in Table 1.

Table 2 displays the prevalence of fair/poor/very poor self-rated health and dependence on IADLs. Negative self-rated health was significantly associated with schooling and multimorbidity, but it was not associated with sex, age and income. The report of dependence on at least one IADL was significantly associated with sex and multimorbidity, but it is not associated with the variables income, age and schooling.

Figure 2 shows the relation between the number of diseases and negative self-rated health in the overall sample (a), among men (b), among women (c), individuals with five or more years of schooling (d) and those who were illiterate or had up to four years of schooling (e). According to the results, individuals with more chronic diseases and female older adults showed negative self-rated health. The same association was found for both categories of schooling but it was not found for males.

Figure 3 illustrates the relation between the number of diseases and dependence on at least one IADL in the overall sample (a), among men (b), among women (c), among older adults with five or more years of schooling (d) and among those who were illiterate or had up to four years of schooling (e). The number of chronic diseases was associated with dependency in at least one IADL for the overall sample, female sex and individuals with 0 to four years of schooling. For the other variables, this association was not found. In other words, there is not a significant association among number of chronic diseases and functional dependency for men and older adults with five or more years of schooling.

Table 1. Characterization of the sample according to socio-demographic variables, morbidities, self-rated health and functional capacity. FIBRA Study. Brazil. 2016-2017.

Variables	N (%)	CI95%*
Sex		
Male	126 (30.1)	25.8-34.6
Female	293 (69.9)	65.3-74.1
Age		
70-79 years	184 (44.1)	39.4-48.9
80 years or more	233 (55.9)	51.0-60.6

to be continued

Continuation of Table 1

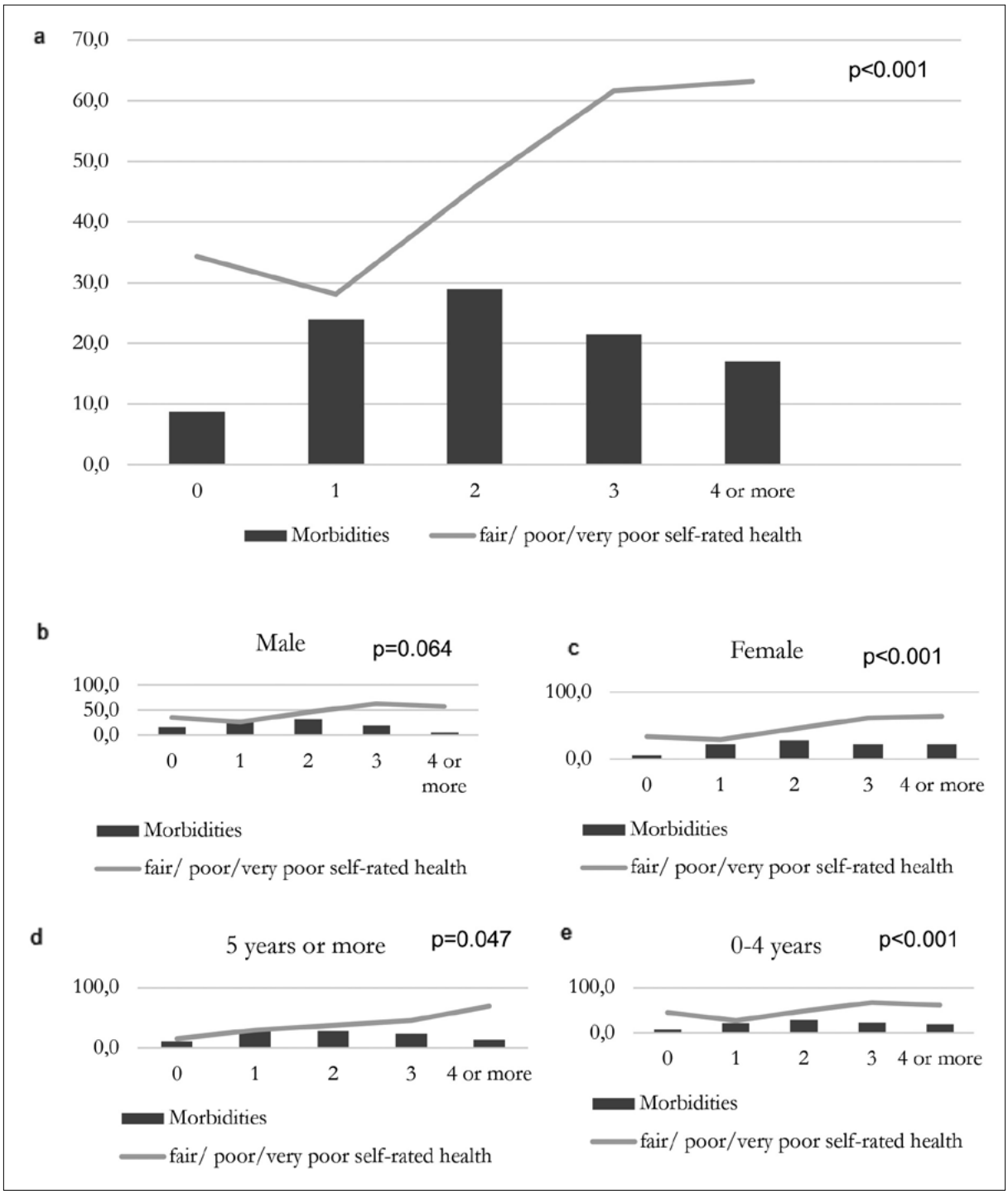
Variables	N (%)	CI95%*
Income		
1st quintile	83 (22.3)	18.3-26.8
2nd quintile	88 (23.7)	19.6-28.3
3rd quintile	56 (15.0)	11.7-19.1
4th quintile	75 (20.2)	16.4-24.6
5th quintile	70 (18.8)	15.1-23.1
Schooling		
Illiterate	57 (13.6)	10.6-17.2
1-4 years	244 (58.2)	53.4-62. 9
5 or more	118 (28.2)	24.0-32.7
Morbidities		
0-1	131 (32.7)	28.2-37.4
2 or more	270 (67.3)	62.6-71.8
Self-rated health		
Very good/good	222 (53.0)	48.2-57.7
Fair/poor/very poor	197 (47.0)	42.3-51.8
Functional capacity		
Independent IADLs**	211 (50.4)	45.6-55.1
Dependent IADLs**	208 (49.6)	44.8-54.4

* Confidence Interval; ** Instrumental activities of daily living.

Table 2. Prevalence of the fair/ poor/very poor self-rated health and dependent for instrumental activities of daily living. FIBRA Study. Brazil. 2016-2017.

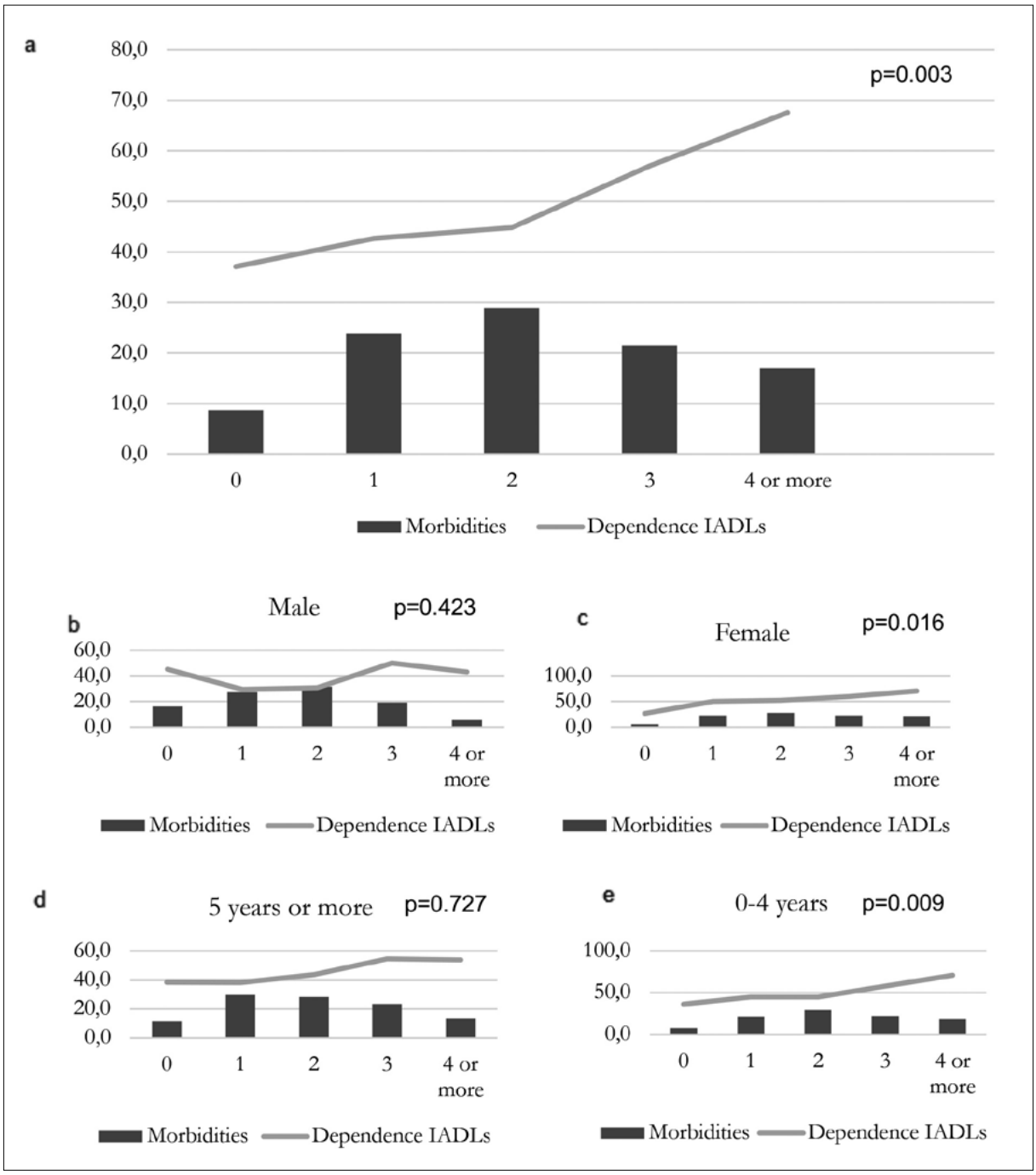
Variables	Fair/poor/very poor self-rated health		Dependent for IADLs*	
	Prevalence %	p-value	Prevalence %	p-value
Sex		0.183		**< 0.001**
Male	42.1		36.5	
Female	49.1		55.3	
Age		0.682	0.645	0.645
70-79 years	48.4		48.4	
80 years or more	46.3		50.6	
Income		0.254		0.087
1st quintile	54.2		50.6	
2nd quintile	47.7		44.3	
3rd quintile	48.2		33.9	
4th quintile	41.3		54.7	
5th quintile	37.1		55.7	
Schooling		**0.020**		0.059
5 or more	39.0		44.1	
1-4 years	47.5		49.2	
Illiterate	61.4		63.2	
Morbidities		**< 0.001**		**0.013**
0-1	29.8		41.2	
2 or more	55.2		54.4	

* IADLs: Instrumental activities of daily living.



(a) Number of chronic diseases associated with self-rated health as fair/poor/very poor in overall sample; (b) Number of chronic diseases associated with self-rated health as fair/poor/very poor among males; (c) Number of chronic diseases associated with self-rated health as fair/poor/very poor among females; (d) Number of chronic diseases associated with self-rated health as fair/poor/very poor among five years or more of schooling; (e) Number of chronic diseases associated with self-rated health as fair/poor/very poor among illiterate to four years of schooling. FIBRA Study, Brazil, 2016-2017.

Figure 2. Number of chronic diseases associated with self-rated health as fair/poor/very poor for sex and schooling, FIBRA Study, Brazil, 2016-2017.



(a) Number of chronic diseases associated with having difficulty on at least one instrumental activity of daily living (IADL) in overall sample; (b) Number of chronic diseases associated with having difficulty on at least one IADL among males; (c) Number of chronic diseases associated with having difficulty on at least one IADL among females; (d) Number of chronic diseases associated with having difficulty on at least one IADL among five years or more of schooling; (e) Number of chronic diseases associated with having difficulty on at least one IADL among illiterate to four years of schooling. FIBRA Study, Brazil, 2016-2017.

Figure 3. Number of chronic diseases associated with having difficulty on at least one instrumental activity of daily living for sex and schooling, FIBRA Study, Brazil, 2016-2017.

DISCUSSION

In the present study, approximately 67.0% of the participants had two or more chronic diseases, 53.0% rated their health as good/very good and 50.4% did not require assistance regarding IADLs. A significant association was found between negative self-rated health and the number of chronic diseases in the overall sample, among women and in both schooling categories; and between number of chronic diseases and dependence on one IADL in the overall sample, among women and among individuals with 0 to four years of schooling.

The prevalence of two or more chronic diseases is in agreement with data described in the ELSI Study-Brazil involving 9,412 individuals aged 50 years or older, among whom the prevalence of multimorbidity was 67.8% for two or more diseases and 47.1% for three or more diseases[20]. A longitudinal study with 9,061 participants with mean age of 61.7 years old showed that, along 23 years, one third of participants (33.7%) presented diagnosis of three or more chronic diseases and 25.9% presented the diagnosis of two diseases occurring simultaneously, corroborating our study's data[21].

Regarding the prevalence of negative self-rated health, significant associations were found with schooling and multimorbidity. Feenstra and colleagues conducted a study with older adults (mean age: 69 years) and found that negative self-rated health was associated with a larger number of chronic diseases, as expected, and low schooling was also associated with the perception of having poor health[22], as occurred in the present investigation. A low level of schooling is associated with poorer living conditions, inequalities in access to healthcare services and their use and low adherence to treatments, which may explain the higher prevalence of negative self-rated health in the subgroups of illiterate older adults and those with a greater number of chronic diseases.

In the analysis of the association between the number of chronic diseases and negative self-rated health according to sex and schooling, significant results were found in the overall sample, among women and in both schooling categories. Antunes et al conducted a study aimed at evaluating the negative self-rated health among older adults living in communities in the city of São Paulo. In the study, the negative self-rated health was related with female sex and schooling, both in general evaluation and in the comparison[23]. A study conducted in Ghana with 1,256 individuals aged 50 years or older found a difference between the sexes regarding self-rated health; the frequency of negative self-rated health being higher among women[24], which is in agreement with the present findings. It is noteworthy that in the aging process health is linked to the course of life and suffers the effects of different exposures throughout life.

Regarding the prevalence of disability on IADLs shown in Table 2, significant associations were found with multimorbidity and sex. A longitudinal study conducted in Portugal in 2016 involving 106 community-dwelling older adults revealed that those who were more dependent and those with multimorbidity at baseline underwent a significant reduction in functional capacity over a five-year period, demonstrating an association between chronic diseases and functional disability[25]. In a study conducted by Filho, in 2018, the prevalence of difficulties for BADL and IADL was larger for women and older adults above 75 years old. Moreover, some specific illness was more related with functional dependency, according to the sex. This study confirms the association among female sex and decrease of functional capacity found in the present study[26]. Similarly to the present study, Torres et al found the females older presented more dependency for BADL and IADL, besides other factors like advanced age, have been bedridden in the last two weeks, pain in the last month, lower educational level and restrictions to leave home[27]. Indeed, older women have multimorbidity more than men, which lends further support to this association[28].

Regarding functional dependence and the number of chronic diseases, significant associations were found in the overall sample, the female sex and among individuals with zero to four years of schooling. Nunes et al conducted a study in 2017 involving 1,593 community-dwelling older adults (60 years of age or older) and found that 34.2% required assistance on IADLs. Such disability was related to an advanced age, widowhood, low schooling,

cognitive impairment and the use of healthcare service. Sex was not evaluated, but low schooling was associated with functional disability[29], as found in the present investigation. At the study conducted by Ćwirlej-Sozańska, with 498 oldest old people, the women showed higher level of dependence than men, besides a greater number of chronic diseases. Other variables were related with lower functional capacity, such as: advanced age, lower level of schooling and social activities, lack of social support, lack of good adaptation of external environment to their needs and higher number of chronic diseases[30]. Such results reveal the multidimensionality of functional capacity and it can be thought that gender inequality in functional disability is mainly explained by the distribution of socioeconomic factors by gender and then health policy and programs aimed at reducing gender differences in socioeconomic resources might mitigate inequality.

Limitation is related to the survival bias; as long-lived individuals, the participants in this study had their diseases under control; otherwise, they would have been disabled or would have died. The participants were mostly women and with 0 to four years of schooling. Future studies should compare functional capacity in older people with different physical limitations and associate these limitations with measures of functional performance. Moreover, longitudinal studies should be conducted to determine risk factors for a poorer functional capacity and negative self-rated health.

CONCLUSION

In conclusion, the prevalence of negative self-rated health showed a significant association with schooling and multimorbidity, and the prevalence of disability on IADLs was significantly associated with multimorbidity and sex. Chronic diseases seem to have a negative impact on self-rated health, especially in women and in relation to years of schooling, and to have a functional disability in relation to instrumental activities of daily living, especially in women and the old people with 0 to 4 years of schooling. The results highlight the need to promote better living conditions to reduce social inequalities in health among the old people.

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Effect of Resistance Training and Pilates on the Quality of Life of Elderly Women: A Randomized Clinical Trial

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Abstract

Objective: The objective of the study was to compare the effects of resistance training (RT) and Pilates on the quality of life (QOL) of elderly women. An experimental design study was carried out with a 12-week intervention. *Methods:* Elderly women (≥60 years) who did not practice any type of physical exercise regularly for at least 3 months were evaluated. The study included 41 elderly women who were randomly divided into three groups: 1- Pilates group (PG), 2- Resistance training group (RTG) and 3- Control group (CG). To assess QOL, the WHOQOL-OLD, WHOQOL-BREF and SF-36 questionnaires were used. The Wilcoxon-Mann-Whitney Test was used to analyze the evolution of intragroup variables and the Kruskal-Wallis test with Dunn's post hoc for intergroup analyzes. To compare the sample characterization variables between the groups, the chi-square test was used. *Results:* There was an improvement in the *Social Participation* domain for the PG (p=0.016). In the RTG, a significant difference was found for the *Mental Health* domain (p=0,019). In the CG, there was an improvement in the *Social Participation* domain (p=0.044) and Total WHOQOL-OLD Score (p=0.044). In the intergroup comparisons, there was a difference in the WHOQOL-BREF Total Score of the PG and RTG, with the PG presenting a better QOL at the beginning of the study (p=0.039). The *Vitality* (p=0,010) and *Mental Health* (p=0,024) of the RTG improved in relation to the PG. *Conclusion:* The groups analyzed improved their QOL after the intervention period.

Keywords: Quality of Life. Health of the Elderly. Motor Activity.

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INTRODUCTION

Population aging is a worldwide phenomenon. It is therefore important to assess the quality of life (QoL) of older adults to improve techniques and procedures and better understand the expectations of this population[1]. QoL is related to personal well-being and can be defined as an individual's perception of their position in life within a socio-cultural context, in relation to their objectives, standards and concerns[2,3].

Measures of QoL are an important indicator for evaluating health programs for older adults, due to their associations with physical activity (PA), morbidity and mortality[4]. Studies that have investigated the association between PA and QoL in older adults concluded that higher levels of PA are associated with a better QoL[4-10]. A recent review of the topic revealed that regular physical exercise improves the physical, social and emotional aspects of QoL[11]. Some evidence also suggests that regular PA may be associated with reducing depression, anxiety and distress, and improving mood[11-14].

Despite the benefits that are often related to PA in terms of improving the QoL of older adults, the evidence of this relationship is limited. Pucci et al.[1] state that most studies that have investigated this relationship are cross-sectional, and recommend further longitudinal and intervention studies. Despite the consistent association between PA and the *Physical* and *Mental* domains[15,16] of QoL, little is known about the other domains. Finally, to date no known study has compared the effects of RT and Pilates on the QoL of older women, especially using different questionnaires. Given the need to investigate how different types of PA affect the QoL of older people, the importance of verifying the effects of RT and Pilates on the QoL of this population is clear. Therefore, the objective of the present study is to compare the effects of RT and Pilates on the quality of life of older women.

METHOD

A parallel, randomized, pre- (week zero) and post-test (week 12) clinical trial, with a 12-week intervention, was performed. The study included older women (≥60 years old) who had not performed any type of physical exercise regularly for at least three months. Older women who did not have a doctor's certificate, or who had musculoskeletal problems that limited the practice of exercises, or uncontrolled chronic diseases or who missed more than 20% of the sessions, were excluded. The study was publicized through social media and on community sites with a high flow of visitors. The project was carried out in Brasília, in the Distrito Federal (Federal District), at the Centro Universitário Euro-americano de Brasília (the Euro-American University Center of Brasília), Brazil, from May to July 2016.

The older women were randomly divided into three groups: 1- Pilates group (PG), 2- Resistance training group (RTG) and 3- Control group (CG). Simple randomization was performed using a table of random numbers. The professor who coordinated the research was responsible for this process and also for registering and assigning the interventions to the participants. Blinding was used, in that the participants did not know the purpose of the study or whether they were part of the treatment or control group. Fifty women were selected to participate in the study, of whom nine dropped out. Thus, the sample consisted of 41 older women aged 60-84 years, with 13 allocated to the PG, 14 to the RTG and 14 to the CG (Figure 1).

In the PG, the exercises were performed on the ground, using body weight as a load and accessories (Swiss ball and dumbbells). The classes were held twice a week by a physical education professional trained in Pilates, who accompanied the group throughout the intervention, assisted by an intern. The classes were divided into three parts: warm-up exercises with dynamic stretching (10 min), general conditioning with dynamic and isometric strength exercises (40 min) and relaxation (5-10 min) according to the previously used protocol[17]. Each exercise sequence was performed once, with a maximum of ten repetitions. The first two weeks were used for adaptation, with pre-Pilates exercises that aimed to teach important concepts and the principles to be used during classes, such as: breathing, activation of the abdominal muscles and neutral spine position. From the third week onwards, basic ground exercises were added.

The intensity of the classes was moderate and increased initially in terms of volume and subsequently through the progression of the exercises. The exercises began with five repetitions each and as the students started to perform them correctly, following the principles of Pilates, the number of repetitions increased progressively up to ten. When the students reached ten repetitions, they continued to perform the exercise with ten repetitions for two more sessions and then moved on to the next progression step, which consisted of a more difficult variation of the same movement, again starting with five repetitions (Table 1).

The RTG classes were conducted by the same instructor, a Physical Education professional with experience in guiding this type of training. The instructor was assisted by two interns. A familiarization period of two weeks was applied in the devices before performing the ten-repetition maximum test (RM). During this period, the participants performed two sets of each exercise with a low load to learn how to reproduce the movement (70% of 10 RM). After this, the 10 RM tests were performed with the participants instructed to perform ten repetitions with as great a load as possible. To obtain this load, the sample group performed three attempts in each device, with an interval of three minutes between each attempt[17].

Six exercises were selected: two for the upper limbs (supine bench press machine and rowing machine), two for the lower limbs (Leg Press and flexor chair), and two for the trunk (hip and abdominal elevation). The sessions were held twice a week and lasted approximately 60 min, comprising: 10 min of warm-up, 40-45 min of resistance exercises and 5-10 min of stretching and warm-down, based on a previously conducted study[18]. The warm-up took place in the equipment itself using a light load and performing the exercise with 10-15 repetitions, while the final stretching was guided by the instructor at the end of the session (Table 2).

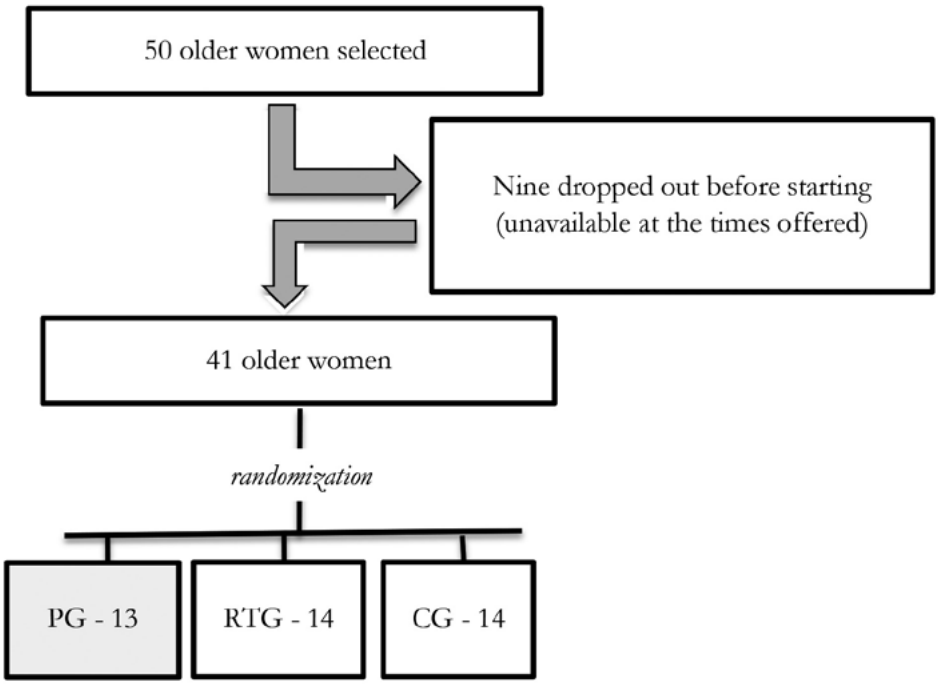

Figure 1. Flowchart showing the selection and exclusion of volunteers. Brasília (DF), Brazil.

PG = Pilates Group, RTG = Resistance Training Group, CG = Control Group.

Table 1. Description of the Pilates intervention program. Brasília (DF), Brazil. 2016

1st -2nd weeks	Repetitions
Breathing and control of the center	10
Imprint and release	10
Hip release	10
Support position	10
Arm elevation	10
Arm circle	10
Spine extension	10
Cervical preparation	10
Abdominal preparation	10
Spine mobility	10
3rd – 12th weeks	Repetitions
Breathing and control of the center	5-10
Standing spine stretch	5-10
Standing lateral trunk stretch	5-10
Standing spinal rotation	5-10
Upward rotation	5-10
Stretching of one leg	5-10
Hundred with legs bent	5-10
Bridge	5-10
Leg circle	5-10
Side kick	5-10
Bird dog	5-10
Half swan	5-10

Table 2. Periods of strength training. Brasília (DF), Brazil, 2016.

Weeks	Intensity (%10 RM)	Series	Repetitions
1st	70	2	10 to 12
2nd	70	2	10 to 12
3rd	80	2	10 to 15
4th	85	2	10 to 15
5th	85	3	10 to 15
6th	90	3	8 to 12
7th	90	3	8 to 12
8th	95	3	6 to 10
9th	95	3	6 to 10
10th	100	3	6 to 10
11th	100	3	6 to 10
12th	95	4	10 to 12

In the CG, various recreational and cognitive activities were offered, such as games and exercises for memory and motor coordination. The CG practiced their activities twice a week for 40 min. The activities were carried out in groups and there was interaction between the older women. In order to maintain motivation to continue in the study, light PA such as walking, balance exercises and joint mobility were offered every 15 days. The older women were asked to report any changes in their usual activities.

Sociodemographic information and health conditions were assessed through an initial questionnaire, together with the IPAQ instrument[19]. The short version IPAQ was applied in the first meeting with the older women to evaluate the level of PA and thus select which individuals met the inclusion criteria of the study. Only older women classified as inactive (0 min/wk.) or insufficiently active (1-149 min/wk.)[20] were included.

To determine the intensity of the PG classes, the modified Borg scale was used, as it correlates closely with HR and is easy to for older adults to understand[21]. Values ranging from three to five points for training intensity were adopted, the perception of exertion was evaluated in the middle and at the end of the session and the older women were previously familiarized with the scale.

To assess QoL, the WHOQoL-OLD, WHOQoL-Bref and SF-36 questionnaires were used. The WHOQoL-OLD is a specific instrument for older adults, adapted from the WHOQoL questionnaire. The WHOQoL-OLD module contains 24 questions divided into six facets: *Sensory Functioning, Autonomy, Past, Present and Future Activities, Social Participation, Death and Dying* and *Intimacy* [22].

The WHOQoL-Bref consists of an abbreviated version of the WHOQoL-100 questionnaire. The instrument consists of 26 questions, two on general QoL, and the others divided between the domains *Physical, Environment, Social Relations* and *Psychological.*

The SF-36 is a generic, multidimensional questionnaire and is the most widely used questionnaire for the assessment of QoL[1]. It consists of 36 items that evaluate eight QoL domains and are divided into two components: *Physical* and *Mental.* The component *Physical* comprises the domains *Physical Functioning, Physical Role Limitations, Bodily Pain*, and *General Health Perceptions*. The *Mental* component contains the domains *Vitality, Social Functioning, Emotional Role Limitations* and *Mental Health*[23]. All the data were collected by a team of previously trained evaluators and all procedures were standardized to increase the reliability of the evaluation.

The sample size was estimated by the G Power 3.1 software package. The software estimated the need for a total of 36 individuals. The following data were input: type of test: F tests; statistical test: ANOVA: repeated measurements, within the factors, effect size =0.6, α=0.05, power (1–β err prob) =0.95, number of groups =3, number of measurements =2 and correlation coefficient between repeated measurements =0.5.

The results were presented in descriptive statistics. All variables were submitted to the Shapiro-Wilk test to verify the distribution of the data. Since most variables presented non-Gaussian distribution, we chose to use nonparametric tests to analyze the evolution of intragroup variables (Wilcoxon-Mann-Whitney Test) and for intergroup analysis (Kruskal-Wallis test, with Dunn's *post hoc test*). The Chi-square test (χ^2) was used to compare the sample characterization variables between the groups. The statistical tests were applied with the significance level accepted at $p<0.05$.

The study was approved by the Research Ethics Committee of the UNIEURO University Center under protocol number 1,169,706. All participants signed an Informed Consent Form, containing all the information on the intervention. The clinical trial was registered through the REBEC platform under number RBR-6wghcx.

RESULTS

Most of the women were 60-69 years old (70%), married (60%) and had an unfinished high school education (46.3%). Almost all reported having a health problem, with arterial hypertension prevalent (63.4%). The majority also had some type of pain

(61%) and 65.8% used controlled medication. Table 3 characterizes the older women participating in this study and the comparison of these variables between the groups at the beginning of the study. The average age of the participants in each group was: 64.92 (± 3.93) for the PG, 67.07 (± 5.85) for the RTG and 69.93 (± 7.27) for the CG, with no significant difference between groups (Kruskal-Wallis test, p=0.157).

Table 3. Characterization of the sample of older women (n=41), Brasília, DF, Brazil, 2016.

	Pilates Group	Resistance Training Group	Control Group
	N (%)	N (%)	N (%)
Marital status*			
Married	6 (46.15)	9 (64.29)	9 (64.29)
Single - Widowed - Divorced	7 (53.85)	5 (35.71)	5 (35.71)
Education**			
Elementary School	4 (30.77)	3 (21.43)	9 (64.29)
High School	8 (61.54)	9 (64.29)	2 (14.29)
Higher Education	1 (7.69)	2 (14.29)	3 (21.43)
Pain			
Reported	8 (61.54)	9 (64.29)	8 (57.14)
Not reported	5 (38.46)	5 (35.71)	6 (42.86)
Comorbidities			
Reported	12 (92.31)	12 (85.71)	13 (92.86)
Not reported	1 (7.69)	2 (14.29)	1 (7.14)
Hypertension			
Hypertensive	9 (69.23)	9 (64.29)	8 (57.14)
Normotensive	4 (30.77)	5 (35.71)	6 (42.86)
Controlled Medication			
Uses	9 (69.23)	9 (64.29)	9 (64.29)
Does not use	4 (30.77)	5 (35.71)	5 (35.71)

N = number of older women,% = percentage within the group, in the variable considered; * Significant difference between the PG and the others (test χ^2, p= 0.011); ** Significant difference between the Groups (test χ^2, p <0.001).

In the PG the WHOQoL-OLD domain with the highest mean value was *Sensory Functioning*. The *Social Participation* domain had the lowest mean score at the time of initial collection, however, after 12 weeks a significant increase was observed (pre= 51.44 ± 21.37; post= 71.63 ± 14.35; p= 0.016), when analyzed by the Wilcoxon-Mann-Whitney test. The *Intimacy* domain had the lowest mean value at 12 weeks. The total WHOQoL-OLD score was high and increased throughout the intervention, although without statistical significance.

In the RTG, the *Sensory Functioning* domain had the highest mean value at the two evaluation times, while the lowest value was in the *Social Participation* domain.

In the CG, the *Sensory Functioning* domain had the highest mean score, while the domain with the lowest score was *Social Participation* (pre= 53.57 ± 19.26; 12 weeks= 69.20 ± 15.59), with a significant increase after 12 weeks of activities (p= 0.044). Another index that showed a significant increase was total *WHOQoL-OLD* score (pre= 85.43 ± 11.86; 12 weeks= 95.36 ± 10.54, p= 0.044)

In the intergroup comparisons (Kruskal-Wallis test, with Dunn's post hoc), the CG had a better score than the RTG in the *Past, Present and Future Activities* facet at 12 weeks (CG= 75.89 ± 14.47 versus RTG= 62.50 ± 11.76; p= 0.031). No significant changes were found in the other domains.

In the WHOQoL-Bref, the highest mean scores in the PG at both evaluation times were in the *Social Relations* domain. The domain that least contributed to the QoL of this group was *Environment*, with the lowest mean value.

The highest mean value in the RTG at the beginning of the study was in the *Physical* domain. At 12 weeks, the *Psychological* domain contributed most to QoL. The domain with the lowest mean score was *Environment*.

The domain that contributed most to QoL in the CG was *Psychological*. As in the other groups, the *Environment* domain had the lowest mean value at the two evaluation times in the study.

In intergroup comparison (Kruskal-Wallis test, with Dunn's post hoc test), a significant difference was observed at the pre-training evaluation in the *WHOQoL-Bref total score* between the PG (71.50 ± 10.07) and the RTG (60.98 ± 9.83), with the PG having a better QoL at the beginning of the study (p= 0.039). After 12 weeks of training, there was no difference between groups in the other domains of the WHOQoL-Bref. In the SF-36 evaluation, the domain that most contributed to QoL in the PG at the pre-training evaluation was *Physical Role Limitations,* while at 12 weeks it was the *Emotional Role Limitations* domain. The *Vitality* domain had the lowest mean score.

In the RTG, the domains with the highest mean values were *Physical Role Limitations* in the pre-exercise evaluation and *Social Functioning* at 12 weeks. The domain that contributed least to QoL was *General Health*. A significant difference was found for the *Mental Health* domain between the pre- (57.43 ± 7.94) and post (66.43 ± 9.55) training evaluations, with p= 0.019.

In the CG analyzes, the highest mean score was in the *Social Aspects* domain. The lowest mean scores were in the *Bodily Pain* domain in the pre-training evaluation and in *Vitality* and *Mental Health* in the post-training evaluation.

In the intergroup comparison, there was no difference between the groups in the pre-training evaluation (Kruskal-Wallis test, with Dunn's post hoc). After 12 weeks of training, the RTG showed significantly better results than the PG in the variables *Vitality* (p= 0.010) and *Mental Health* (p= 0.024).

Table 4 shows the results of the intra-group comparisons, analyzed by the Wilcoxon-Mann-Whitney test, of the WHOQoL-OLD, WHOQoL-Bref and SF-36 instruments at the two evaluation times.

Table 4. Quality of life of older women (n=41), using the WHOQoL-OLD (WO), WHOQoL-Bref (WB) and SF-36 (SF) instruments before and after 12 weeks of physical training. Brasília (DF), Brazil, 2016.

Instrument - Dimension	PG Pre Mean (±sd)	PG 12 Mean (±sd)	*p-value*	Pre RTG Mean (±sd)	RTG 12 Mean (±sd)	*p-value*	CG Pre Mean (±sd)	CG 12 Mean (±sd)	*p-value*
WO – Sensory Functioning	82.21± 15.49	80.29± 11.65	0.579	81.25± 14.71	83.48± 14.83	0.667	72.77± 18.44	83.48± 15.62	0.114
WO – Autonomy	63.46± 16.11	70.19± 20.60	0.336	63.84± 21.54	59.82± 14.02	0.804	65.63± 19.42	75.89± 18.81	0.194
WO - Past, Present and Future Activities	68.27± 16.03	74.52± 12.09	0.511	71.88± 13.59	62.50± 11.76	0.050	66.96± 13.07	75.89± 14.47	0.114
WO - Social Participation	51.44± 21.37	71.63± 14.35	0.016*	51.79± 20.57	58.48± 15.43	0.427	53.57± 19.26	69.20± 15.59	0.044*
WO - Death and Dying	74.04± 23.36	75.48± 23.73	0.840	61.16± 32.72	66.07± 29.29	0.769	58.93± 33.68	68.75± 23.89	0.571
WO – Intimacy	63.94± 18.07	64.90± 25.71	0.650	74.55± 20.14	63.39± 22.85	0.150	66.07± 27.38	72.77± 24.22	0.454
WO - Total score	88.71± 11.62	87.00± 10.60	0.243	88.71± 11.62	87.00± 10.60	0.804	85.43± 11.86	95.36± 10.54	0.044*
WB – Physical	71.67± 11.25	70.88± 15.07	0.880	66.79± 16.06	71.43± 15.60	0.352	63.72± 22.54	68.62± 17.73	0.401
WB – Psychological	75.00± 13.18	71.80± 13.08	0.801	65.77± 15.26	74.40± 12.10	0.077	75.60± 15.32	75.00± 13.48	0.874
WB - Social Relations	76.25± 12.67	73.72± 16.96	1.000	62.48± 18.41	64.29± 17.12	0.734	74.98± 18.49	73.21± 10.43	0.734
WB – Environment	65.85± 14.00	70.19± 11.24	0.362	55.79± 9.72	61.38± 9.85	0.114	60.70± 18.21	67.19± 11.08	0.246
WB - Total score	71.50± 10.07	71.65± 11.50	0.920	60.98± 9.83	67.88± 9.95	0.178	69.02± 10.52	71.01± 10.28	0.571
SF – Physical functioning	73.85± 16.09	80.00± 14.58	0.390	65.00± 24.81	68.57± 23.97	0.635	61.07± 24.90	70.36± 22.23	0.352
SF – Physical role limitations	82.69± 29.55	86.54± 19.41	0.960	71.43± 40.26	75.00± 36.96	0.839	58.93± 39.96	73.21± 34.62	0.306
SF – Bodily Pain	58.54± 14.93	72.38± 22.56	0.113	61.29±2 9.79	67.57± 20.70	0.541	53.07± 26.84	62.86± 28.79	0.401
SF - General State of Health	61.69± 8.64	61.08± 17.92	0.724	56.00± 11.00	58.36± 19.40	0.769	62.46± 9.01	70.71± 14.66	0.125
SF – Vitality	52.31± 14.52	50.38± 11.27	0.960	58.93± 14.83	62.86± 6.99	0.194	52.50± 13.69	60.36± 11.68	0.125
SF - Social Functioning	81.73± 21.42	89.42± 14.29	0.390	69.64± 30.11	82.14± 18.81	0.329	78.57± 15.83	87.50± 16.26	0.137
SF – Emotional Role Limitations	79.48± 34.81	92.30± 19.99	0.479	59.51± 47.46	73.80± 39.62	0.427	64.27± 40.23	76.16± 27.53	0.541
SF - Mental health	56.62± 5.85	56.92± 10.85	0.614	57.43± 7.94	66.43± 9.55	0.019*	56.86± 11.65	60.57± 9.39	0.178
SF - Physical Component	69.65± 12.42	75.00± 12.86	0.418	63.54± 19.44	67.38± 19.64	0.454	59.63± 19.41	69.29± 18.40	0.178

PG = Pilates Group, RTG = Resistance Training Group, CG = Control Group, SD = standard deviation; * Dif sig (p<0.05) between the pre- and 12-week evaluation, using the Wilcoxon-Mann-Whitney test.

DISCUSSION

The present study compared the effects of Pilates and RT on the QoL of older women. Improvements were observed in some QoL domains after 12 weeks of moderate exercise, with 2 sessions/week. This period was sufficient to produce significant changes in the psychological, but not the physical aspects of QoL. This suggests that to achieve the latter, a longer intervention time and/or greater exercise intensity would be required.

Confirming this hypothesis, in a study by Fonte et al.[24], older participants in an PA program in the community were evaluated, and the authors found that longer participation in the program was associated with a better QoL. Vieira et al.[25] evaluated Pilates practitioners and found similar results, with significantly higher scores among those who had been practicing Pilates for more than a year than among those who had been practicing for three months. However, the participants in the present study had a high mean score in the WHOQoL-OLD domains and total score, showing that they had a good QoL, which was maintained throughout the study period.

The participants in the present study had a high mean score in the domains and total WHOQoL-OLD score, showing that they already had a good QoL and this was maintained throughout the study period.

The *Social Participation* facet assesses the involvement of older adults in daily activities, especially those practiced in the community, satisfaction with levels of daily activity and with the use of one's time. This was one of the most compromised facets in the analysis of QoL, with the lowest mean score in all the groups at at least one evaluation time. Data consistent with the findings of the present study were also found in other studies[15,26], with the lowest QoL scores found in the *Social Participation* facet. Such social disengagement becomes more evident after 75 years of age, and is influenced by several factors such as retirement, widowhood and health problems, in addition to being associated with greater cognitive and motor decline[27,28].

However, at 12 weeks, there was a significant increase in this aspect in the PG and CG groups. An increase in the mean score in this facet was also observed in the RTG, but it was not significant. In other words, the involvement of older women in the study, in addition to providing physical and psychological benefits, contributed to the exchange of experiences and social activities with people of the same age group and gave them a better perception of QoL in this regard. In this perspective, it is essential that older adults are encouraged by health professionals and family members to participate in activities in the community that favor such an insertion in social life.

Another facet worthy of note in the evaluation is *Sensory Functioning*. This facet, which assesses sensory functioning and the impact of sensory losses on QoL, had the highest mean score in the three groups at the two assessment points. The sensory organs allow older adults to perceive the different situations which surround them in the environment in which they live, contributing to their integration with the environment[29]. For the older women evaluated, these issues were not evaluated negatively, possibly because they were younger seniors, for whom such sensory losses may not be especially present in their daily lives. In a study with active older women, Vagetti et al.[15] also found that the facet with the highest mean score was *Sensory Functioning*.

The CG had better scores in the *Past, Present and Future Activities* domain at the second evaluation time than the RTG. This facet describes satisfaction about achievements in life and the things that one yearns for. Often retirement, or children leaving home, makes older adults feel inadequate in their new role in society. With the perception that they are no longer needed, older adults have difficulty fitting into their social group and retaining perspectives of the future, and so tend to isolate themselves and exclude themselves from society, further accelerating the aging process[11]. It should be noted that the scarcity of research on the relationship between the WHOQoL-OLD questionnaire and the training methods investigated made it difficult to discuss the results, in order to establish comparisons with other studies.

In the initial evaluation, the total QoL of the RTG, assessed by the WHOQoL-BREF, was lower than that of the PG. After 12 weeks of training,

however, the QoL of the participants of the two groups was equal. In other words, 12 weeks of moderate intensity RT were shown to be effective in improving the general QoL of practitioners in this group. The results of this study have been confirmed by others that demonstrate that there is indeed a positive relationship between PA and QoL. However, the type of PA and the intensity at which the activity is performed influences and contributes to different aspects of the overall QoL and also its domains[15,30].

Studies found in literature that analyzed the effects of general PA on specific QoL domains found a more frequent association between PA and the *Psychological* and *Physical* domains[1,15,16,31]. In analysis with the WHOQoL-BREF, neither domain showed a significant difference, however, the highest scores were in the *Psychological* domain. At the end of the study the highest mean scores of both the RTG and the PG were in the *Psychological* domains, suggesting that the activities performed improved the self-esteem and body image of older adults, improving their perception of this domain.

The *Environment* domain, despite not exhibiting a statistically significant difference, had the lowest mean score in the three groups at the two evaluation times. A household survey carried out with 1691 older people also obtained the lowest QoL scores in the *Environment* domain, corroborating the data found in the present study[26]. The authors believe a possible hypothesis for this result is related to the limited financial resources of older adults, which can contribute to more fragile security and housing conditions and fewer opportunities for leisure and recreation. The physical environment in which older adults are inserted can have a positive or negative influence on QoL[32]. According to the WHO[20] (2010), older adults who perceive the environment in which they live as being unsafe and having few leisure attractions are less likely to leave the house, becoming more susceptible to social isolation and depression.

When evaluating the SF-36, it was noticed that at the end of the intervention the RTG and the CG had higher *Vitality* scores than the PG. The *Vitality* domain evaluates levels of energy and fatigue, with low values meaning the individual feels tired and worn out most of the time, and high values indicating that they feel animated and energetic[23]. Although this domain includes issues that seem to be influenced by the practice of PA, this relationship has not yet been made clear in literature. A review on the subject found that existing evidence on this relationship remains inconsistent[33].

The *Mental Health* domain improved significantly in the RTG. A similar result was found in the study by Kimura et al.[34], where only this domain improved among older adults after 12 weeks of RT. The authors argue that the lack of positive results in other QoL domains is not related to the ineffectiveness of the PA program, but rather, is explained by the fact that the sample investigated was composed of healthy and active older adults who had a good QoL at the beginning of the intervention, as in the present study. Pimenta et al.[35] found that the regular practice of PA was associated with better QoL in the *Mental Health* domain in retirees. Vagetti et al.[15] in their systematic review of QoL and PA in older adults, found that the evidence gathered points to a consistent association between PA and the *Mental Health* domain. This domain is associated with issues related to four dimensions: anxiety, depression, loss of emotional control and psychological well-being[23]. In the present study, the fact that the older adults were beginning a new PA program and had a new purpose in life with a twice-weekly commitment, with greater social participation, proved to be beneficial for the mental health of older participants in the RTG.

The study had some limitations: (1) only women were evaluated, which prevents us from expanding the findings to both sexes; (2) the lack of representativeness of the sample, in relation to the city of Brasília; (3) the broad age range of the sample; (4) the use of the IPAQ questionnaire to assess the practice of PA, which, as it is based exclusively on memory, may overestimate or underestimate the level of PA; and (5) the fact that the CG participated in activities that may have benefited QoL.

However, despite these limitations, it is important to highlight the relevant aspects of the study, namely: (1) the randomized experimental design and blinding of the participants, who were not aware of the purpose of the study, or whether they were part of the control or treatment group; (2) the originality of

comparing the effects of QoL in older practitioners of Pilates and RT (no similar study has been identified in literature to date); (3) the application of the most frequently used QoL questionnaires in literature, including the analysis of general and also specific QoL for older adults. Furthermore, the evaluation of different questionnaires allowed for a more complete evaluation, as they address different QoL domains.

CONCLUSION

In closing, it was found that both Pilates and resistance training proved effective in improving the quality of life of the older adults investigated, and should be encouraged among this population. The findings of the present study make a relevant contribution to the understanding of health professionals of the relationship between exercise and quality of life, contributing to the implementation of health interventions aimed at promoting quality of life in older adults.

However, further investigations with larger samples, stratified by sex and age, are required to assess how these two types of exercise relate to the different domains of quality of life.

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Negative self-rated health in older people associated with socioeconomic conditions and health: a population survey in Rio Branco, Acre

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Abstract

Objective: To estimate the prevalence of negative self-rated health and its association with socioeconomic conditions, depressive symptoms, self-reported functionality, and morbidities in older people in Rio Branco, Acre. *Method*: This is a survey carried out with data from Estudo das Doenças Crônicas em Idosos (EDOC-I - Study of Chronic Diseases in Older People), a household survey carried out with people aged 60 and over living in Rio Branco, Acre, Brazil, in 2014 (n=1,016). Negative self-rated health was defined by the "bad" and "very bad" strata. The scales of geriatric depression and activities of daily living and instrumental activities of daily living were applied. As a measure of association between negative self-rated health and variables of interest, the multiple logistic regression technique was used. *Results*: The prevalence of negative self-rated health was 15.4%, with a statistically significant association with females (OR: 1.72; 95%CI:1.17-2.51), low education (OR:2.33; 95%CI:1.37-3.97), sedentary lifestyle (OR:1.84; 95%CI:1.08-3.14), and medication use (OR:3.01; 95%CI:1.52-5,95). An association was also detected with depressive symptoms (OR:2.55; 95%CI:1.74-3.73), presence of multimorbidities (OR:1.73; 95%CI:1.15-2.61), and total dependence on instrumental activities of daily living (OR:2.42; 95%CI:1.40-4.17). The morbidities associated with the negative perception of health were asthma/bronchitis (OR:2.74; 95%CI:1.61-4.67), insomnia (OR:1.80; 95%CI:1.25-2.58),

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and heart problems (OR:1.77; 95%CI:1.18-2.68). *Conclusion*: Therefore, the negative self-rated health of older people is influenced by socioeconomic and health conditions, being a useful indicator for the design of health strategies to favor aging with independence and physical and emotional well-being.

INTRODUCTION

Population aging is also a reality in Brazil resulting in changes in the pattern of morbidity and mortality. Aging is inevitable and progressive, as well as the phenomena that come with it, like organic wear, changes in cultural, social, and emotional aspects. Said changes influence the self-rated health since the idea of aging, health, and disease permeates and suffers the action from the socio-historical moment built by a variety of physical, cultural, and affective components, allowing the confusion of clinical and non-clinical conditions[1].

The factors considered in the individual when assessing their health status are not yet fully defined but include different aspects such as sociodemographic indicators, health conditions, and decreased functionality among the older people[2]. It should be mentioned that the correlation between objective and subjective health tends to decrease with aging. However, given the conditions of disability, presence of morbidities, and depression, there is an increase in the prevalence of negative self-rated health[3].

In a systematic review with studies from 1999 to 2011, the prevalence of negative self-rated health among older people ranged from 12.6 to 51.9%. In the presence of diseases, an association was observed with the use of medications, family income, hospitalizations, medical appointments, dependence on activities of daily living, symptoms of depression and anxiety, and insomnia[4].

Understanding the factors associated with negative self-rated health in older people makes it possible to identify and monitor the general health conditions of this population. It also allows comparing its results with those of other regions of the country, since studies on this topic in the Amazon are scarce. Therefore, the objective of the present study was to estimate the prevalence of negative self-rated health and its association with socioeconomic conditions, depressive symptoms, self-reported functionality, and morbidities in older people in Rio Branco, Acre, Brazil.

METHOD

This is a survey carried out with data from Estudo das Doenças Crônicas em Idosos (EDOC-I - Study of Chronic Diseases in Older People)[5], a household survey carried out with older people (aged 60 and over) living in Rio Branco, Acre state, Brazil, in 2014. With a sampling plan by clusters in two stages, census enumeration area (CEA) and household, all older people residing in the selected households of each of the 40 surveyed CEAs were included. Individuals with compromises that hindered communication or the understanding of the questions were excluded.

The sample size of the EDOC-I was determined assuming a prevalence of 40.0% of changes in renal function, with a confidence level of 95.0% and an absolute error of 3.0%. The final sample included 1,016 older people, which based on the calibrated weights of the observations allowed inferential estimates for the population of 23,416 older people living in Rio Branco on July 1st, 2014. More information on the sampling plan, instruments, and protocols for data collection can be found in the methodological article previously published by Amaral et al.[5].

Data were collected from March to September 2014. Home interviews were carried out to investigate the socio-economic, demographic, and health conditions, as well as the participants' lifestyle habits. The physical condition was also assessed with anthropometric, heart rate, and blood pressure measurements, in addition to collecting blood and urine samples for clinical analysis.

The body mass index (BMI) was assessed according to the specific cutoff points for the older population: low weight (BMI <22kg/m^2), eutrophic (BMI between 22kg/m^2 and 27kg/m^2), and overweight (BMI >27kg/m^2).

The presence of arterial hypertension was defined as diastolic blood pressure (DBP) ≥90 mmHg and/or systolic blood pressure (SBP) ≥140 mmHg and/or current use of antihypertensive medication. For diabetes mellitus, the criteria of the American Diabetes Association (ADA) were used: fasting plasma glucose ≥126 mg/dl, as well as the use of oral hypoglycemic medication or insulin[6].

Dyslipidemia was defined by the presence of abnormal levels of one or more of the following blood lipid components: total cholesterol ≥200 mg/dl; LDL-C ≥60 mg/dl; triglycerides ≥50 mg/dl; and HDL-C in men <40 mg/dl and women <50 mg/dl, in addition to reports of medication used to reduce these values[7].

Multimorbidity was considered from two cutoff points, one considering the presence of 2 or more chronic diseases and the other 3 or more.

The Geriatric Depression Scale (GDS-15) was used for the presence of symptoms of depression. The scale was adapted and validated for the Brazilian population by Almeida and Almeida[8]. This scale's score ranges from 0 to 15, with 6 points being considered as a suggestive case of the disease.

The Katz Index for Activities of Daily Living (ADL) and the Lawton and Brody scale for Instrumental Activities of Daily Living (IADL) were used to assess the functional capacity. The Katz scale has already been validated for Brazil[9], and assesses the level of autonomy of older people to perform six daily activities: dressing; bathing; going to the bathroom; sitting, lying down, and getting up from the bed or a chair; continence; and feeding. The score varies between 0 and 6 points, with 1 point attributed to each answer *Yes*. Based on the Katz scale, older people were classified as independent (6 to 5 points), partially dependent (4 to 3 points), or totally dependent (less than 3 points).

The scale of Instrumental Activities of Daily Living (IADL) adapted to Brazilian Portuguese[10] consists of eight activities: taking care of the house, doing laundry, cooking, shopping, using the telephone, taking transportation, managing money, and managing medication. For this scale, those older people who reached 27 points were classified as independent, between 26-18 points as partially dependent, and less than 18 points as dependent.

The dependent variable of the present survey was obtained from the answers to the question, *in general, would you say that your health is very good, good, regular, bad, or very bad?* Those that indicated the strata *bad* and *very bad* were defined as having negative self-rated health.

Thirty (30) older people were interviewed and physically evaluated in the pilot study for information quality control[5].

The data were analyzed in a descriptive and exploratory way to assess the distribution and characterize the studied population. The variables were described by absolute frequencies and ratios, with the differences between ratios estimated by the Pearson's chi-square test.

The bivariate analysis was performed to explore the association between different variables and the object of study. The logistic regression models estimated the association magnitude in odds ratio (OR) between the dependent variable 'negative self-rated health' and the independent variables.

In the multiple analysis, variables that had $p<0.20$ were included in the raw analysis, and the magnitude of association of the variables adjusted by the other significant variables was estimated. The hierarchical model was used. In it, the demographic and socioeconomic variables are in the first level, life habits and health conditions in the second one, and morbidities and factors related to diseases in the third one. The significant variables in one step remained in the model in the following steps. Additionally, the multiple regression analysis was performed for the presence of multimorbidity, depressive symptoms, and functional capacity. The significance level adopted was $\alpha = 0.05$.

All analyzes took into account the effect of the sample design and the calibrated weights of the observations from which the ratios were defined. The frequencies of observation in the sample were expressed by 'n', and the population inferences by 'N'.

The EDOC complied with the provisions of Resolution of National Health Council (CNS)

466/2012 which deals with ethics in research involving human beings, and was approved by the Research Ethics Committee (CEP) of the Federal University of Acre, under opinion No. 1.610.359.

RESULTS

The prevalence of negative self-rating among older people in Rio Branco in 2014 was 15.4%. The prevalence in the regular stratum was 47.9%, and the positive self-rating was 36.7%. In the analysis of negative self-rating, higher prevalences were observed in females, education up to elementary school, and a sedentary profile ($p<0.05$) (Table 1).

Higher prevalences of negative health perception were also observed among older people who use medication, with a history of hospitalization in the 12 months before the interview, and among those who reported suffering from asthma/bronchitis, insomnia, poor blood circulation, heart problems, and osteoporosis (all with $p<0.05$) (Table 2).

In the presence of depressive symptoms and dependence on IADLs, the prevalence of negative self-rated health was greater than 25.0%. The negative self-rating also had a higher prevalence among older people with multimorbidity assessed for two or more chronic morbidities and three or more ($p<0.05$) (Table 2).

The multivariate analysis adjusted by the hierarchical level at the distal level revealed statistically significant associations between negative self-rated health and sex and education. At the intermediate level, an association with sedentary lifestyle was detected, and at the proximal level with the use of medication, presence of asthma/bronchitis, insomnia, and heart problems (CHF, arrhythmias, acute myocardial infarction) (Table 3).

The presence of depressive symptoms, multimorbidities, and functional dependence increased an individual's chance of negatively self-rating health after adjustment by potentially confounding variables (Table 4).

Table 1. Prevalence of negative self-rated health according to sociodemographic characteristics and lifestyle in older people. Rio Branco, Acre, Brazil, 2014.

Variables	Total	Negative Self-rated Health		*p-value* [a]
	N	n	N (%)	
Total	23,416	1,016	3,610 (15.4)	
Age (years)				0.081
60-79	20,081	842	2,905 (14.5)	
80 and over	3,335	174	705 (21.2)	
Gender				0.009
Male	10,896	418	1,283 (11.8)	
Female	12,520	598	2,327 (18.6)	
Marital status*				0.453
Common-law marriage	9,086	376	1,271 (14.0)	
No common-law marriage	14,172	633	2,277 (16.1)	
Skin color				0.591
White	5,614	250	931 (16.6)	
Not white	17,802	766	2,679 (15.0)	
Education*				0.001
High school and higher education	3,789	156	299 (7.9)	
Up to elementary school	19,434	852	3,287 (16.9)	

to be continued

Continuation of Table 1

Variables	Total	Negative Self-rated Health		*p-value* [a]
	N	n	N (%)	
Physical activity*				0.003
Yes	3,577	151	293 (8.2)	
No	19,839	865	3,317 (16.7)	
Smoking*				0.882
Non-smoking	6,763	294	1,020 (15.1)	
Smoker / ex-smoker	16,653	722	2,590 (15.6)	

*The differences regarding the total are due to the lack of information in the variable; [a]Pearson's chi-square; N = population inference based on the sample design.

Table 2. Prevalence of negative self-rated health according to health conditions, presence of morbidities, multimorbidity, depressive symptoms, and functionality in older people. Rio Branco, Acre, Brazil, 2014.

Variables	Total	Negative Self-rated Health		*p-value* [a]
	N	n	N (%)	
Use of medication				<0.001
No	5,871	237	332 (5.7)	
Yes	17,545	779	3,278 (18.7)	
BMI (kg/m²)*				0.100
<22	2,789	128	583 (20.9)	
22 to 27	10,042	432	1,292 (12.9)	
>27	9,204	397	1,568 (17.0)	
Central obesity (CC)*				0.410
CC≤102M or ≤88F	14,381	610	2,120 (14.7)	
CC> 102M or> 88F	7,871	357	1,364 (17.3)	
Hospitalization in the last 12 months*				0.003
No	18,868	818	2,614 (13.9)	
Yes	3,746	162	823 (22.0)	
Arterial hypertension*				0.251
No	5,458	235	1,002 (18.4)	
Yes	17,385	759	2,584 (14.9)	
Diabetes*				0.226
No	18,843	820	2,740 (14.5)	
Yes	3,834	166	705 (18.4)	
Dyslipidemia*				0.930
No	4,585	198	696 (15,2)	
Yes	18,031	785	2.782 (15,4)	
Self-reported morbidities				
Asthma/bronchitis				<0.001
No	21,067	913	2,853 (13.5)	
Yes	2,275	100	725 (31.9)	

to be continued

Continuation of Table 2

Variables	Total	Negative Self-rated Health		*p-value* [a]
	N	n	N (%)	
Insomnia*				0.001
No	15,333	658	1,904 (12.4)	
Yes	8,039	356	1,706 (21.2)	
Poor circulation				0.047
No	2,018	632	2,018 (13.6)	
Yes	8,437	379	1,518 (18.0)	
Heart problems*				<0.001
No	19,843	858	2,547 (12.8)	
Yes	3,245	144	880 (27.1)	
Encephalic Vascular Accident*				0.513
No	22,313	967	3,480 (15.6)	
Yes	1,026	46	130 (12.7)	
Osteoporosis*				0.007
No	19,473	829	2,703 (13.9)	
Yes	3,453	164	775 (22.4)	
Depression (GDS)*				<0.001
No	15,666	671	1,658 (10.6)	
Yes	7,558	337	1,908 (25.2)	
Multimorbidity*				
No	10,019	419	1,112 (11.1)	0.002
Yes (≥2)	13,398	597	2,498 (18.6)	
No	14,786	627	1,708 (11.6)	<0.001
Yes (≥3)	8,630	389	1,902 (22.0)	
ADL*				0.898
Independent	17,539	760	2,684 (15.3)	
Partial dependence	4,000	176	584 (14.6)	
Total dependence	1,771	75	299 (16.9)	
IADL				< 0.001
Independent	11,908	490	1,309 (11.0)	
Partial dependence	9,079	412	1,657 (18.3)	

*The differences regarding the total are due to the lack of information in the variable; [a]Pearson's chi-square; N=population inference based on the sample design; BMI=Body Mass Index; GDS=geriatric depression scale; IADL=instrumental activities of daily living; ADL=activities of daily living.

Table 3. Hierarchical model of negative self-rated health according to independent variables in older people. Rio Branco, Acre, Brazil, 2014.

Variables	OR_{Crude} (95%CI)	OR_{Adjust} (95%CI)
Distal level		
Age (≥80 vs. 60-79)	1.59 (0.94 - 2.68)	1.47 (0.86 - 2.51)
Gender (female vs. male)	1.71 (1.15 - 2.55)	1.72 (1.17 – 2.51)
Education (up to element. vs. ≥ high school)	2.37 (1.40 – 4.01)	2.33 (1.37 – 3.97)
Intermediate level		
Physical activity (sedentary vs. active)	2.25 (1.33 – 3.78)	1.84 (1.08 – 3.14)
BMI (kg/m^2)*		
< 22 vs. 22 – 27	1.79 (1.15 – 2.79)	1.58 (0.99 – 2.52)
> 27 vs. 22 – 27	1.39 (0.87 – 2.22)	1.31 (0.82 – 2.10)
Proximal Level		
Use of medication (yes vs. no)	3.84 (2.11 – 6.98)	3.01 (1.52 – 5.95)
Hospitalization (yes vs. no)	1.75 (1.22 – 2.51)	1.31 (0.83 – 2.09)
Asthma/Bronchitis (yes vs. no)	2.98 (1.82 – 4.89)	2.74 (1.61 – 4.67)
Insomnia (yes vs. no)	1.90 (1.30 – 2.78)	1.80 (1.25 – 2.58)
Poor circulation (yes vs. no)	1.39 (1.00 – 1.94)	1.05 (0.76 – 1.45)
Heart problems (yes vs. no)	2.53 (1.73 – 3.70)	1.77 (1.18 – 2.68)
Osteoporosis (yes vs. no)	1.79 (1.18 – 2.74)	1.19 (0.73 – 1.96)

OR=*Odds Ratio*; CI=confidence interval; OR_{adjust}=adjusted *Odds Ratio*. Distal level adjusted by the distal variables between them; Intermediate level adjusted by the intermediate variables between them and by the significant variables of the distal level; Proximal level adjusted by the proximal variables and significant variables of the distal and intermediate levels. Up to element. = education up to elementary school; ≥ high school = greater than or equal to high school; BMI = Body Mass Index.

Table 4. Logistic regression analysis of the presence of multimorbidity, depressive symptoms, and functionality with negative self-rated health in older people. Rio Branco, Acre, Brazil, 2014.

Variables	OR_{Crude} (95%CI) (model 1)*	OR_{Adjust} (95%CI) (model 2)**	OR_{Adjust} (95%CI) (model 3)***
Depression (GDS)			
Yes vs. No	2.85 (1.91 – 4.26)	2.69 (1.85 – 3.93)	2.55 (1.74 – 3.73)
Instrumental activities of daily living			
Partially dependent vs. Independent	1.81 (1.23 – 2.65)	1.71 (1.12 – 2.60)	1.63 (1.06 – 2.51)
Totally dependent vs. Independent	2.82 (1.71 – 4.65)	2.64 (1.51 – 4.62)	2.42 (1.40 – 4.17)
Multimorbidity (≥2)			
Yes vs. No	1.84 (1.26 – 2.68)	1.69 (1.14 – 2.51)	1.73 (1.15 – 2.61)
Multimorbidity (≥3)			
Yes vs. No	2.16 (1.63 – 2.87)	1.97 (1.44 – 2.72)	1.93 (1.37 – 2.72)

*model 1: crude; **model 2: adjusted by gender and age; ***model 3: adjusted by gender, age, education, and physical activity. GDS = geriatric depression scale.

DISCUSSION

A moderate prevalence of negative self-rated health (15.4%) was identified among older people who considered their health bad or very bad in Rio Branco, Acre, in 2014. The negative perception of their health was associated with depressive symptoms and dependence on instrumental activities of daily living. Associations with the female gender, low education, sedentary lifestyle, and use of medications were also observed in addition to the association with self-reported asthma/bronchitis, insomnia, heart problems, and multimorbidities.

In comparison with the results of some international studies[11,12], the prevalence of negative self-rated health in older people in Rio Branco is much higher than that observed in Argentina and lower than that presented in Mexico. A study with 436 older people carried out in Córdoba, Argentina in 2011 revealed a prevalence of 8.3%[11]. However, a study with 8,874 older people aged 60 and over carried out in Mexico in 2012 detected a prevalence of 18.1%[12].

The older people of Rio Branco have a higher prevalence of negative perception of health compared with the results of national studies[13-15]. Data from 1,344 people aged 60 or over in the city of São Paulo in 2010 showed that the prevalence of negative self-rated health was 7.8%[13]. In the city of Campinas, São Paulo, the prevalence among individuals of the same age group between 2008 and 2009 was 10.9%[14]. In Minas Gerais, the prevalence with 686 older people was 13.5%[15].

Studies on self-rated health should be carefully compared since many studies include the regular category as a negative assessment, thus overestimating the prevalence values and consequently compromising the association estimates. It is recommended to use only the categories bad and very bad to define the negative health perception[4].

Among the conditions associated with negative self-rated health, older women had a worse assessment of their health. They appear as the majority, a feminization phenomenon of aging resulting from a life expectancy higher than that of men, and they also represent the highest frequency of negative self-rated health compared to men[16].

In a study carried out in São Paulo[13], the chance of negative self-rated health was almost twice as high in females as in males, thus corroborating the findings of the present study. It implies a paradox to be faced by women as they live longer, although in worse health conditions, which can be partly explained by the lower levels of education and time for leisure activities, besides the biological reasons like the reproductive function - women experience a delicate postmenopausal period, although with a low risk of death[17].

Inequalities are not restricted to the gender variable. Data from Pesquisa de Orçamentos Familiares (Family Budget Survey - POF 2008 - 2009) reveal that access to basic services is worse among those with low income and less education[18], with an association between lower education and negative self-rated health being observed among older women in the present study. At the global level, social inequalities in health are problems affecting everyone since regardless of the country in which they live, individuals who live in worse socioeconomic conditions are the most susceptible to several health problems, and therefore with worse health assessment[19].

A national study[20] analyzing data from 1998 to 2013 pointed to a 7 to 9 times greater chance of negative self-rated health in Brazilians with a low education level when compared to those with a higher education level. It is worth noting that despite the progress in education levels during this period, there was no reduction in the prevalence of negative perceptions of one's health, pointing out the need to improve people's chronic conditions and mental health to bring a positive impact on the Brazilian's self-perception of health.

Regarding the association observed between the use of medication and negative perception of health, two perspectives must be considered: the first is that the use of medication indicates the presence of morbidities, which explains the worse self-rated health; another important consideration is that the adverse effects resulting from medication may have a worse effect on health perception[21].

A study with 1,705 older people carried out in Florianópolis in 2009 revealed a prevalence of polypharmacy of 32.0%, with the most used groups

of medications being those prescribed for the cardiovascular system, alimentary tract, metabolism, and nervous system[22]. It is noteworthy the need for greater care on the use of medication for older people to ensure adherence and avoid complications.

The prevalence of cardiovascular diseases (CVD) has increased in the older population partly due to the increased life expectancy and increased exposure to risk factors[23]. In the United States, about 82.0% of all deaths in older people (≥65 years) are attributed to CVD, and these diseases are important in the occurrence of disabilities, functional decline, health costs, and declining health perception, thus confirming the findings of the present survey, which imposes the need to ensure expectancy of an active life and not only the survival expectancy of older people[24]. In Brazil, CVD is the leading cause of death. However, it has shown a downward trend, mainly in the age group from 50 to 69 years[25].

In the present study, asthma/bronchitis was associated with negative self-rated health, as observed in a study conducted in Montes Claros, Minas Gerais, in which the self-report of asthma was three times higher in individuals with negative self-rated health[15].

If the presence of a single morbidity may result in a change in the perception of one's own health, multimorbidity is even more impactful since the greater number of diseases generates physical, social, and mental complications in older people resulting in worse self-rated health[26]. Data from a review study identified that the prevalence of multimorbidity in older people in Brazil ranges from 30.7% to 57.0%, being associated with the socioeconomic and demographic conditions, lifestyle, and family structure[27]. In another study with older people in the municipalities to the north of Rio Grande do Sul, the presence of multimorbidities increased the negative self-rated health by 29.0%[28].

The association between depression symptoms and negative self-rated health identified among healthy people in the present study was also observed in another study[14]. Besides physical health conditions, psychic conditions also have an important effect on health perception. Data from the World Health Organization reveal that the older population will reach 22.0% of the world population in 2050, and mental health and well-being are important at this point in life since 15.0% of older people (≥60 years) suffer from some mental disorder, 7.0% and of these are due to depression[29]. Depression is a common disorder in older people affecting their functional capacity and being associated with somatic diseases leading to social isolation and worsening the quality of life.

In Montes Claros, Minas Gerais, the presence of depression was associated with a two-fold increase in negative self-rated health[30]. Data from the EpiFloripa Idoso survey with 1,656 older people associated bad self-rated health with symptoms of depression (PR=2.64; 95%CI 1.82-3.83), and functional dependence (PR=1.83; 95%CI 1.43-2.33)[31]. As the population ages, the prevalence of chronic and disabling diseases increases leading to changes in the person's abilities which can cause considerable changes in the performance of daily activities[32].

Aging can result in loss of independence due to mobility restrictions, frailty, and decreased functional fitness and cognitive abilities, with specific programs and policies being important to keep older people healthy and independent throughout life[33]. According to Campos et al.[34], the prevalence of functional disability in Brazil ranges from 13.2% to 85.0%.

Amid the demographic transition, researchers and health professionals should focus on the interactions among functional capacity, aging, morbidity, and their relevance to patient-centered goals. It is worth mentioning that the processes contributing to the susceptibility to the disease and the decline in functional status are inherent to age. Among the most important systemic and cellular components for functional capacity are mitochondrial dysfunction, oxidative stress, abnormal calcium management, chronic inflammation, cellular senescence, extracellular matrix production, loss of telomere structures, and little DNA repair capacity[35].

It is worth considering that the present study presents specific limitations and also strengths that should be considered. The first limitation is the survival bias inherent to cross-sectional studies with older people. However, the exploratory nature of the analyses presented here and the non-intention of making causative inferences are emphasized. On the other hand, the probabilistic sampling whose

estimates are inferential for the older population of the municipality of Rio Branco is shown as a strong point of the study. Also, the exclusion of individuals with impaired cognitive capacity could lead to errors in the estimates of functionality since they are more likely to be functionally dependent.

Another point to be acknowledged as limiting of the findings is the use of self-reported measures for some health conditions that may underestimate or overestimate the prevalence. Moreover, some morbidities were defined by clinical and laboratory criteria. Therefore, it is a study with objective and subjective data of health conditions to assess negative self-rated health, depression, and functional disability in older people. This dangerous triad has repercussions on the quality of life and well-being of this group.

CONCLUSION

The older population of Rio Branco has a moderate prevalence of negative self-rated health, and this self-rating is associated with depression and dependence on instrumental activities of daily living, as well as self-report of asthma/bronchitis, insomnia, heart problems, and multimorbidities. An association was also observed with females of low education, sedentary lifestyle, and in use of medication.

Actions to monitor physical and psychological conditions should be a constant in the health care of older people, and the functional capacity, symptoms of depression, and self-rated health need to be assessed and used to guide preventive actions. Self-rated health is an important indicator of physical and mental health status and can be used in studies and the follow-up of the health of the older population.

The use of the present finding may be useful to design health strategies favoring aging with independence and physical and emotional well-being. Further research should be carried out with methods to allow verify causality.

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Medical practice for the management of dementias in the municipalities that are center of residency in family healthcare in Minas Gerais

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Abstract

Objective: To analyze the practice of medical professionals in Primary Health Care (PHC) in municipalities that are centers of Residency in Family Healthcare in Minas Gerais (MG), Brazil. *Method:* This is a cross-sectional and analytical study carried out from March to October 2018 with doctors and resident doctors who worked in the Family Health Strategy teams in eight municipalities in MG. The sociodemographic characteristics, participation in specific training for dementia, and practices of doctors in caring for the old person with dementia were evaluated. *Results:* Among the professionals, most were female (63.4%) aged 30 years or less (57.7%), and did not participate in training for dementia (60%). It was observed that most doctors diagnosed the pathology in the moderate to the severe stage (67.5%). Among the difficulties in identifying cases of dementia, the following stood out: poor use of complementary exams (26.8%) and difficulty in differentiating signs and symptoms of dementia from their main differential diagnoses (50%). Participation in training influenced the difficulties in identifying the cases (p=0.019), differentiation of signs and symptoms (p=0.018), confidence in the diagnosis (p<0.001), responsibility for the diagnosis by the specialized service (p=0.019), and low availability of time by professionals (p=0.015). *Conclusion:* Practical education in dementia provided to health professionals during medical training is still incipient and requires improvement, demanding educational interventions with the PHC team, and improvement of protocols aimed at early diagnosis and management of dementia.

Keywords: Dementia. Inservice Training. Health Personnel. Education. Primary Health Care.

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INTRODUCTION

Medical training requires a close relationship between theoretical and practical teaching and public health services to enable students to become familiar with the main health problems of the community[1]. All scenarios of the medical practice must be present during the training process, so there must be an effective performance in Basic Healthcare Units (UBS), specialty outpatient clinics, and hospitals. This should be a priority in the educational and social spheres as it will allow the development of a professional profile familiarized with the public health problems and health policies in the country. It also identifies the need for training based on social responsibility along with educational activities to promote improvement to different scenarios of the professional practice[2].

Primary Health Care (PHC) was developed based on a high decentralization and became the entry to the healthcare services through the UBS, which maintain communication between the community and the other levels of health care[3]. Its importance is based on the possibility of offering easy access to the public healthcare system, also providing a resolute response to most of the population's health problems[4].

It is necessary to establish direct contact with the PHC through actions to prevent diseases and promote health. This allows an eventual discussion on the curricular improvement of such practices[5]. Strengthening of intersectoral integrations promotes greater effectiveness of primary care, which requires not only better medical performance but also from government sectors[6].

In this context, the Family Healthcare Residency programs are PHC settings, contribute to the development of more assistance and humanized professional profile to meet the healthcare needs of individuals, family, and the community[7]. The institutionalization of the teaching-service-community relation through these programs, in addition to expanding the learning environment, helps the Unified Health System (SUS) improve the care provided to the population[8].

Population aging is recognized worldwide, and the Brazilian Institute of Geography and Statistics (IBGE) estimates that in 2050 the share of the old population in Brazil will be about 58.4 million, representing approximately 26.7% of the Brazilian population. An important fact of this process is the prevalence of chronic non-communicable diseases, which contribute to an increase in the number of deaths, hospitalizations, institutionalizations, and decreased individual's functional and cognitive capacity. Among these diseases is dementia, which has become a public health problem[9].

Dementia is a clinical condition comprising cognitive deficit that generates damage to memory, the notion of spatial vision, reasoning, and judgment[10]. The number of cases of dementia increased by 117% between 1990 and 2016 worldwide, going from 20.2 million in 1990 to 43.8 million in 2016, with an increase of 1.7% in prevalence by age in the same period[11]. Also, about 47 million people have dementia, almost 60% in low- and middle-income countries. In 2030, there are a projected 75 million people with dementia and 132 million in 2050[12].

In Brazil, it is believed that dementia affects about 2 million old people, with an average of 40 to 60% due to Alzheimer's disease[13]. A Brazilian study carried out mainly in the southeastern region revealed a percentage of cases of dementia varying from 5.1 to 17.5% in the country[14]. Among the main psychiatric morbidities analyzed during hospitalization of old people in the country between 2008 and 2014, dementia contributed with the highest number of deaths, with the Southeast being the region with the highest mortality rate[15].

It is important to emphasize that dementia syndromes are the main causes of loss of autonomy in old age, requiring constant care during this disease which without early diagnosis and adequate treatment results in total patient dependence since there is no cure or treatment to effectively change the course of the disease[16].

Regarding the approach of dementia in basic healthcare units, the training offered by medical schools provides students with incipient knowledge

on cognitive changes through a theoretical basis that may be efficient, but further training focusing on the diagnosis and early recognition of changes suggestive of dementia in this environment is still necessary[17]. The qualification of PHC healthcare professionals can help in the early and favorable diagnosis of dementia, thus allowing an appropriate follow-up[3].

The importance of prior recognition of the signs and symptoms of dementia is justified by its great social impact and the benefits of an early therapeutic intervention[18]. Thus, it is necessary to identify what are the main difficulties that PHC professionals face in screening for dementia syndromes. Studies aimed at evaluating the knowledge of these healthcare professionals appear as a tool to improve protocols and conducts in the management of dementia[3].

This study aimed to analyze the practice of medical professionals in PHC in municipalities centers of Family Healthcare Residency in Minas Gerais, Brazil.

METHODS

This is a cross-sectional and analytical study carried out at the PHC of municipalities that are centers of Family Healthcare and Community Medicine Residency and Multiprofessional Residency in Family Healthcare of Universidade Estadual de Montes Claros (UNIMONTES). The study was carried out with the population of PHC doctors and residents who worked in the UBS teams in the municipalities of the north of Minas Gerais: Montes Claros (158 teams), Taiobeiras (15 teams), Salinas (17 teams), Pirapora (17 teams), Janaúba (24 teams), Porteirinha (17 teams), Coração de Jesus (13 teams), and Bocaiúva (13 teams). During the study period, the population of approximately 274 medical professionals in the staff of these municipalities and 122 residents was estimated. This survey considered the number of teams registered in the National Registry of Health Facilities (CNES) and registered in the vacancies offered in the calls for bid for Family Healthcare and Community Medicine residency and Multiprofessional Residency in Family and Community Healthcare. The inclusion criterion used was being a professional working in PHC, and the exclusion criterion used was being away from work activities due to leave or any other reason and being on vacation.

Data were collected from March to October 2018 in scheduled visits to the Basic Healthcare Units. The professionals had been identified in their workplaces and invited to participate in the study. Professionals who were not present on the day of the visit received the questionnaire via e-mail.

For data collection, the instrument *Health Care for Dementia: the view of Primary Care* was applied in the version for doctors. The original instrument was developed and applied in Dublin by the *Dementia Services Information and Development Centre*. This instrument was adapted to the Brazilian context following the international standards of cross-cultural adaptation, and for that, the steps of translation, synthesis, back translation, review by a committee of experts (judges), and pretests were used[3]. For the present study, questions were used to contemplate the sociodemographic characteristics of gender (male or female), age (20 to 29, 30 to 39, 40 to 49, 50 or older), and self-declared skin color (white, black, brown, or yellow) in addition to the economic characteristic of income (minimum wages). Questions including the participation in specific training for dementia and the physician's practice in treating old people with dementia (screening and diagnosis methods) were also used.

The data was organized, tabulated, and later coded. Absolute frequencies (n) and relative frequencies (%) were calculated. To analyze the possible association between the variables, the Pearson's chi-square or the Fisher's exact tests were used. The level of significance adopted was 95%.

The research project is following Resolution No. 466/2012 and Resolution No. 510/2016. The present study was approved by the Research Ethics Committee (REC No. 2,483,632) and approved by the PHC Coordination and/or the health managers of the municipalities through the Institution's Informed Consent Form (ICF). Research participants were given or sent the Terms of Informed Consent Form (ICF).

RESULTS

138 physicians were participating in the present study, of which 35.5% (49) were attending a residency in Family Healthcare. The response rate was 34.8%. Among the doctors, 65.2% (90) were female, 38.4% (53) aged up to 39 years, 51.4% (71) self-declared white skin color, and 59.4% (82) had an income of 5 to 10 minimum wages.

Regarding education, 44.2% (61) were graduated, 27.5% (38) with specialization, 22.5% (31) residency, and 5.8% (8) master's or doctorate. Among the doctors interviewed, 97.8% (135) considered it important to carry out specific training activities in dementia. However, 60.9% (84) of the respondents denied having participated in training aimed at the diagnosis and management of dementia syndromes.

Regarding the frequency of diagnosing dementia, 52.9% (73) of the respondents stated that they had never/rarely been diagnosed. However, when they do, 67.8% (94) of doctors do it at a moderate/severe stage of the disease. Among the doctors who participated in the study, 15.9% (22) do not diagnose and refer the patient to a specialist.

Regarding the difficulties found in identifying a case of dementia, 61.6% (85) reported difficulties in differentiating the signs and symptoms of dementia compared to their main differential diagnoses, and 26.1% (36) identified the poor use of the complementary exams as a major difficulty. Participation in training in dementia significantly influenced the difficulties in identifying a case of dementia and in differentiating signs and symptoms of dementia (Table 1).

Table 2 shows the main aspects of the difficult diagnose of dementia. Of the doctors interviewed, 59.6% (81) reported little confidence in the diagnosis, 38.7% (53) considered that a specialized service should diagnose, and 87.5% (63) complained about the low availability of time to diagnose. These aspects were associated with the variable participation in training ($p<0.05$). It was observed that 13.8% (19) of the professionals stated that no aspect hinders the diagnosis.

Regarding the regular use of tests to assess the cognitive function, 71% (98) of the doctors interviewed used the mini-mental state exam, 27.5% (38) used the verbal fluency test category animal and/or fruit, and 34.1% (47) used the clock-drawing test. Participation in training was significantly associated with the use of the verbal fluency test category animal and/or fruit ($p=0.017$), and the use of the clock drawing test ($p=0.015$) (Table 3).

Considering the tests to assess functional capacity, 69.6% (96) claimed not using any tests. Regarding the complementary exams requested to diagnose the subtype of dementia, the following stood out: 68.6% (94) of blood counts, 63.5% (87) biochemistry with glycemia, 67.9% (90) thyroid-stimulating hormone, 69.3% (95) vitamin B12, 51.8% (71) folic acid. Among the physicians interviewed, 27.5% (35) reported not diagnosing the subtype of dementia and referring the patient to the specialist.

Table 1. Difficulties found in identifying a case of dementia by doctors in Primary Health Care. Montes Claros, MG, 2018.

Variables	Total	Participated in training	
	N (%)	n (%)	*p-value*
Identify a case of dementia*			0.019
Yes	119 (86.2)	42 (35.3%)	
No	15 (10.9)	10 (66.7%)	
Differentiate signs and symptoms of dementia*			
Yes	85 (62.5)	26 (30.6)	0.018
No	51 (37.5)	26 (51.0)	
Apply memory tests considering their low specificity			
Yes	27 (19.9)	9 (33.3)	0.558
No	109 (80.1)	43 (39.4)	
Apply complementary exams considering their poor use			
Yes	36 (26.5)	9 (25.0)	0.057
No	109 (73.5)	43 (43.0)	

*Presence of missing data.

Table 2. Aspects to hinder the diagnosis of dementia by doctors in Primary Health Care. Montes Claros, MG, 2018.

Variables	Total	Participated in training	
	N (%)	n (%)	*p-value*
Low diagnostic reliability*			
Yes	81 (59.6)	21 (25.9)	<0.001
No	55 (40.4)	32 (58.2)	
Make the specialized service responsible for carrying out the diagnosis*			
Yes	53 (38.7)	14 (26.4)	0.019
No	84 (61.3)	39 (46.4)	
Negative effect on the patient's biopsychosocial context*			
Yes	11 (8.0)	5 (45.5)	0.631
No	126 (92.0)	58 (38.1)	
Low availability of time to diagnose*			
Yes	87 (63.5)	27 (31.0)	0.015
No	50 (36.5)	26 (52.0)	

*Presence of missing data.

Table 3. Tests used to assess the cognitive function in the practice of Primary Health Care doctors. Montes Claros, MG, 2018.

Variables	Total	Participated in training	
	N (%)	n (%)	*p-value*
Mini-Mental State Examination			
Yes	98 (71.0%)	42 (42.9)	0.160
No	40 (29.0%)	12 (30.0)	
Functional cognitive assessment scale (FUCAS)			
Yes	26 (18.8%)	11 (42.3)	0.713
No	112 (81.2%)	43 (38.4)	
Verbal fluency test, animal and/or fruit category			
Yes	38 (27.5%)	21 (55.3)	0.017
No	100 (72.5%)	33 (33.0)	
Clock-drawing test			
Yes	47 (34.1%)	25 (53.2)	0.015
No	91 (65.9%)	29 (31.9)	
Montreal Cognitive Assessment (MoCA)			
Yes	7 (5.1%)	3 (42.9)	0.564
No	131 (94.9%)	51 (38.9)	
CERAD* word list			
Yes	12 (8.7%)	6 (50.0)	0.419
No	126 (91.3%)	48 (38.1)	
IQCODE**			
Yes	11 (8.0%)	5 (45.5)	0.442
No	127 (92.0%)	49 (38.6)	

*Consortium to Establish a Registry for Alzheimer's Disease (CERAD); **Informant Questionnaire on Cognitive Decline (IQCODE).

Among the physicians participating in the study, 81.2% (112) stated that they had difficulties in caring for patients with severe dementia considering complex pharmacological treatment as the main difficulties 51.4% (71), and the lack of specialized care support 40.6% (56). Regarding the treatment and monitoring of patients with dementia in Primary Care, the main difficulties were the use of specific drugs 59.4% (82), antidepressants 13% (18), antipsychotics 29.7% (41), benzodiazepines, sedatives, and hypnotics 22.5% (31), management of stiffness, tremor and other neurological disorders 38.4% (53), support the needs of the caregiver and/or the family 52.9% (73), lack of time to monitor and treat the patient 42.0% (58). Of the doctors interviewed, 4.3% (6) claimed not having any difficulties.

Regarding the frequency of planning specific monitoring for the caregiver of the patient with dementia, 67.0% (87) of the physicians reported that they had never/rarely done so. Regarding the influence factors for the physician not to inform the patient about the diagnosis of dementia, 31.9% (44) do not inform for the reason of the patient being at an advanced stage of the disease, 47.1% (65) are not able to understand the diagnosis information, and 21.7% (30) due to the family not wanting the patient to know their diagnosis.

DISCUSSION

In the present study, the medical practice in the face of dementia in PHC was evaluated, and it was demonstrated that most of the professionals interviewed did not participate in specific training activities in dementia and had difficulties not only in the diagnosis but also in the management and monitoring of patients with dementia, which shows an incipient understanding of dementia. The strategies used for cognitive evaluation were diverse, showing the knowledge of these professionals about the tests available. However, tests for functional evaluation had limited use. Besides, most doctors reported difficulties in treating severe cases of dementia and reported little planning for the follow-up of these patients.

The lack of knowledge about dementia by health professionals affects the understanding of the clinical progression of this pathology, in addition to postponing diagnosis and treatment which are essential for the mitigation of symptoms and delay of the disease[11]. Despite the growing demand for dementia treatment, little has been done in terms of professional training on this subject, since in many countries there are no educational programs focused on this topic[10]. The curricular guidelines of the Medicine course broadened the discussion on medical training, signaling the importance of PHC in this process, which requires new institutional arrangements and the expansion of strategies to train healthcare professionals committed to resolving and quality practices[2].

The Ministry of Health has created permanent education proposals for health professionals to provide better development of the professional practice[19]. In this context, the expansion of knowledge about the referral and counter-referral system through these educational actions contributes to developing an integrated system with the rapprochement between primary healthcare professionals and those working at other levels of the healthcare service[20].

The effective management of dementia is based on solid knowledge about pathophysiology, clinical manifestation, and pharmacotherapeutic among health professionals. Thus, the absence of early recognition is related to the lower levels of doctors' knowledge about the symptoms involved in dementia, which causes a barrier to reach timely diagnoses, which can be achieved through educational interventions, as demonstrated in a study carried out in 2017 in the United Kingdom[21].

In another study carried out in the state of Rio de Janeiro, six UBS teams from three municipalities were assessed regarding the work of health care for the old person. A total of 54 people were studied, being 30 community healthcare workers, 12 professionals with higher education, and 12 professionals with secondary education. The analysis of the content of individual interviews used analytical categories from the speeches. This study showed the deficiency in the healthcare provided to this group and the need for actions to value and include this population through effective improvement in training and greater integration of services and use of protocols to guide proper management and quality healthcare[22].

It is important to establish a training model in line with the particularities of the medical practice aimed at the old people and their main comorbidities[23]. A study of 450 health professionals in China evaluated the knowledge and approaches of cases of Alzheimer's disease and other dementias, demonstrating the importance of continuous learning about the pathology. Short-term educational interventions hinder the necessary in-depth learning or clinical confidence to recognize the dementia syndrome, requiring a deeper investigation to create policies related to the adequate recognition of the disease[24]. Therefore, in the case of specific dementia training, it is recommended that educational strategies take place, such as seminars, case discussions, availability of study materials, and management programs aimed at dementia syndromes along with the PHC teams, as the PHC is a center for Residency in Family and Community Healthcare. These measures tend to demonstrate a significant advance in the ability to suspect and deal with cases of dementia by healthcare professionals[19].

Besides, it was found that the dementia diagnosis is established most of the time when the clinical condition is moderate to severe. This is because patients with this disease already present cognitive deficits years before diagnosis. Although memory

impairments are relevant, the degree and speed with which other cognitive functions are impaired during the years preceding the clinical onset of the disease remain unclear[25]. Added to this is the fact that patients, family members, and/or caregivers seek healthcare services when this disease is no longer in its onset[3]. Another reason for the late diagnosis of dementia that cognitive impairment is believed to be normal in old people, which compromises the screening for cognitive deficit in old age[26].

Regarding the differential diagnosis, it is important not to confuse depression with the early stages of dementia or a mild cognitive impairment[27]. It is necessary to emphasize that there may be an association between cognitive disorders and depression, and depression may be a predictor for dementia[28].

Regarding the difficulties of doctor-patient communication, it is important to note that inadequate communication implies a lack of information and autonomy for the patient or caregivers[29]. Patients have the right to have truthful information related to their diagnosis and treatment, as well as the right to participate in decisions about appropriate management of their pathology[30]. Therefore, healthcare professionals must be trained for good communication skills[31].

Regarding treatment, physicians assisting the patient must institute a Singular Therapeutic Project (STP), with the monitoring of the patient and the periodic review of the prescribed drugs and their possible adverse effects being essential[32]. Monitoring by the multi-professional team is also essential, which reduces the burden on caregivers in addition to benefiting the treatment of dementia. Note that those who directly care for people with dementia become more susceptible to the development of chronic diseases. Therefore, it is important to preserve the physical and mental health of these caregivers, which can be done with programs that include psychotherapy and regular physical activities[33].

The present study has the possibility of information bias as a limitation. Data generalization is still limited by convenience sampling. The low response rate obtained must be considered and can be associated with the online nature of the survey. Even so, the results of this study are important because they come from a pioneering survey in the municipalities of northern Minas Gerais.

The information and evidence obtained in the present study should encourage healthcare professionals, especially those working in PHC, to be continuously updated on this topic. The data obtained also demonstrated the importance of investing in dementia training during medical training. Also, few studies have been devoted to the analysis of medical training for dementia in PHC, which corroborates the importance of the topic and the conduct of more research on the subject.

CONCLUSION

The present study demonstrated that the practical teaching directed to dementia provided to healthcare professionals in the study scenario during medical training is still incipient and requires improvement. The results obtained may contribute to the knowledge in the area and discussions regarding the teaching and learning process in the medical field.

The early diagnosis of dementias allows for a better prognosis of the disease, a better quality of life for the patient and their caregiver, and makes it possible to reduce costs with hospital care. Therefore, it is necessary that educational interventions occur with the Primary Health Care Team, and that protocols are improved for early diagnosis and management of dementia.

There must be an improvement in the referral system of the specialist professional in secondary health care, with consequent counter-referral and organization of the healthcare network for the old person. Furthermore, further studies on dementia are needed, as there is a shortage of literature on the subject.

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Quality Indicators in Enteral Nutrition Therapy: Application among Older Patients in an Intensive Care Unit

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Abstract

Objective: to investigate the quality indicators in enteral nutritional therapy in older patients admitted to the intensive care unit of a university hospital in the city of João Pessoa, Paraíba. *Methods*: a retrospective, cross-sectional study was carried out with older adults admitted to the intensive care unit between March 2018 and March 2019. The indicators used were the frequency of measurement of Body Mass Index (BMI) at admission; estimated energy expenditure and protein requirement; adequate administration of prescribed vs. infused volume; patients fasting before starting enteral nutritional therapy; diarrhea and constipation according to the parameters of the International Life Sciences Institute of Brazil. For the comparison between quality indicators and clinical outcomes (hospital discharge and death) and length of stay (≤14 and >14 days), the chi-square test was used, with associations with $p<0.05$ being considered significant. *Results*: there were 79 older adults, with an average hospital stay of 14 days. Regarding the indicators, the frequency of BMI measurement at admission and the estimate of energy expenditure and protein requirement reached the targets. When analyzing the association of quality indicators with clinical outcomes, significant differences ($p=0.010$) were observed between the infused vs. prescribed volume indicator and hospital discharge. *Conclusion*: the indicator of the frequency of adequate administration of prescribed vs. infused volume had a significant association with the outcome, suggesting that this indicator should be considered in monitoring nutritional assistance for older adults. It is therefore necessary to develop action plans to ensure the effectiveness of the processes, although more studies are also needed.

Keywords: Health of the Elderly. Nutrition Therapy. Intensive Care Units. Quality Indicators, Health Care.

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INTRODUCTION

The rapid growth of population aging, and the physiological changes resulting from the process, leave older adults prone to deficits and the increased possibility of hospitalization, as well as vulnerable to nutritional problems. The importance of nutrition in the hospital environment should therefore not be underestimated, especially in the intensive care unit (ICU)[1].

According to Pedrosa et al.[2], when older adults are admitted to the ICU, factors other than age – such as functional status prior to admission, the presence of associated comorbidities, the severity of the disease which led to ICU admission and hemodynamic disorders – can encourage more invasive procedures, which prolong stays in the ICU, leading to more complications and greater exposure to mortality among this group.

In 2013, a review assessed the malnutrition rate of hospitalized older adults in Brazil, finding a similar prevalence to that of the overall population, with 60% of older adults in Brazilian hospitals identified as malnourished[3] .

The nutritional status of an inpatient has a major influence on their clinical evolution, and can directly affect prognosis. Studies indicate that 35% to 65% of hospitalized older adults have some degree of malnutrition, a finding which may be related to a high rate of infectious complications and a considerable increase in mortality[4].

Given this scenario, it is extremely important to provide older patients with effective nutritional therapy (NT), as inadequate nutrition contributes to the worsening of many illnesses, particularly in cases of acute disease[5]. It is noteworthy that in this age group, nutritional problems are generalized, and the catabolic effects of disease quickly result in a state of malnutrition among older adults, which is directly related to worsening prognoses, such as: increased infection rates; a higher incidence of pressure injuries; increased hospital stays; slower convalescence following acute illness; and increased mortality[5].

NT has a significant impact on the clinical evolution of a hospitalized patient, especially in anorexic ICU patients who are unable to eat orally for days or months, for whom enteral nutritional therapy (ENT) and/or parenteral nutritional therapy (PNT) is indicated[6].

ENT may be indicated in the following situations: patients who are unable to achieve adequate oral intake, to meet their daily nutritional needs, either because of diseases of the upper gastrointestinal tract, orotracheal intubation, or neurological disorders, with an impaired level of consciousness or masticatory movement. It is also indicated in cases where the patient does not reach full oral intake (between 60 and 70%), due to anorexia and/or various etiologies[6].

Patients in intensive care often present inadequacies in nutritional support, either due to under or overestimation of their daily nutritional needs, the delayed introduction of ENT, interruptions to procedures, or because of complications arising from the state of the disease and/or reasons related to nutritional therapy[7], including diarrhea, constipation, prolonged use of mechanical ventilation, and infections[8].

To evaluate and monitor NT, identifying the possible difficulties and failures of the nutritional care protocols provided to the patient, it is important to apply quality indicators in nutritional therapy (QINTs), with the aim of improving nutritional care[9].

QINTs, which are highly applicable in the ICU, include nutritional screening frequency, frequency of diarrhea and constipation, frequency of obstruction of the nasoenteral tube (NET), frequency of early initiation of nutritional therapy, frequency of fasting for more than 24 hours in patients undergoing ENT, frequency of non-compliance of the prescription of nutritional therapy, frequency of estimation of energy and protein needs, and frequency of discrepancy between the prescribed and the provided supply of ENT, among others, and have emerged as a powerful tool to combat the adverse effects that contribute to increased hospital malnutrition and increased morbidity and mortality, and also to reducing the cost-benefit of nutritional therapy. QINTs, a tool used by the nutritional therapy multidisciplinary

team (NTMT), can indicate possible failures in the execution of tasks related to EN, allowing decisions to be taken to improve the service in case of fluctuations in quality[10].

Seeking to contribute to the nutritional care of the critically ill and, consequently, to achieve better clinical outcomes and reduce hospital spending, the present study aimed to investigate the quality indicators in enteral nutritional therapy in older adults hospitalized in an intensive care unit of a public hospital in the city of João Pessoa, Paraíba, Brazil.

METHOD

A cross-sectional, retrospective study was conducted, using data from the medical records of older patients admitted to the intensive care unit of the Lauro Wanderley University Hospital in the city of João Pessoa, Paraíba, Brazil.

The study sample was non-probabilistic, obtained for convenience, and included all older adults hospitalized between March 2018 and March 2019. The inclusion criteria were as follows: hospitalized in the ICU for more than 72 hours, received ENT exclusively and with the nutritional monitoring form adopted by the nutrition service included in the patient's medical records. During this period, 318 older adults were admitted, of whom 25 died and 90 were discharged within 72 hours. Patients discharged in this period were excluded from the sample, as this is the timeframe required to detect nutritional risk, apply quality indicators and obtain the results of nutritional therapy, and is therefore applied as the cutoff point for completing the nutritional monitoring form for critical patients adopted in the protocols of the institution studied. A total of 80 patients receiving oral, parenteral, or mixed nutritional therapy or who did not begin a diet, and 44 patients whose medical records did not include the nutritional monitoring form, were excluded. The sample therefore consisted of 79 older adults.

The nutritional monitoring form used in the daily routine of the nutritionists was created by such professionals to monitor the nutritional therapy of patients admitted to the ICU of the hospital. It includes general data related to patient identification, clinical history, anthropometry, biochemistry, signs of perfusion and clinical signs, and also identifies certain important nutritional parameters. Of these data, to meet the objectives of the study, only the following parameters were analyzed: age; gender; period of hospitalization; clinical outcome and variables for calculating quality indicators in nutritional therapy (QINT), of which the following six were chosen: frequency of measurement of body mass index (BMI) at admission; frequency of measurement or estimate of energy expenditure (EE) and protein requirements; frequency of proper administration of prescribed x infused volume in patients undergoing nutritional therapy; frequency of patients fasting before enteral nutritional therapy (early NT); frequency of diarrhea; frequency of episodes of intestinal constipation.

Chart 1 shows the indicators with their respective formulas and targets recommended by the International Life Sciences Institute (ILSI) of Brazil[11], which were chosen for this study due to the possibility of applying the data available in the medical records.

The data were analyzed using descriptive and analytical statistics. In analytical statistics, the normality of the data was first assessed using the Kolmogorov-Smirnov test. In the analysis and presentation of the results, in addition to absolute and relative frequencies, mean and standard deviation (SD) were used for variables with normal and median distribution, and interquartile range (IQ) was used for those with non-normal distribution. For comparison between the quality indicators, days of hospitalization (≤14 days or >14 days, which was the average obtained), and outcome (discharge or death), the chi-square test was used. When conditions for using the chi-square test were not verified, Fisher's exact test or Yates' correction were used. The results were considered statistically significant with a value of $p<0.05$.

In performing the study the ethical aspects that regulate research in human beings were considered, in accordance with Resolution 466/12 of the National Health Council of the Ministry of Health (or CNS/MS)[12]. As this is a retrospective, non-interventionist study, the waiver of the Informed Consent Term (ICF) was requested ad approved by the Ethics and Research Committee under opinion No. 3,449,341 of *Plataforma Brasil*.

Chart 1. Quality indicators, formulas for estimation and targets proposed by International Life Sciences Institute.

- Frequency of BMI measurement at admission in patients undergoing ENT: *Number of patients undergoing ENT with BMI measured at admission* x 100 Total number of patients undergoing ENT TARGET: >80%
- Frequency of measurement or estimate of energy expenditure and protein requirement in patients undergoing ENT: *No. of patients undergoing ENT with assessment of energy and protein expenditure* x 100 *Total number of patients undergoing ENT* TARGET = ≥ 80%
- Frequency of adequate administration of prescribed X infused volume in patients undergoing ENT: *Number of patients with proper ENT volume* x 100 Total number of patients undergoing ENT TARGET = ≥ 80%
- Frequency of patients fasting before starting early ENT: *No. of ENT candidates fasting> 48h* x 100 *Total number of patients undergoing ENT* TARGET = <20%
- Frequency of diarrhea in patients undergoing ENT: *No. of patients undergoing ENT with diarrhea* x 100 Total number of patients undergoing ENT TARGET = ≤ 10%
- Frequency of episodes of constipation in patients undergoing ENT: *No. of patients undergoing ENT with constipation* x 100 *Total number of patients undergoing ENT* TARGET = <20%

BMI - body mass index; ENT - enteral nutritional therapy.

RESULTS

The sample consisted of 79 older adults, of whom 38% (n=30) were male and 62% (n=49) female. The study involved patients aged between 60 and 100 years, with an average of 72.5 years. The length of stay in the ICU ranged from 03 to 57 days of hospitalization, with a median of 14 days (interquartile range of 8-20 days). It was found that death occurred in 44.3% of the older adults surveyed (Table 1).

In relation to the QINTs, it was found that 89.87% (n=71) of the older adults had their BMI calculated at admission (**Ind1**); 84.61% (n=66) had their caloric and protein targets estimated (**Ind** 2); 54.66% (n=41) achieved the prescribed x infused volume (**Ind** 3), and 31.64% (n=25) had been fasting for more than 48 hours before starting NT (**Ind** 4). With regard to gastrointestinal complications, 34.2% (n=27) had diarrhea (**Ind5**) and 62.02% (n=49) had episodes of intestinal constipation (**Ind6**).

In Figure 1, all the QINTs analyzed are shown with their respective targets, recommended by the Brazil ILSI[11].

Table 1. Demographic, clinical and nutritional characteristics of patients undergoing enteral nutritional therapy in the ICU of a university hospital in the city of João Pessoa (Paraíba), 2019.

Variable	Mean	Median	±Standard-Deviation	Interquartile distance	n (%)
Age (years)*	72.5	71.0	9.4	(66.0-78.0)	-
Length of ICU stay (days) **	17.3	14.0	12.4	(8.0-20.0)	-
Duration of nutritional therapy**	12.4	9.0	10.9	(4.0-17.2)	-
Sex					
Male		-			30 (38.0)
Female		-			49 (62.0)
Outcome					
Discharge		-			44 (55.7)
Death		-			35 (44.3)

* Variable with normal distribution (mean and standard deviation); ** Variable with non-normal distribution (median and interquartile range)

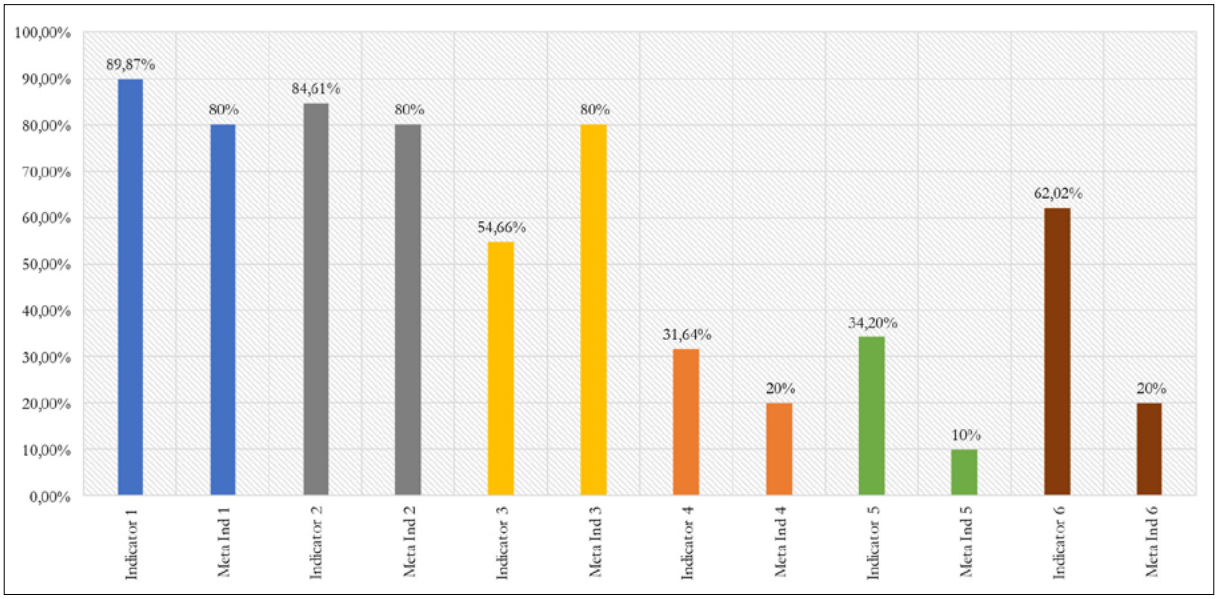

Figure 1. Quality indicators of patients receiving enteral nutritional therapy in the ICU of a university hospital in the city of João Pessoa (Paraíba), 2019.

Table 2 shows the association between length of hospital stay and the ENT quality indicators. No statistically significant association (p>0.05) was observed between length of stay and any of the quality indicators. However, the group of patients with over 14 days of hospitalization had a frequency of diarrhea of 43.6% and a frequency of constipation of 69.2%, whereas the group with 14 days or less of hospitalization had percentages of diarrhea of 25% and constipation of 55%, although the differences observed between the two groups were not statistically significant.

The statistical association between the clinical outcomes (hospital discharge and death) and the

QINTs in the patients is shown in Table 3. The data indicate that, among the group with an outcome of discharge, there was a higher frequency of BMI measurement (95.5% versus 82.9%), energy expenditure estimation (86.4% versus 80%), adequate infused vs. prescribed volume (65.9% versus 34.3%), than in the group that died.

Regarding gastrointestinal complications, the group that were discharged had a lower frequency of diarrhea (29.5% versus 40%) and a higher frequency of constipation (70.5% versus 51.4%) than the group that died. However, there was a statistically significant difference only in relation to the infused vs. prescribed volume (p=0.010).

Table 2. Association of quality indicators in patients undergoing ENT and days of ICU hospitalization in a public hospital in the city of João Pessoa (Paraíba), 2019.

Indicators	Length of stay n (%)		p
	≤14 days	>14 days	
Fasting			0.946[a]
≤ 48h	30 (75.0)	28 (71.8)	
> 48h	10 (25.0)	11 (28.2)	
BMI			0.263[b]
Measured	34 (85.0)	37 (94.9)	
Not measured	6 (15.0)	2 (5.1)	
EE estimate			0.116[b]
Estimated	31 (77.5)	35 (89.7)	
Not estimated	9 (22.5)	3 (7.7)	
Missing*	0 (0.0)	1 (2.6)	
Prescribed x infused volume *			0.052[a]
Yes	15 (37.5)	26 (66.7)	
No	21 (52.5)	13 (33.3)	
Missing*	4 (10.0)	0 (0.0)	
Episodes of diarrhea *			0.111[a]
Yes	10 (25.0)	17 (43.6)	
No	30 (75.0)	21 (53.8)	
Missing*	0 (0.0)	1 (2.6)	
Episodes of constipation			0.284[a]
Yes	22 (55.0)	27 (69.2)	
No	18 (45.0)	12 (30.8)	

[a] Yates correction; [b] Fisher's exact test * the values described as missing were disregarded in the inferential statistical analysis.

Table 3. Association of quality indicators undergoing ENT and days of ICU stay in a public hospital in the city of João Pessoa (PB), 2019.

Indicators	Outcome n (%)		*p*
	Discharge	Death	
Fasting			0.680[a]
≤ 48h	31 (70.5)	27 (77.1)	
> 48h	13 (29.5)	8 (22.9)	
BMI			0.129[b]
Measured	42 (95.5)	29 (82.9)	
Not measured	2 (4.5)	6 (17.1)	
EE estimate			0.356[b]
Estimated	38 (86.4)	28 (80.0)	
Not estimated	5 (11.3)	7 (20.0)	
Missing*	1 (2.3)	0 (0.0)	
Prescribed x infused volume *			0.010[a]
Yes	29 (65.9)	12 (34.3)	
No	13 (29.5)	21 (60.0)	
Missing*	2 (4.6)	2 (5.7)	
Episodes of diarrhea*			0.508[a]
Yes	13 (29.5)	14 (40)	
No	30 (68.2)	21 (60)	
Missing*	1 (2.3)	0 (0.0)	
Episodes of constipation			0.134[a]
Yes	31 (70.5)	18 (51.4)	
No	13 (29.5)	17 (48.6)	

[a] Yates correction; [b] Fisher's exact test * values described as missing were disregarded in the inferential statistical analysis.

DISCUSSION

The results obtained indicate poor performance in the quality indicators in nutritional therapy (QINTs) applied, as of the six indicators analyzed, only frequency of measurement of BMI at admission and frequency of measurement or estimate of energy expenditure and protein needs met the established targets. Thus, the present findings illustrate the need and importance of the application and monitoring of QINTs for the assessment of nutritional therapy of older patients admitted to the ICU.

The average age of the population studied was 72.5 years, with a prevalence of death in the total sample of 44.3%. In a study carried out with the objective of constructing a prognostic assessment instrument for older adults hospitalized in the ICU, 59.02% of the sample had an outcome of death[2], showing that the mortality rate in the studied population is high. Studies have shown that the mortality rate of the older population in intensive care units is between 28 and 62%[13,14].

It was observed that the QINTs were an effective tool for assessing the adequacy of NT, with the indicators used in the present study considered among the best by ILSI Brazil, as they are useful, practical, easy to perform and inexpensive[11]. In addition, of the six QINT used, the continuous application of five is suggested by the Sociedade Brasileira de Nutrição Parenteral e Enteral - The Brazilian Society of Parenteral and Enteral Nutrition (BRASPEN), with the objective of correcting flaws, redefining

targets and identifying any difficulties that may arise[15]. Most of the indicators analyzed in this study, with the exception of frequency of BMI measurement at admission and frequency of the measurement or estimate of energy expenditure and protein requirement, did not reach the established target.

A Ministry of Health ordinance (n. 272, dated April 8, 1998) which addresses the requirements for parenteral nutrition therapy, recognizes the importance of nutritional assessment as the first step in the diagnosis of the patient, and determines that it must precede nutritional therapy. While there is no gold standard for assessing nutritional status in the ICU, the use of all the methods available is recommended, in order to achieve greater reliability of nutritional diagnosis and, consequently, a more accurate definition of required treatment conduct[16]. BMI is a simple indicator of nutritional status and, like other evaluation parameters, has its limitations, especially regarding critical patients[17]. Of the sample analyzed, 89.9% (n=71) of hospitalized patients had their BMI calculated on admission. These results achieved the target of ILSI Brazil and corroborate the study by Sá and Marshall[18] on the use of QINTs, where the authors found a 100% frequency of BMI measurement during the evaluation period.

It was found that 31.6% (n=25) of the sample fasted for more than 48 hours before starting NT, with no statistically significant differences for this indicator among the clinical outcomes (p= 0.680) or length of stay (p=0.946). However, it is worth emphasizing the importance of the early onset of NT among critically ill patients, to achieve better clinical results. The advantages of the early onset of nutritional therapy have been well established among critical patients, and the tool can help mitigate metabolic changes[19]. When initiated, it may favor, among other aspects, an increase in protein synthesis and the improvement of lean body mass, and the maintenance of intestinal integrity (by reducing the permeability of this tissue), promoting an improvement in insulin sensitivity, increasing the absorptive capacity of the intestine and the reduction of inflammation and oxidative stress[20]. Bezerra and Cabral[21], in a retrospective case series study in an ICU, began ENT within up to 48 hours of admission in 75.3% of the sample and observed that in this group, the probability of progressing to discharge in the ICU was 1.22 times higher than in the group that started later (> 48h).

Of the older adults in this study, it was observed that the frequency of measurement or estimate of energy expenditure and protein requirement (84.61%, n=66) reached the target proposed by ILSI Brazil. However, no statistically significant differences were observed with the clinical outcomes (p= 0.356) or length of hospital stay (p=0.116). Alves and Borges[22], in a quantitative, retrospective study carried out at the Regional Hospital of Taguatinga, found that 58.6% of the sample achieved the target for the same indicator, and also that there was no significant difference with the clinical outcomes, with values of p=0.057 and p=0.455, respectively, for hospital discharge and death. However, they emphasize the importance of continuing to calculate the nutritional needs of patients to ensure appropriate NT.

It was found that 54.66% (n=41) of patients achieved the frequency of adequate administration of prescribed x infused volume, a figure below the proposed target (≥80%). However, a significant association was identified (p=0.010) between this indicator and clinical outcome, and it was observed that 65.9% (n=29) of patients who received the adequate prescribed volume were ultimately discharged. Stefanello and Poll[17] in their study, also found a low percentage (36.1%) of adequacy in the prescribed volume, in relation to the administration of the enteral formulation. Simões et al.[23], in an observational study with adults and older adults, observed, in the 50-80 years age group, that the infused volume was significantly less than the prescribed volume over five days of follow-up, and the same result was observed in the 81-100 year old age group.

Also in this regard, Stefanello and Poll[17] suggest that adjustments between the prescribed and the received enteral diet in terms of volume, calories and proteins need to be improved to meet the nutritional requirements of critically ill patients, and report that studies that exhibit positive results in this analysis are carried out in ICUs in which the monitoring of the quality/quantity of enteral nutrition has been carried out for some years, and with the meaningful involvement of the nutritional therapy

multidisciplinary team (NTMT). The adequate supply of nutrients maintains or restores nutritional status, while studies have evaluated prescription and the adequacy to reach an energy target as a strategy for improved clinical outcomes[24]. McClave et al.[25] observed that patients who received an enteral nutrition volume close to 100% of that prescribed, progressed to lower rates of infectious complications, reduced their length of hospitalization and tended to have lower mortality rates.

In the present study, the presence of gastrointestinal complications, such as diarrhea and constipation, was also assessed, with a prevalence of 34.2% and 62% respectively. Neither indicator exhibited values within the proposed target, and there was no association with number of days spent in the ICU or outcome. In their study, O'Meara, et al.[26] observed these complications in 25.6% of total patients. In the study by Bezerra et al.[27], however, episodes of diarrhea were less frequent (4%), reaching the ILSI Brazil target, which was associated with the exclusive use of EN in a closed system, resulting in a lower risk of contamination and better flow control. It is worth mentioning that diarrhea can be associated with several other causes, such as the rapid infusion of an enteral diet, bacterial contamination, hyperosmolar formula, drug treatments, hospital infections and even as a consequence of the underlying disease itself[28].

Some studies have also found a significant frequency of constipation. Batassini and Beghettoque[29], in a study carried out in an intensive care center composed of 40 clinical and surgical beds in a high-complexity Brazilian university hospital, found a higher frequency of constipation (75.8%). Prat et al.[30], in a prospective observational study carried out in two ICUs with 22 total beds, in two French university hospitals, obtained a similar frequency (51.9%). Therefore, several studies carried out in intensive care units confirm that constipation is a genuine complication in critically ill patients, and that the use of a protocol minimizes this incidence[31].

It should be mentioned that the applicability of QINTs in a unit requires that the clinical scenario be directed and standardized in accordance with the reality of the sector, and that the human resources are available to obtain positive results, reach targets and to allow a realistic selection of QINTs[8].

Although the present study has certain limitations, such as its non-probabilistic, convenience-type sampling, and did not adjust the association for possible confounding factors, such as the severity of illness and the age of patients, it contributes to an explanation of the panorama of quality indicators in nutritional therapy in older adults receiving care in the ICU of a public hospital. In addition, for some variables, there was a lack of information in the nutritional monitoring forms, as highlighted in Tables 2 and 3. It can be verified, therefore, that the control and daily recording of nutritional monitoring are extremely important, and essential for the analysis of the effectiveness of the therapy.

Another important limitation relates to prescribed vs. infused volume. In general, more severely ill patients have a clinical profile that leads to difficulty in adapting nutritional therapy. Mendonça and Guedes[7] in a study that monitored the adequacy of ENT in the ICU, described the importance of an adequate intake of nutrients and energy in critically ill patients, but highlighted that these patients often receive an energy value below their needs, due to factors that prevent adequate enteral nutritional intake, such as those related to diet intolerance (vomiting, diarrhea, gastric waste, abdominal distension, etc.), routine nursing practices (patient handling, administration of medication, etc.) and other routines (procedures, exams), which may have influenced the results in relation to the outcome.

CONCLUSION

It was observed that the indicator of the frequency of the adequate administration of the prescribed x infused volume was significantly associated with hospital discharge, suggesting that this indicator should be considered for the monitoring of nutritional care. However there is a need for further studies to assess the feasibility of applying quality indicators in nutritional therapy more broadly to improve the assessment of nutritional care for older adults.

It is noteworthy that of the six indicators analyzed in the study, four did not reach the targets for quality indicators in nutritional therapy, highlighting the need to develop action plans to ensure the effectiveness of the processes, and thus improve the results and efficiency of nutritional therapy, as effective nutritional therapy for older adults admitted to the ICU is extremely important.

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Prevalence of frailty and associated factors in old people after cerebrovascular accident

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Abstract

Objective: to assess the prevalence of frailty and associated factors in old people affected by cerebrovascular accident (CVA) *Method*: a cross-sectional study with patients aged 60 years or older assisted in a neurology outpatient clinic. Data were collected by a questionnaire containing sociodemographic, clinical, lifestyle, and assistance data in the rehabilitation area, and by the Mini-Mental State Examination and Edmonton Frail Scale. *Results*: The study population comprised 69 old people with an average age of 72 (±7.4) years. Among the frail patients were the longest-lived individuals (90.9%), females (92.3%), with marital status representing having had a partner at some point in life (separated, divorced, or widowed - 94.4%), those who did not live alone (80.3%), with no education (80.6%) and income (100%), and self-declared to be black (100%) or spiritist (100%). Most did not present any comorbidities nor harmful lifestyle habits, except for systemic arterial hypertension. There was also low assistance in the rehabilitation area. The MMSE assessment indicated altered mental status for 83.7% of frail old people. Significant associations were found between frailty and marital status (p=0.042), with the presence of diabetes *mellitus* (p=0.002), and absence of acute myocardial infarction (p=0.030). *Conclusion*: We suggest further studies to follow this type of population affected by CVA from hospitalization to rehabilitation discharge to clarify the process of functional and cognitive decline and its relation with frailty.

Keywords: Health of the Elderly. Frailty. Stroke.

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INTRODUCTION

Considering the complexity of the changes influencing the aging process, the variation in physical and cognitive function should be analyzed in addition to changes in chronological age. In fact, old people are more likely to experience multiple, coexisting, and interrelated problems which are often seen due to the presence of broader geriatric syndromes such as frailty and impaired cognition, or the loss of functionality[1]. An effective gerontological assessment associated with coordinated care shows that functional assessments of these syndromes are better predictors of survival than the presence or number of specific diseases[1].

One of the challenges of the health system with the aging of the population is to adjust the services offered aiming at the quality of life of the old population. However, with the increase in Chronic Non-Communicable Diseases (NCDs) there will be an overload on health services mainly affecting low-income populations as they are more vulnerable, more exposed to risks, and have less access to health promotion and disease prevention services and practices, resulting in devastating consequences for individuals, families, and communities[2]. Among NCDs, cardiovascular diseases (CVDs) represent the main cause of death in Brazil and the world, corresponding to one-third of the total deaths and for this reason, they are considered a serious public health problem[3,4]. CVDs present several risk factors including aging[3].

Research carried out in the USA and Europe pointed out a significant relationship between the components of frailty and the onset of cerebrovascular diseases with repercussions on the survival and recovery after the episode due to impaired functional performance, as well as the scarcity of prevention and rehabilitation programs for the most affected frailty components in this population[5,6].

Frailty is a common and important geriatric syndrome conceptually defined as a clinically recognizable condition in older adults, with increased vulnerability to adverse health events resulting from age-associated declines in the physiological reserve and function of multiple organ systems[7]. Also, frailty would be based on the tripod of the different alterations related to the aging process consisting of sarcopenia, immune dysfunction, and neuroendocrine dysregulation[8].

From the observation that frailty and pre-frailty are common in people with CVD, the need to identify and evaluate this syndrome in the cerebrovascular accident (CVA) survivors was pointed out, and how the possible clinical implications can affect the prognosis[9] since CVA is among the four diseases that most contributed to hospitalizations - including diabetes and hypertension -, and is part of the Brazilian list of hospitalizations that can be avoided with effective actions at other levels of care[10].

Considering the aging process of the population, increased NCDs with emphasis on CVDs, in particular CVA and their relationship with frailty in old people, we suggested research aimed at the frailty syndrome and associated factors to optimize health policies and actions in Brazil and the specificities of its old population. In this sense, we intended to assess the prevalence of frailty and associated factors in old people affected by CVA.

METHOD

This is a cross-sectional observational and quantitative study carried out in an outpatient clinic of a state referral hospital in neurology located in the Metropolitan Region of Recife, Pernambuco. The study sample was non-probabilistic, being obtained by signaling users and family members who confirmed to be within the desired profile in an initial interview since the service was not specific to the desired outcome.

In 2019, 69 patients who met the inclusion criteria (age equal to or greater than 60 years, diagnosis of CVA, and being assisted in this service) were evaluated for approximately five months. Those who had severe cognitive impairment or commitment to communication along with the absence of an informant were excluded, as it was impossible to obtain the responses to the questions presented in the questionnaire and scales described below.

The questionnaire was applied to the old people and their caregivers and included sociodemographic, clinical, lifestyle data as well as on rehabilitation care. It comprised the questions on age, gender, marital status, whether living together, education, occupation, bond with a social security institution, income, self-reported skin color, religion, presence of comorbidities such as acute myocardial infarction, systemic arterial hypertension, diabetes mellitus, alcoholism or smoking, and rehabilitation care by Physiotherapy, Speech Therapy, and Occupational Therapy.

One of the instruments used was the Mini-Mental State Examination (MMSE) aimed at assessing the mental status, more specifically for dementia symptoms. The following cutoff points were used to investigate the presence of cognitive impairment: 13 points for illiterate old people, 18 points for those with low and medium education (up to eight years of studies), and 26 points for old people with high education (above eight years of studies)[11].

Lastly, the Edmonton Frail Scale (EFS) aimed at assessing frailty in old people was used, translated, and validated in Brazil. Said scale comprises the nine domains of cognition, general health, functional independence, social support, medication use, nutrition, mood, continence, and functional performance investigated by 11 items. The maximum score is 17, and it represents the highest level of frailty. The scores for the analysis of frailty are 0-4 representing no frailty, 5-6 apparently vulnerable, 7-8 mild frailty, 9-10 moderate frailty, 11 or more severe frailty[12].

For data analysis, a database was created on the Microsoft Excel spreadsheet and was exported to a statistical software where it was analyzed. The percentage frequencies were calculated to characterize the profile with the questionnaire information, and the respective frequency distributions were built. To compare the percentages found in the levels of the evaluated factors, the chi-square test was applied to compare proportions.

The contingency tables were created to assess which factors influenced the EFS classification, and the chi-square test for independence was applied. The Fisher's Exact test was applied for the cases where the assumptions of the test were violated. The Poisson multivariate model with robust variance was adjusted to assess which factors jointly influenced the patient's level of frailty. Variables with statistical significance of up to 20% (0.2) in the bivariate analysis were included in the initial model. The significance level of 5% was considered in the Wald test for the permanence of the variables in the model. Also, the prevalence ratios were calculated to compare the risk of frailty in groups of patients with a higher risk profile for this syndrome.

The research was carried out following the ethical procedures recommended by Resolution 466/12 of Conselho Nacional de Saúde (CNS - the Brazilian National Health Council) and approved by the Human Research Ethics Committee of Instituto de Medicina Integral Professor Fernando Figueira (IMIP) under Opinion No. 3,196,109. The participants were previously informed about the research objectives, the possible implications of their participation, and when they agreed to participate in the study they signed the ICF.

RESULTS

The study population comprised 69 old people with an average age of 72 (±7.4) ranging from 60 to 86 years who were assisted in a neurology outpatient clinic due to a cerebrovascular accident (CVA). A profile was found in which 43.5% of the individuals were between 70 and 79 years old (n = 30), 62.3% were male (n = 43), 52.2% were married or in a common-law marriage (n = 36), 95.7% lived with a roommate (n = 66), 53.7% had not completed any year of regular education (n = 36). Although 81.2% of the individuals claimed to have had an occupation at a productive age (n = 56), retirement represented the main source of income only for 62.3% of these old people (n = 38), and this income was restricted to one minimum wage to 81.8% (n = 54) represented by R$998.00 (nine hundred and ninety-eight Brazilian reais) in force in 2019. Besides, 63.8% of these old people self-declared to have brown skin color (n = 44), and 69.3% were Catholic (n = 45).

Table 1 shows the distribution of the EFS classification according to the sociodemographic profile of old patients. There is a higher prevalence of frailty in the group of female patients aged 80 years or older with marital status representing having had a partner at some point in life, who lived with a roommate, no education, who had no occupation, with other links with the social security institution, which had no income, who self-declared to be black and from a spiritism religion. However, the only aspect described presenting a significant result in the independence test was related to the gender of the patients.

Table 2 shows the distribution of the EFS classification according to the comorbidities and habits of the patients evaluated where there was a higher prevalence of frailty in the group of patients without acute myocardial infarction (AMI), the presence of systemic arterial hypertension (SAH), and diabetes mellitus (DM), and in the absence of alcoholism and smoking. Even though a higher prevalence of frailty was found in the group of patients with the profile described, the independence test was significant only for AMI and DM indicating that these factors significantly change the level of the EFS classification.

The distribution of the EFS classification according to rehabilitation care is in table 3 and shows a higher prevalence of frailty in the group of patients who were not followed by physiotherapy, speech therapy, or occupational therapy. However, even though a higher prevalence of frailty was found for patients who did not have any rehabilitation care, the independence test was not significant for the factors evaluated indicating that follow-up is not decisive for a better EFS classification.

The bottom part of Table 3 shows the distribution of the EFS classification according to the MMSE classification in which there is a higher prevalence of frailty in the group of patients with altered mental status. Even though a difference was observed in the percentage of the worst classification of frailty in the groups described, the examination by the independence test was not significant indicating that the MMSE classification is not decisive for the EFS classification.

Finally, the Poisson multivariate model for patient frailty is shown in table 4. For the multivariate analysis, variables with statistical significance less than 0.2 were included in the multivariate analysis: gender, marital status, type of connection with the INSS, AMI, speech therapy, and MMSE observed score. In the final adjustment of the model, the variables presenting statistical significance of up to 0.05 were the marital status (p-value = 0.042), AMI (p-value = 0.030), and DM (p-value = 0.002). The groups of single and separated/divorced/widow/ed patients had a higher risk of frailty with 18% and 35%, respectively, when compared to the group of married/in common-law marriage patients. However, there is an increased risk of frailty in patients who did not have AMI (74%) when compared to the group of patients who already had AMI. In the presence of DM, there was a 37% increase in the risk of frailty when compared to the group of patients without DM.

Table 1. Distribution of the EFS classification according to the sociodemographic profile of old people affected by CVA treated at a neurology outpatient clinic. Recife, Pernambuco, 2019.

	EFS classification		p-value
	Frail	No frailty	
Age (years)			0.538*
60 to 69	21 (75.0%)	7 (25.0%)	
70 to 79	24 (80.0%)	6 (20.0%)	
80 or more	10 (90.9%)	1 (9.1%)	
Gender			0.043*
Male	31 (72.1%)	12 (27.9%)	
Female	24 (92.3%)	2 (7.7%)	
Marital status			0.082**
Single	13 (86.7%)	2 (13.3%)	
Married/common-law marriage	25 (69.4%)	11 (30.6%)	
Separated/divorced/widow/ed	17 (94.4%)	1 (5.6%)	
Lives with a roommate			0.499**
Yes	53 (80.3%)	13 (19.7%)	
No	2 (66.7%)	1 (33.3%)	
Education (complete years)			0.845**
None	29 (80.6%)	7 (19.4%)	
1 to 8 years	16 (80.0%)	4 (20.0%)	
More than 8 years	8 (72.7%)	3 (27.3%)	
Occupation			0.278**
Has an occupation	43 (76.8%)	13 (23.2%)	
Has no occupation	12 (92.3%)	1 (7.7%)	
Link with the INSS (social security institution)			0.059**
Retirement	27 (71.1%)	11 (28.9%)	
Continuing Benefit Conveyance	11 (91.7%)	1 (8.3%)	
Others (eg pension)	11 (100.0%)	0 (0.0%)	
Income (in minimum wages)			0.420**
None	6 (100.0%)	0 (0.0%)	
1 MW	43 (79.6%)	11 (20.4%)	
2 MW or more	4 (66.7%)	2 (33.3%)	
Skin color			0.631**
White	15 (75.0%)	5 (25.0%)	
Black	5 (100.0%)	0 (0.0%)	
Brown	35 (79.5%)	9 (20.5%)	
Religion			0.450**
Catholicism	34 (75.6%)	11 (24.4%)	
Evangelical	17 (89.5%)	2 (10.5%)	
Spiritism	1 (100.0%)	0 (0.0%)	

*p-value of the chi-square test for independence; **p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; CVA = cerebrovascular accident; BPC = Continuing Benefit Conveyance.

Table 2. Distribution of the EFS classification according to the comorbidities and lifestyle habits of old people affected by CVA treated at a neurology outpatient clinic. Recife, Pernambuco, 2019.

	EFS classification		p-value*
	Frail	No frailty	
Acute Myocardial Infarction			
Present	6 (50.0%)	6 (50.0%)	0.011**
Absent	49 (86.0%)	8 (14.0%)	
Systemic Arterial Hypertension			
Present	45 (81.8%)	10(18.2%)	0.460**
Absent	10 (71.4%)	4 (28.6%)	
Diabetes mellitus			
Present	26 (92.9%)	2 (7.1%)	0.025*
Absent	29 (70.7%)	12 (29.3%)	
Alcohol use			
Present	19 (76.0%)	6 (24.0%)	0.564*
Absent	36 (81.8%)	8 (18.2%)	
Smoking			
Present	26 (78.8%)	7 (21.2%)	0.855*
Absent	29 (80.6%)	7 (19.4%)	

*p-value of the chi-square test for independence; **p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; CVA = cerebrovascular accident.

Table 3. Distribution of the EFS classification according to the rehabilitation care and the MMSE classification in old people affected by CVA assisted in a neurology outpatient clinic Recife, Pernambuco, 2019.

	EFS classification		p-value
	Frail	No frailty	
Physiotherapy			
Yes	26 (74.3%)	9 (25.7%)	0.256*
No	29 (85.3%)	5 (14.7%)	
Speech Therapy			
Yes	10 (66.7%)	5 (33.3%)	0.167**
No	45 (83.3%)	9 (16.7%)	
Occupational therapy			
Yes	5 (71.4%)	2 (28.6%)	0.624**
No	50 (80.6%)	12 (19.4%)	
MMSE Classification			
Normal mental status	14 (70.0%)	6 (30.0%)	0.208**
Altered mental status	41 (83.7%)	8 (16.3%)	

*p-value of the chi-square test for independence; **p-value of the Fisher's exact test; EFS = Edmonton Frail Scale; MMSE = Mini-Mental State Examination; CVA = Cerebrovascular Accident.

Table 4. Adjustment of the Poisson's multivariate model for EFS frailty in old people with CVA treated in a neurology outpatient clinic. Recife, Pernambuco, 2019.

	PR	CI (95%)	p-value*
Marital status			
Single	1.18	0.90 - 1.53	0.226
Married/common-law marriage	1.00	-	-
Separated/divorced/widow/ed	1.35	1.07 - 1.70	0.012
Acute Myocardial Infarction			
Present	1.00	-	-
Absent	1.74	1.05 - 2.89	0.030
Diabetes mellitus;			
Present	1.37	1.12 - 1.68	0.002
Absent	1.00	-	-

EFS = Edmonton Frail Scale; CVA = Cerebrovascular Accident; PR = Prevalence Ratio; CI = Confidence interval; *p-value of the Wald test.

DISCUSSION

The old population affected by CVA in the present study egressed from a state referral hospital in neurology was mostly represented by young old men, married or who had a partner, with no education, retired, and with an income of up to one minimum wage. These results are similar to the aspects found by researchers from São Paulo for an old population after hospital discharge, where the average age was 71.2 years (± 8.4) with a higher prevalence of males, married, but with education from 1 to 4 years completed in regular education[13].

Similar data can be found outside the hospital, as in the research by Damata et. al.[14] in Piauí related to specialized care in a rehabilitation service in which it was observed that this is the user profile remaining in the healthcare service after a CVA.

It is observed that, as in the present research, in most of the aforementioned studies, it is the old male with a partner who constitutes the public treated in healthcare services focused on this condition, reflecting that their marital status would serve as support for the maintenance of this care, considering the construction of the task of caring as a female role[14]. In this sense, publications aimed at old people caregivers in this profile point to a predominance of females, whether in the family, formal or informal in the care work, which consequently may be related to the care directed to the male public[15,16,17].

Even so, regarding the influence of family arrangements and income on the old population considering the presence of a roommate and the precarious economic situation found in the present study, the role of this caregiver in the face of the situation where old people are breadwinners is questioned, as a deliberation not only of the old people and their family but as a reflection of historical, sociocultural, political, economic, and demographic factors in the provision of care[18].

According to Paulo, Wajnman, and Hermeto [19], "the health of the old person and their age are of great importance in determining their home composition", since the age group and health conditions would be predictors of the accumulation of disabilities and consequent dependence on third parties. Besides, while there are a lower survival rate and a higher probability of new family formation or marriage for men, in the case of widowhood or divorce, old women tend to establish single-person households and their financial autonomy.

In this sense, the most prevalent characteristics related to gender and family ties of old people who had a CVA and are associated with frailty were being female, not having a partner (even if they lived alone),

having low education, receiving income equal or less than one minimum wage, and not being white. To corroborate these findings, Bushnell[20] refers to gender and skin color pointing to a higher prevalence of frailty in women than in men, in addition to the high vulnerability among African-American women. However, these results differ from those found in a survey carried out in China in which old women were considered less prone to decline in terms of frailty status than men[21].

Regarding comorbidities, although the general prevalence of SAH was emphasized in the absence of the other conditions analyzed for AMI and DM as well as the lifestyle habits of alcoholism and smoking in the population studied, concerning frailty, the risk factors considered were the absence of previous AMI and the presence of DM.

Regarding the absence of AMI as a factor related to the increased risk of frailty in old people with CVA, a longitudinal study carried out with an old population in the Netherlands also found no significant association between CVD, AMI, and frailty. However, it emphasized other conditions such as peripheral arterial disease and heart failure, which would make these subjects more likely to be frail, while in an inverse association analysis frailty would not precede the development of CVD[22]. In addition to the above, as it represents a greater risk for long-lived old people in events related to AMI, studies suggest the assessment of frailty as a prognostic factor in the treatment of this population[23].

Regarding diabetes, although absent in the majority of the population studied, it presented a high percentage in individuals classified as frail and was configured as a risk factor in the development of this condition. Corroborating this finding, Schernthaner and Schernthaner-Reiter[24] point out that diabetes is associated with frailty, dementia, and cognitive impairment, in addition to having a direct relationship with the increase in comorbidities such as myocardial infarction, cerebrovascular accident, peripheral arterial disease, and kidney failure, compared to non-diabetic old people.

In this sense, while frailty depends on the deterioration of muscle and nerve function with a subsequent decrease in the cardiopulmonary reserve and loss of executive function, DM often causes functional impairment in each of the aforementioned systems, leading to a loss of homeostasis of the whole body and the deterioration of the physical function[25]. Therefore, knowledge of these concomitant clinical conditions - CVA and diabetes - influences the therapeutic approach to be followed since a less rigorous objective must be adopted for frail old people, as well as those with cognitive decline[26].

As for alcohol and smoking habits, there was a higher prevalence in the absence of these two habits in the population studied, although the number of smokers and non-smokers was similar. In a national study, Noronha et. al.[27] found a pattern close to that observed in other populations in which old people reporting heart diseases, CVA, and DM consumed less alcohol. The suggested relation was that the subjects affected by these diseases were less likely to drink due to possible negative interactions with medications as well as because they had more frequent medical monitoring for these chronic conditions.

However, even though there is a decline in the prevalence of smokers with increased age possibly related to the emergence of actions to explain the onset of problems due to the non-cessation of cigarette consumption, the greater probability of early death of smokers, and the growing concern about health with the adoption of healthier behaviors, the prevalence in old people with serious diseases including CVA remains high[28].

In the assessment of cognitive deficit by the MMSE, there was a higher frequency of altered mental status among the group of old people with frailty, even though the statistical analysis did not show significance between cognitive performance and the presence of frailty. This suggests that individuals affected by CVA may have cognitive impairment and frailty, which although simultaneously present may not be related to each other considering the characteristics of each condition.

Mijajlović et. al.[29] point out that CVA survivors have a higher risk of developing cognitive deficits, as well as losses of executive functions, functional performance, and quality of life. And that despite the availability of information on the subject, conflicting results are observed between the cognitive effect after

a CVA event and the cognitive decline associated with age and vascular risk factors. That is why physical disabilities tend to improve after a CVA, while cognitive deficits progressively worsen for reasons that remain unknown.

Another concept proposed by the International Consensus Group of the International Academy on Nutrition and Aging and the International Association of Gerontology and Geriatrics based on epidemiological findings related to cognitive fragility and deterioration is that "cognitive fragility" is defined by the simultaneous presence of physical frailty and cognitive impairment in old people without a clear diagnosis of dementia. Another characteristic of this cognitive frailty would be its reversibility, making it the target of actions to prevent neurodegenerative processes[30].

In this context, physical frailty could then be associated with cognitive impairment at the end of life, and with the presence of other comorbidities such as dementia, including Alzheimer's disease, mild cognitive impairment, and vascular dementia[30].

Even though no significant results were obtained regarding the influence of the type of care provided in the rehabilitation area among frail and non-frail old people, it was observed that the majority of old people treated was in the group of those considered frail. Physiotherapy was the area with the highest prevalence of users treated, while speech therapy and occupational therapy reached, respectively, only one-fifth and one-tenth of the population assisted.

This suggests an emphasis on the motor sequelae of CVA when compared to the aspects related to functional independence, cognition, and language that may also be affected. In the present study, for example, most of the old people had some cognitive deficit considering the educational criteria in the assessment by the MMSE. Another factor related to reduced care in some areas may be the provision of these services in healthcare services. In the case of the hospital where the collection took place, after hospital discharge, the only service offered among those mentioned above was physiotherapy, and users should look for other places of care according to their needs.

A survey carried out in Espírito Santo showed a high prevalence of functional disability in old people after CVA with the association with advanced age, self-perceived limitations in body functions, and accessibility to public roads, reiterating the need for measures to monitor the functional capacity and promote support to this population[31]. In other words, the CVA condition is already debilitating, and could be worsened by aspects related to frailty and difficulty in accessing services, but which are not always the target of health interventions.

A multicenter study with users treated at home pointed out that the vast majority of prognostic factors reported in the literature as related to the discharge of CVA patients after rehabilitation was not correlated to the discharge of frail and multimorbid old people admitted to geriatric rehabilitation[32]. This same study showed that a higher level of independence in activities of daily living, when compared to the moment of admission to geriatric rehabilitation, would be associated with discharge after 6 months from the beginning of CVA rehabilitation, emphasizing the importance of data on frailty and social support during this process[32].

In general, a high prevalence of frailty is observed in old people after CVA with different factors associated with characteristics specific to the socio-economic situation of the populations where these old people are inserted. In the present study, the associations were related to marital status and some comorbidities such as AMI and DM, considering that a percentage of almost 80% of old people interviewed were frail. In China, there was a 67.6% prevalence of frailty among old people living in the community associated with age, ethnicity, family, number of children, income, diet, and exercise[33]. Another study carried out in Portugal showed a 60% prevalence of frailty among old people in the community, but with an association with vision problems, fear of falling, hospitalizations in the last year, use of mobility devices, and perception of health status[5].

For this reason, Zhang et. al.[33] advise that a comprehensive health management model be implemented for prevention and multidimensional intervention in the frail population. For Farooqi et. al.[34], despite advances in the prevention and

treatment of CVD, frail patients represent an important subgroup that remains at high risk for adverse cardiovascular events and CVD-related death. Therefore, the assessment of frailty could increase the prognosis when added to traditional CVD risk measures and assist in the identification of people with established risk factors[33].

Although it contributes to the understanding of the prevalence of frailty in old people with CVA, the present study had limitations. As it did not use a representative sample and excluded patients with sequelae related to the disease such as severe cognitive impairment or communication impairment, the results cannot be extended to the entire population of old people affected by CVA. It is noteworthy that the healthcare service was not specific for the old population or this specific clinical condition.

CONCLUSION

The evaluation model in the present study showed a good adjustment in terms of sensitivity and specificity for the estimation of frailty in the group of patients affected by cerebrovascular accident (CVA), finding sociodemographic and clinical aspects associated with the outcome. The instrument selected for evaluation and classification allowed to verify that the majority of old people affected by CVA in this survey were frail.

The sample pointed to a profile of old people similar to those found in other national surveys with characteristics that point to the influence of gender, education, financial issues, and possibly related to access to healthcare services after a CVA. The data with significant results in the association with frailty corroborate what is pointed out in the literature, considering that marital status represented a greater risk for those who did not have a partner regarding sociodemographic data. For clinical aspects, associations were found with the presence of diabetes mellitus and absence of acute myocardial infarction.

Last but not least, we suggest further longitudinal studies and probabilistic samples to follow this type of population of old people affected by CVA from hospitalization to the rehabilitation process after discharge to clarify the process of functional and cognitive decline and its relation with frailty.

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