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We must overcome the fear of change

Is it possible to grow old with good health and quality of life in Brazil? How much does the health system contribute to this? And how can this health system, especially the supplementary system, be redesigned to meet the needs of the population in a short period of time? What needs to be done?

This and other related questions have been the subject of many debates, studies and forums.

The increase in life expectancy in the last decades has been a great achievement for the Brazilian population. Living longer - aging - is already a reality in the current decade, and will become more common in the years to come.

However, the structure of the supplementary health system in Brazil must adjust to the different demographic and epidemiological profiles resulting from the greater participation of the elderly in the population. The scale of the increase in health expenditure on the elderly population will depend, above all, on these additional years being healthy and free from illness and dependence. Prevention, the maintenance of health, independence and autonomy, and delaying disease and frailty in an older population are the major health-related challenges for aging populations. Thus, any social and health policy for the elderly should consider the promotion of health and the maintenance of functional capacity.

Some points must be highlighted in this reorganization of the health system, such as: the training of health professionals (who are still trained and instructed as they were decades ago) focusing on a completely different epidemiological and demographic profile; specialists who are still molded and guided by the prevailing model of remuneration, which prioritizes specialties linked to the execution of procedures, with the role of specialties such as geriatrics and medical and family clinical care diminishing; the lack of health care equipment for elderly care, namely: palliative care, home care, transitional and long-term care, day centers and others; lack of a structured entrance point for the creation of a care plan, avoiding unnecessary emergencies and hospitalizations; the lack of an electronic health record, which stores and makes the entire health/illness history of an elderly person available in all care locations.

All these changes in the health service delivery model need to be accompanied by a change in the way the supplementary health sector is remunerated, moving from a model focused on payment for procedures and services (fee-for-service) to alternatives that make the user the center of health actions (patient-centered).

The reorganization of the care and payment model must generate better care results, as well as the reduction of waste and iatrogenesis, making the system more efficient and ensuring the patient receives better care.

What is needed to achieve this? We must get out of our comfort zone and away from the "more of the same" approach. We need to innovate in the care we provide, in the way we remunerate the sector and in our evaluation of the quality of the sector. We must always remember that innovating often means recovering the simplest care and values that have been lost within our health system.

Thus, it is not enough to simply argue that the cost of health increases every year, or that aging brings additional costs to the system. It must be understood, finally, that a model that only contributes to inefficiencies must change or costs will become unsustainable. We can no longer put the blame on spending on the elderly or try to expunge the "risk" of health insurance portfolios. There is already strong evidence to show that great results can be achieved by doing things differently. The desire to do so is all that is required.

The proposal behind the “Projeto Idoso Bem Cuidado" (“the Well Cared For Elderly Person Project"), developed by ANS and created in partnership with several institutions, has not only structured this reorganization of health care and compensation models, but has already presented significant improvements in healthcare and economic indicators, demonstrating that sustainability and performance can be achieved.

It's time to bring about the changes required! Everyone will benefit, especially the patient.

Martha Regina de Oliveira

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Agência Nacional de Saúde Suplementar (the National Supplementary Health Agency) (ANS)

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Prevalence of and factors associated with benzodiazepine use in community-resident elderly persons

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Abstract

Objective: to assess the prevalence of and factors associated with the use of benzodiazepines in elderly persons living in the community. *Method:* a cross-sectional study was conducted through a household survey of 423 elderly persons from Juiz de Fora, Minas Gerais, Brazil. To analyze the factors associated with the outcome, the Poisson regression model was used, based on the theoretical model of determination with hierarchical blocks. The variables were adjusted within each block, with those with a 5% significance level remaining in the final model. *Result:* The prevalence of benzodiazepine use was 18.3% (95% CI 15.2 to 21.6). Most benzodiazepines used had a long-elimination half-life (59.2%) and use was considered long in 85.5% of users. Among benzodiazepine users 38.4% also used antidepressants. The use of these drugs was associated with the presence of self-reported mental and behavioral disorders, polypharmacy and medical visits in the last three months. *Conclusion:* The use of benzodiazepines was considered high among the elderly. The reduction in the prescription of these drugs should be assessed individually, considering the physiological alterations of the elderly and the adverse effects of drugs, in order to minimize incorrect prescriptions.

Keywords: Aging. Health of the Elderly. Cross-Sectional Studies. Benzodiazepines.

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INTRODUCTION

Greater susceptibility to chronic diseases, disabilities, psychosocial problems and comorbidities are more prevalent in old age. The process of population has brought about a growing concern about mental health care, mainly due to the high prevalence of mental disorders in the elderly population, particularly mood and anxiety disorders[1].

The use of medication is one of the main forms of treatment for the control and prevention of the most prevalent chronic health conditions, especially in the case of the elderly. The elevated use of drugs makes this population more susceptible to the risks of polypharmacy and problems related to pharmacotherapy[2].

Among the medications used by the elderly, the chronic use of psychotropic drugs, especially benzodiazepine class hypnotics, sedatives and anxiolytics, is highlighted, due to the constant insomnia and anxiety that affect this group. Chronic use of psychoactive drugs can lead to serious consequences, such as increased drug interactions, adverse reactions, and the development of dependence and tolerance. The elevated consumption of drugs, especially of psychoactive drugs, may be related to the reduction of functional capacity and consequently a low quality of life[3].

The evelated use of psychotropic drugs emphasizes the need for intervention[4]. Benzodiazepines are highly prominent among psychotropic drugs, and their popularization has revealed new problems, mainly due to inadequate use. Chemical dependence on benzodiazepines with all the inherent implications of such conditions has become a major concern for public health.

The prolonged use of benzodiazepines is associated with many adverse effects, including sedation, amnesia, cognitive impairment and ataxia, in addition to a greater number of falls[5]. Such drugs also add to the development of psychological dependence in chronic benzodiazepine users, and both physicians and patients have difficulty implementing protocols to reduce their use. Many patients deny or minimize side effects, or express a reluctance to risk suffering without the drug[6].

It is essential to understand the patterns of medication use by the elderly population, in order to establish ways to ensure their rational use, the improvement in quality of life and the maintenance of functional capacity. Given the above, the present study aims to evaluate the prevalence of benzodiazepine use in the elderly and associated factors.

METHOD

The present study originates from an observational follow-up study of elderly residents in the northern zone of the city of Juiz de Fora, Minas Gerais, Brazil. The present study is part of the second cross-sectional phase. The northern zone is the region of the city with the greatest territorial availability in the urban area and has the second largest population in the municipality, as well as having the largest number of neighborhoods, concentration of unplanned communities and social programs[7].

Data were obtained through two household surveys conducted in 2010 and 2014-2015. The individuals were selected by conglomerate sampling, and the primary sampling subunits were the census tracts. As the current survey has multiple outcomes, the sample size was calculated based on a prevalence of 50%, deff 1.5 (considering stratification effect and cluster) and a significance level of 95%.

All the elderly participants of the first survey (2010) were visited again. Losses over time included a change of address where it was not possible to obtain the new address, where the elderly person was not found after three attempts at contact at different times and on different days, and refusals. The losses were not differential. To compensate for losses, the oversample[8] method was used, considering cluster sampling. Thus, 248 elderly people included in the 2010 sample participated in the present study, in addition to 175 new elderly people, and the study was composed of 423 individuals.

The questionnaire used was standardized and previously tested. Data collection was performed at the homes of the elderly persons between September 2014 and March 2015. Quality control of the information collected was performed, in which 10% of the sample was evaluated by a new partial

interview. The Mini Mental State Exam (MMSE) was used to screen for cognitive impairment[9]. Elderly persons who did not reach the minimum established for the study[10] had their questionnaires answered by a caregiver/family member. In such cases, self-perception questions were not answered. In the absence of another respondent, the elderly were excluded from the study.

The dependent variable was the continuous use of benzodiazepines. The independent variables were selected based on theoretical reference[11-14] and were grouped into three blocks. The first block included the sociodemographic variables (distal determinants), which are responsible for conditioning the variables of the other blocks. The second block (intermediate determinants) included variables related to the health of the elderly. Variables relating to health services were allocated in the third block.

The variables of each block included: Block 1) sociodemographic variables: gender; age; schooling; ethnicity (white, black, yellow (Asian-Brazilian), brown (mixed-race), indigenous); marital status (single, married/stable, widowed, separated/divorced, other); home arrangement (lived alone or with others); Block 2) variables related to the health of the elderly: perception of health, vision and hearing (excellent, very good, good, fair and poor); self-reported comorbidities (classified according to the International Classification of Diseases - ICD 10), including diseases of the nervous system, mental and behavioral disorders; frailty measured according to the Edmonton scale[15] (does not present frailty, apparently vulnerable, mild frailty, moderate frailty and severe frailty); functional capacity for the performance of instrumental activities of daily living (IADL) classified by the Lawton-Brody scale[16] (dependence, partial dependence and independence); suggestion of anxiety and/or depression, according to the Patient Health Questionnaire (PHQ-4) scale[17]; falls in the last year (yes or no); continuous-use medication (yes or no); polypharmacy[18] (yes or no); Block 3) variables related to the health service: type of coverage of the public health service [discovery area, Basic Health Unit (BHU) with Family Health Strategy, traditional BHU]; possesses a health plan (yes or no); satisfaction with medical health service (yes or no), including public and private services; medical consultation in the last three months (yes or no).

In order to evaluate the use of medicines, the question used was: "Do you continuously use any medication?" If so, the boxes or blister packs of the medication were analyzed. In the absence of these, the information was completed according to the reports of the elderly. The study considered polypharmacy to be the use of five or more drugs[18]. Benzodiazepines were classified according to their elimination half-life[19]: short/intermediate acting (half-life up to 24 hours) and long-acting (half-life greater than 24 hours). The time of continuous treatment with benzodiazepines was stratified as up to six months of treatment or greater than six months, the second case being considered as a prolonged period[20].

Initially the data were submitted to descriptive univariate analysis to obtain the absolute and relative frequency of the variables analyzed, as well as the prevalence of the investigated variable. For the quantitative variables, measures of central tendency and dispersion were calculated. The chi-square test was used in the bivariate analysis to verify the association between each of the independent variables and the dependent variable.

Multivariate analysis was based on the proposed theoretical model of determination with hierarchical blocks of variables (Figure 1) to control for possible confounding factors. Initial adjustment was performed within each block, with variables with a level of significance less than or equal to 0.20 in the bivariate analysis included. The variables that achieved a score of $p<0.05$ in the block analysis were maintained in the final model, with those that retained a significance level of 5% ($p<0.05$), controlled by all the significant variables of the blocks immediately above, included in this model. For the multivariate analysis, the Poisson regression model was used to estimate crude and adjusted prevalence ratios, with a robust estimate of variance and a 95% confidence interval (95%CI).

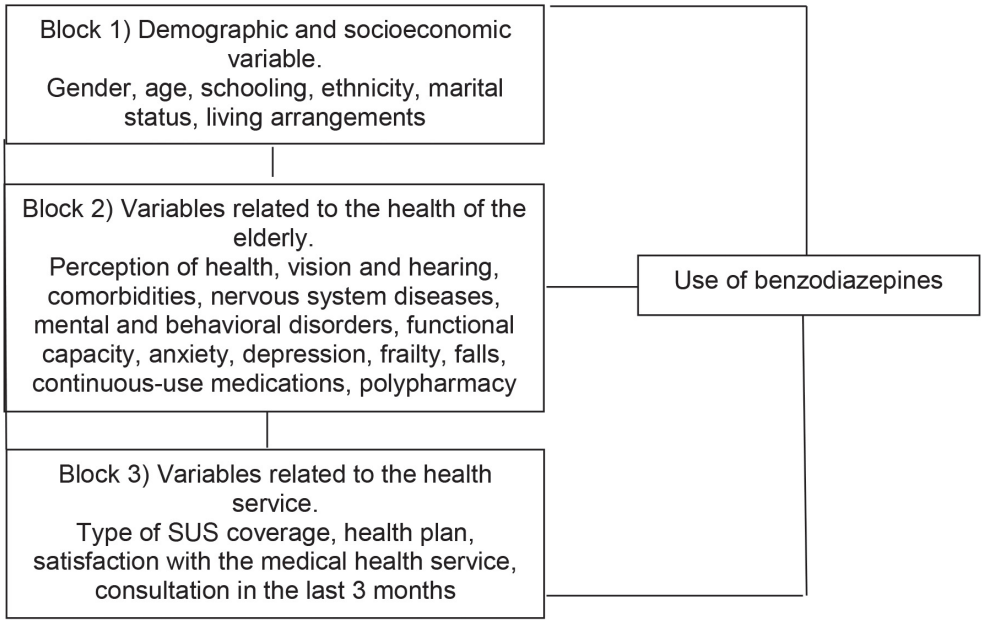

Figure 1. Theoretical model of investigation of the effects of the independent variables on the use of benzodiazepine in hierarchical blocks. Juiz de Fora, MG, 2015.

The study was approved by the Ethics Research Committee of the Universidade Federal de Juiz de Fora (Juiz de Fora Federal University), under approval n. 771.916, and a Free and Informed Consent Form was signed by all the participants.

RESULTS

A total of 423 questionnaires were analyzed, of which 23 were excluded due to poor MMSE performance and the lack of another respondent. The final sample consisted of 400 elderly individuals, with 315 (78.8%) questionnaires answered by the elderly themselves and 85 (21.2%) by another respondent.

The majority of the participants were women (64.5%), lived with another person (89.5%), were married or in a common-law marriage (55.8%), and declared themselves as white (45.5%). The mean age was 73.8 years (±8.0) and mean schooling was 4.2 years (±3.4).

A poor or fair health perception was reported by 43.5% of the elderly, 54.9% described having fair or poor vision, and 28.6% had fair or poor hearing. The presence of comorbidities was reported by 89.0% of the elderly persons, and 4.8% reported diseases of the nervous system and 11.3% mental and behavioral disorders. Most were independent in the assessment of functional capacity for instrumental activities of daily living (Lawton and Brody Scale, 84.5%) and presented some level of frailty (Edmonton Scale, 57.8%). A suggestion of anxiety was verified in 72.7% of the elderly and there was a suggestion of depression in 77.1% (PHQ-4 Scale).

In terms of health services, the majority of the elderly resided in an area that had BHU care within the Family Health Strategy (74.0%) and 60.3% had a health plan. Of the elderly who used medical health services, 81.3% were satisfied with the service. The prevalence of a medical consultation in the last three months was 76.0%. The characteristics of the sample according to the independent variables are described in Table 01.

Table 1. Characteristics of the sample according to the use of benzodiazepines. Juiz de Fora, Minas Gerais, 2015.

Variables	Use of benzodiazepines	
	Yes. n (%)	No. n (%)
Sociodemographic variable		
Gender		
Male	19 (26.0)	123 (37.6)
Female	54 (74.0)	204 (62.4)
Age (years)		
60 - 69	25 (34.2)	111 (33.9)
70 - 79	33 (45.2)	132 (40.4)
80 or more	15 (20.5)	84 (25.7)
Variables related to the health of the elderly person		
Comorbidities		
Presence	68 (93.2)	288 (88.1)
Absence	5 (6.8)	39 (11.9)
Nervous system diseases*		
Yes	8 (11.8)	9 (3.1)
No	60 (88.2)	278 (96.9)
Mental and behavioral disorders*		
Yes	18 (26.5)	22 (7.7)
No	50 (73.5)	265 (92.3)
Functional Capacity for the performance of IADL		
Independent	62 (84.9)	276 (84.4)
Partial Dependency to Dependency	11 (15.1)	51 (15.5)
Suggestion of Anxiety*		
No	34 (58.6)	195 (75.9)
Yes	24 (41.4)	62 (24.1)
Suggestion of Depression*		
No	39 (67.2)	204 (79.4)
Yes	19 (32.8)	53 (20.6)
Frailty*		
Did not exhibit frailty	16 (27.6)	127 (45.2)
Apparently vulnerable	10 (17.2)	65 (23.1)
Mild frailty	13 (22.4)	51 (18.1)
Moderate to severe frailty	19 (32.7)	38 (13.5)
Falls in last year		
Yes	27 (37.0)	114 (34.9)
No	46 (63.0)	213 (65.1)
Polypharmacy*		
Yes	51 (69.9)	127 (43.1)
No	22 (30.1)	168 (56.9)
Variables related to health service		
Satisified with health service*		
Yes	63 (86.3)	258 (80.1)
No	10 (13.7)	64 (19.9)
Medical consultation in last three months		
Yes	66 (90.4)	238 (72.8)
No	7 (9.6)	89 (27.2)

IADL: instrumental activities of daily living; *Excluding non-respondents.

In terms of pharmacological therapy, 92.0% of the elderly used at least one continuous-use drug. Of these, 48.4% used five or more drugs, characterized as polypharmacy. The average number of medications used by the elderly was 4.8 (±2.9).

The prevalence of benzodiazepine use in the population was 18.3% (95% CI 15.2-21.6) (73/400), with clonazepam, bromazepam and alprazolam being the most commonly used benzodiazepines. In addition, 4.1% (3/73) of the elderly used two benzodiazepines. Most of the benzodiazepines used by the elderly in the present study had a long elimination half-life (half-life greater than 24 hours, 59.2%). The time of benzodiazepine use was greater than six months in 85.5% of users. Among the benzodiazepine users, 38.4% also used antidepressants. The characterization of the use of benzodiazepines by the elderly is described in Table 2.

The variables that remained associated with the use of benzodiazepines in the bivariate analysis and the adjusted prevalence ratios within each hierarchical block are described in Table 3. In block-adjusted multivariate analysis, no block 1 variable was statistically significant ($p<0.05$). In block 2, the variables auditory perception, self-report of mental and behavioral disorders and polypharmacy were significant. The only significant variable in block 3 was medical consultation in the last three months.

After multiple regression analysis, three variables associated with the use of benzodiazepines remained in the final model (Table 4): presence of self-reported mental and behavioral disorders (adjusted PR =4.72, 95%CI, 1.88-11.82), polypharmacy (adjusted PR =2.17, 95%CI, 1.14-4.35) and medical consultation in the last three months (adjusted PR =6.64, 95%CI 1.51-29.22).

Table 2. Characterization of benzodiazepine use by the elderly. Juiz de Fora, Minas Gerais, 2015.

Variables	N (%)
Use benzodiazepines	
Yes	73 (18.3)
No	327 (81.2)
Active principle	
Alprazolam	12/76 (15.8)
Bromazepam	15/76 (19.7)
Clonazepam	32/76 (42.1)
Cloxazolam	2/76 (2.6)
Diazepam	9/76 (11.8)
Flunitrazepam	2/76 (2.6)
Lorazepam	4/76 (5.3)
Elimination Half Life	
Short/Intermediate	31/76 (40.8)
Long	45/76 (59.2)
Time of use (months)*	
Up to 6	9/62 (14.5)
Over 6	53/62 (85.5)

*Variable investigated only when respondent was the elderly person themselves.

Table 3. Use of benzodiazepines according to independent variables. Juiz de Fora, Minas Gerais, 2015.

Variables	%	Crude PR (CI 95%)	p	Adjusted PR (CI 95%)	p
Block 1 – Sociodemographic variables					
Gender			0.061		0.093
Female	20.9	1		1	
Male	13.4	0.58 (0.33-1.03)		0.61 (0.34-1.08)	
Schooling (years)			0.141		0.221
5 or more	14.6	1		1	
1 to 4	18.5	1.34 (0.71-2.52)		1.33 (0.87-2.02)	
0	24.5	1.90 (0.81-4.45)		1.33 (0.87-2.02)	
Block 2 – Variables related to the health of the elderly person					
Perception of Health*			0.023		0.098
Fair/Poor	24.1	1		1	
Excellent to Good	14.0	0.51 (0.29-0.92)		0.48 (0.20-1.15)	
Perception of Hearing*			0.039		**0.048**
Fair	25.6	1		1	
Excellent to Good	15.6	0.54 (0.30-0.97)		0.45 (0.20-0.99)	
Nervous system diseases*			**0.003**		0.074
No	17.8	1		1	
Yes	47.1	4.12(1.53-11.11)		4.68 (0.86-25.40)	
Mental and behavioral disorders*			**<0.001**		**0.007**
No	15.9	1		1	
Yes	45.0	4.34 (2.17-8.67)		5.38 (1.57-18.44)	
Suggestion of Anxiety*			**0.008**		0.750
Yes	27.9	1		1	
No	14.8	0.45 (0.25-0.82)		0.87 (0.37-2.06)	
Suggestion of Depression*			**0.047**		0.565
Yes	26.4	1		1	
No	16.0	0.53 (0.28-1.0)		0.76 (0.29-1.95)	
Frailty*			**0.009**		0.118
Present	21.4	1		1	
Absent	11.2	0.46 (0.25-0.86)		2.23 (0.82-6.08)	
Polypharmacy*			<0.001		**0.023**
No	11.6	1		1	
Yes	28.7	3.03 (1.79-5.26)		2.56 (1.14-5.88)	
Use of antidepressants			<0.001		0.086
No	13.4	1		1	
Yes	44.4	5.19 (2.88-9.34)		2.42 (0.88-6.63)	
Block 3 – Variables related to health service					
Health Plan			0.111		0.116
No	14.5	1		1	
Yes	20.7	1.55 (0.90-2.66)		1.55 (0.90-2.68)	
Medical consultation in last three months			**<0.001**		**0.002**
No	7.3	1		1	
Yes	21.7	3.53 (1.56-7.97)		3.53 (1.56-8.00)	

*Excluding non-respondents.

Table 4. Final regression model of association of benzodiazepine use and independent variables. Juiz de Fora, Minas Gerais, 2015.

Variables	Crude PR (CI 95%)	p	Adjusted PR (CI 95%)	p
Mental and behavioral disorders*		0.007		0.001
No	1		1	
Yes	5.38 (1.57-18.44)		4.72 (1.88-11.82)	
Polypharmacy*		0.023		**0.020**
No	1		1	
Yes	2.56 (1.14-5.88)		2.17 (1.14-4.35)	
Medical consultation in last three months		**0.002**		**0.012**
No	1		1	
Yes	3.53 (1.56-8.00)		6.64 (1.51-29.22)	

*Excluding non-respondents.

DISCUSSION

The prevalence of benzodiazepine use in the study population was 18.3%, similar to that found in other studies[11,12]. Prevalences that differ from the present study have also been reported in literature[13,14,21]. Differences between studies can be explained by the difference in definitions of use and the period of observation. The present study analyzed drugs in continuous use at the time of the interview, while others evaluated medication use in the 15 days, 90 days or 12 months prior to the interview. The contrasts identified may also reveal important differences among the analyzed populations, such as health service use, epidemiological profile, sociocultural characteristics, or even reflect the habits of those prescribing the drugs, in addition to the criteria used to indicate these medications[14].

The high consumption of benzodiazepines may be related to the progressive decrease in humanity's resistance to stress, the introduction of new drugs, the increasing pressure of advertising by the pharmaceutical industry, or inadequate prescription habits on the part of professionals[22]. It should also be added that drugs are considered one of the main contemporary technologies of care, and promise to ward off any suffering caused by society, such as depression, anxiety, psychotic disorders, loneliness, economic crises and sadness, simply through the administration of an effective chemical in the body[4].

The long-term use of benzodiazepines in 85.5% of the elderly and the high prevalence of long half-life benzodiazepines (59.2%) are noteworthy. Long-acting benzodiazepines accumulate when taken repeatedly and their undesirable effects may manifest themselves after several days or weeks[23]. According to the Beers-Fick and STOPP criteria for drugs that are inappropriate for the elderly, the use of benzodiazepines should be avoided in such individuals, regardless of the half-life of the drug[24,25].

Restrictions on the use of benzodiazepines by the elderly have been increasing, related to depression of the central nervous system, such as decreased psychomotor activity, memory impairment and the potentiation of the depressive effect through interaction with other depressant drugs[22]. Literature indicates that even short-acting benzodiazepines are a significant risk factor for the frequency of falls in geriatric patients[26].

A prospective study by Billioti de Gage et al.[27] showed that the use of benzodiazepines is associated with an increased risk of dementia. The risk of dementia increases with cumulative dose, duration of treatment, and when long-acting drugs are used[27]. Specific concerns about prolonged use also include the development of tolerance and increased dosage, addiction, drug abuse and difficulty of withdrawal[5,6]. Drug dependence leads to the annulment of responses to social suffering related to gender, aging and poor

economic and quality of life conditions, promoting psychiatric illnesses such as anxiety and depression, which can be intensified in the elderly and stimulated by the continuous use of medications[28].

The difficulty of withdrawing benzodiazepine use from patients who have become dependent due to prolonged use is also an important issue. Modifying consumption in patients who have used benzodiazepines for several years remains a challenge. The reason for the continued use of benzodiazepines is described as a fear of the return and intensification of symptoms, or impairment of the performance of daily activities. Psychological dependence and the underestimation or negation of the potential side effects of benzodiazepines contribute to the resistance, especially of the elderly, to discontinuing medication[29].

Factors associated with the use of benzodiazepines found in the present study following multivariate analysis were the presence of mental and behavioral disorders, polypharmacy and a medical consultation in the last three months. An association between the use of benzodiazepines and mental and behavioral disorders was verified in other studies, with use associated with common mental disorders[11] and previous psychiatric illnesses[20].

The association between the use of benzodiazepines and the use of other drugs has been verified in literature[11]. In the present study the use of benzodiazepines was associated with polypharmacy. The presence of comorbidities and consultation with different specialists may be related to this practice[14]. Polypharmacy does not necessarily indicate that the prescription and use of the drugs is incorrect, and it is often necessary to guarantee a better quality of life for the elderly person[30]. However, the number of drugs prescribed, the complexity of therapeutic regimens, especially in the case of comorbidities, and the pharmacokinetic and pharmacodynamic changes inherent in the aging process, increase the vulnerability of the elderly to medications, whether due to adverse reactions, drug interactions or side effects[31]. In a study by Richardson et al.[5], it was found that the use of benzodiazepines was associated with an increased risk of falls when combined with polypharmacy.

The periodic medical consultations by users of benzodiazepines may be justified by the fact that these drugs are only dispensed with a medical prescription, and the amount dispensed is only sufficient for a maximum of 60 days of treatment. Studies have confirmed this association[11,12]. Contact with the medical service is seen as an opportunity to obtain the prescription of a psychotropic drug[12]. On the other hand, the use of benzodiazepines may increase the patient's contact with the physician. According to Auchewski et al.[22], a return visit to the doctor may be interpreted as the desire of the prescriber to accompany the response of the patient to the benzodiazepines, including dose monitoring, evaluation of side effects and therapeutic response. A return visit to the doctor should be seen as a precaution, as a rational prescription should be based on the continuous monitoring of the patient. However, in practice, it has been observed that patients only return to obtain a new prescription. A study carried out by Alvarenga et al.[32] reports the ease of the acquisition of prescriptions, which can be obtained without the need for a formal medical consultation or adequate medical guidance on the care needed during treatment. A link is not established with the medical professional or with the health service, but with the medication itself, with the need to present a prescription being understood as an obstacle.

The use of benzodiazepines in geriatrics should be carried out with discretion and according to specific criteria, since the sensitivity of the elderly to benzodiazepines and their half-life increases considerably with age. Despite the growing concern, the use of benzodiazepines by the elderly remains high. This is largely because no superior pharmacotherapeutic alternative has been developed to treat anxiety and insomnia. Benzodiazepines act fast and, at least in the initial prescription stage, are safe and possess predictable effects[33].

Reducing the prescription of benzodiazepines requires replacement with other treatments for sleep disorders and anxiety, many of which are non-pharmacological[12]. Gradual cessation of use may be effective, with a gradual reduction in dose. Cognitive behavioral therapy is considered effective for the treatment of chronic insomnia, facilitating

the reduction of the use of benzodiazepines in the elderly[34]. Interventions in the areas of prescription, substitution, psychotherapies and pharmacotherapies may contribute to the management of benzodiazepine dependence. Efforts should be made to educate and support patients. In addition, proper interaction between medical professionals and patients may contribute to tackling the problem of inappropriate prescriptions.

Consideration should be given to the limitations of the present study, mainly due to its cross-sectional design, which does not allow the evaluation of temporal relationships, as well as the impossibility of identifying the therapeutic indication of the drug, the existence of adverse events and the occurrence of drug interactions. The advantages of the study should also be highlighted, such as the fact that it was performed with elderly people living in the community, and so is less prone to selection bias than studies conducted in selected populations[11].

CONCLUSION

The prevalence of the chronic use of benzodiazepines in the elderly was considered high, and similar to findings in literature. The use of benzodiazepines was associated with mental and behavioral disorders, polypharmacy and medical consultations. Prescription in the elderly, as well as prolonged use, should be evaluated with caution, considering the physiological changes among this population and the adverse effects of the medications.

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Factors associated with overactive bladder syndrome in the elderly community: a cross-sectional study

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Abstract

Objective: to identify risk factors related to overactive bladder syndrome. *Method:* a cross-sectional study was performed with elderly women (>60 years) from the community of Ceilândia, in the Distrito Federal, Brazil, with or without symptoms of OBS, who were evaluated through interviews and questionnaires. The clinical and sociodemographic variables analyzed were: age; body mass index (BMI); parity, schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, constipation, systemic arterial hypertension (SAH), diabetes mellitus; depression and anxiety. The questionnaires applied were the Overactive Bladder Awareness Tool (OAB-V8), the Geriatric Depression Scale and the Beck Anxiety Scale. Data were analyzed descriptively. Binary logistic regression was used to evaluate the significant associations between the independent variables and the outcome of interest. Risk ratios were calculated for each independent variable with 95% confidence intervals. *Result:* A total of 372 volunteers were recruited, 292 of whom were eligible. Of these, 172 were allocated to the case group (58.9%) and 120 (41.1%) were control subjects. The two groups were homogeneous between one another. There was a high prevalence of OBS in the study population and significant differences for the variables presence of SAH, abdominal surgery and pelvic surgery, with the case group presenting a higher frequency of these events. In multivariate analysis, it was observed that an active sexual life reduces the chance of having OBS by 70.8%, while urogynecologic surgeries increase this risk 3.098 times. *Conclusion:* In univariate logistic regression analysis, BMI, SAH, a previous history of abdominal and urogynecologic surgery, number of abortions and the presence of symptoms of depression and anxiety, were found to be factors associated with OBS.

Keywords: Urinary Bladder, Overactive. Risk Factors. Elderly. Urinary Incontinence, Urge.

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INTRODUCTION

Overactive Bladder Syndrome (OBS) is characterized by micturition urgency with or without incontinence, polyuria and nocturia, in the absence of other local pathologies[1]. Its diagnosis is clinical, is evidenced by the presence of the defining symptoms of the condition, and does not involve the use of invasive examinations[2]. The syndrome has a negative impact on quality of life (QOL)[3] and is associated with high economic costs[4]. It results in social, psychological, emotional, physical and sexual difficulties and is considered a serious health problem which mainly affects elderly women[5,6].

It is estimated that by 2018 more than 500 million individuals worldwide will suffer from this disorder[7]. North American epidemiological data indicate a prevalence of 16% among the population of that continent[8], while for Brazil the estimate is 18%[7]. Little is known, however, about the factors associated with OBS and its prevalence among elderly Brazilian women[9].

While population-based studies have been conducted in a number of countries to estimate the prevalence and risk factors of OBS, the comparison of results is difficult because of the methodological diversity these works employ and their conflicting results[10-12]. More accurate knowledge on the subject in question is therefore necessary, with risk groups delimited in a more efficient manner.

In view of the above, the present study aims to identify factors associated with the occurrence of OBS in elderly women living in the community.

METHOD

A cross-sectional study was performed, with the sample group recruited from the activities of the "Escola de Avós" (Grandmother's School) health promotion program, organized by the Health Center for the Elderly of the Primary Health Care Subsecretariat, which takes place in a fire station in the city of Ceilândia, in the Distrito Federal, Brazil. A sample calculation was performed based on the total number of elderly residents in this city (29,168). A sample error of 5% was considered and 95% was adopted as the confidence level, resulting in a required sample size of 118 individuals for each group[13].

The eligibility criteria were: female participants, aged 60 years or older, with or without overactive bladder symptoms, such as: urgency; and/or urge incontinence; and/or polyuria; and/or nocturia; which were evaluated through questionnaires. Older women with a history of neurological diseases (Multiple Sclerosis, Alzheimer's Disease, Vascular Brain Accident, Parkinson's Disease and/or spinal cord injury); bladder cancer; psychological disturbances or the inability to respond to questionnaires were excluded.

The elderly women underwent an interview to obtain the clinical and sociodemographic variable data. The following information was collected: age; BMI; parity (gestations, vaginal deliveries, cesarean deliveries and abortions), schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, constipation, systemic arterial hypertension (SAH), diabetes mellitus; depression and anxiety.

They were then divided into two groups: case and control. The groups were divided using the Overactive Bladder Awareness Tool (OAB-V8), an instrument developed to evaluate OBS symptoms. This consists of eight questions related to increased urinary frequency, nocturia, micturition urgency, urinary incontinence, urge incontinence and enuresis, with domains from 0 to 5, where 0 equals none, 1 almost none, 2 a little, 3 some, 4 a lot and 5 very much. If the sum of the answers is equal to or greater than 8 points there is a probable diagnosis of OBS[14].

Following the interview and due completion of the questionnaires, the total points of the questionnaire were used to divide the sample into two groups: one for elderly women with OBS and one for elderly women without OBS, according to the lower urinary tract infection identified by OAB-V8. Women who scored less than 8 in their final OAB-V8 result were classified as the control group, while a score equal to or greater than 8 meant the participant was placed in the case group. The reduced Yesavage version of the Geriatric Depression Scale (GDS-15)[15] was used for the identification of depressive symptoms in the sample, while anxiety symptoms were evaluated using the Beck Anxiety Scale (BAS)[16].

Interviewers were trained so that each interviewer repeated the question at most three times, if necessary, with no extra explanation during the administration of the questionnaire that might interfere with the participant's interpretation. All the data, from each participant, was collected in a single meeting with an average duration of 30 minutes. Questionnaires were chosen as this strategy provides access to the subjective views of individuals regarding their condition, as well as being an inexpensive and non-invasive method.

The data were analyzed descriptively. Non-normal distribution of data was confirmed using the Kolmogorov-Smirnov test. The differences in the continuous data of the study subgroups defined according to the presence of overactive bladder as *elderly women with* versus *elderly women without* were analyzed using the Mann Whitney U test for independent samples, while the chi-squared test (X^2) was used for the categorical data. The confidence intervals for the mean of the difference between the continuous data of the groups were calculated.

Binary logistic regression analysis was used to evaluate the significant associations between the independent variables and the outcome of interest (OBS). Firstly, univariate logistic regression analysis was used to determine the association between each independent variable and the dependent variable presence of an overactive bladder, thereby verifying the factors that contributed to the occurrence of this syndrome. The risk ratios (RR) were calculated for each independent (explanatory) variable with 95% confidence intervals.

Subsequently, the variables that presented an association with a *p*-value lower than 0.20 in univariate regression analysis were included in multivariate logistic regression analysis to investigate the independent effect, when taken together, of these variables, for the explanation of "OBS". The selection of the best model was performed with the reduction of variables procedure, based on the forward stepwise method applying the Likelihood Ratio (LR) criterion, which adds variables based on the significance identified in the statistical scores (5%) and removes them from the tests according to the maximum likelihood statistic (10%) obtained by the data set. The b-weight value (regression coefficient) associated with each independent variable was used to determine the probability of the elderly having OBS. In multivariate logistic regression, there was no collinearity between the independent (explanatory) variables through the tolerance analysis (>0.1) and the Variance Inflation Factor (<10). A significance level of 5% was considered.

The present study was approved by the Research Ethics Committee of the Faculdade de Ciências da Saúde (the Health Sciences School) of the Universidade de Brasília (the University of Brasilia), under approval nº 410.161, dated 30 September 2013, and was carried out from September 2013 to December 2016.

RESULTS

A total of 372 volunteers were recruited and a total of 292 elderly women were deemed to be eligible, with a total of 172 allocated to the case group and 120 to the control group.

Among the socio-demographic and clinical factors investigated, there was a higher frequency of hypertension and of abdominal and urogynecological surgeries in the case group. The other characteristics were homogeneous.

When the analyzed variables of the groups were compared, there were significant differences in the presence of SAH and having undergone prior abdominal and pelvic surgery, with the case group having higher frequencies of these events. The case group also obtained higher scores in the GDS-15 and BAS questionnaires, with a significant difference between the groups.

Univariate logistic regression analysis showed that BMI, the diagnosis of hypertension, a previous history of abdominal and urogynecological surgery, number of abortions, and higher scores in the GDS-15 and BSA questionnaires were associated with OBS when analyzed in an isolated manner, as shown in Table 2. All the other analyzed variables had no association with OBS.

The ten variables that resulted in a *p*-value lower than 0.20 in univariate analysis were used in multivariate logistic regression analysis. Thus, in the final model, only the diagnosis of diabetes, a history of urogynecological surgery and the maintaining of an active sex life remained as independent variables associated with OBS (Table 3).

Table 1. Comparison of demographic and clinical characteristics of the case group and the control group of elderly women living in the community (n= 292). Distrito Federal, 2016.

Variables	Case group (n=172)		Control group (n=120)		Mean difference [95% CI]	*p*-value
	Mean (sd)	n (%)	Mean (sd)	n (%)		
Age**	68.67 (6.12)		69.71 (6.75)		-1.04 (-2.53 a 0.45)	0.184
BMI**	28.07 (5.03)		26.76 (4.21)		1.31 (0.21 a 2.42)	0.05
Years of schooling**	1.31 (1.00)		1.36 (0.90)		-0.04 (-0.27 a 0.18)	0.476
Skin color/ethnicity***						
White		56 (32.6)		47(39.2)		0.447
Black/Afro-Brazilian		18 (10.5)		10 (8.3)		
Mixed-race		23 (13.4)		21(17.5)		
Asian-Brazilian		22 (12.8)		10 (8.3)		
Other		53 (30.8)		32 (26.7)		
Marital Status***						
Single		20 (11.6)		17 (14.2)		0.913
Married or cohabiting		66 (38.4)		45 (37.5)		
Divorced		32(18.6)		20 (16.7)		
Widowed		54 (31.4)		38 (31.7)		
Gestation**	5.42 (3.69)		5.45 (3.34)		-0.026(-0.86 a 0.81)	0.750
Vaginal deliveries**	4.15 (3.16)		4.43 (3.24)		-0.27(-1.02 a 0.47)	0.432
Cesarean deliveries**	0.42 (0.70)		0.48 (0.73)		-0.06(-0.23 a 0.11)	0.510
Abortions**	0.85 (1.42)		0.55 (0.92)		0.30 (0.03 a 0.57)	0.081
Physical activity (yes)***		101 (58.7)		62 (51.7)		0.141
Sexually active(yes)***		6 (12)		28 (23.3)		0.067
Smoker (yes)***		7 (4.1)		5 (4.2)		0.595
Constipation (yes)***		36 (20.9)		24 (20.2)		0.874
Diabetes (yes)***		30 (17.4)		29 (24.2)		0.183
SAH (yes)***		125 (72.7)		62 (51.7)		0.000
Abdominal surgery (yes)***		127 (73.8)		73 (60.8)		0.013
Urogynecological Surgery(yes)***		77 (44.8)		30 (25)		0.000
GDS-15**	5.47(2.89)		4.28 (2.81)		1.18(0.51 a 1.85)	0.000
BAS**	17.26(10.54)		10.51(9.64)		6.75 (4.36 a 9.13)	0.000
OAB-V8**	22.31 (6.49)		2.61 (2.34)		19.71(18.64 a 20.77)	0.000

Table 2. Univariate logistic regression to verify factors associated with overactive bladder syndrome. Distrito Federal, 2016.

Variables	Univariate analysis			
	b-weights	RR	95% CI	*p*-value
Age	-0.025	0.975	0.940 – 1.011	0.172
Body Mass Index	0.060	1.062	1.007 – 1.121	0.027
Years of schooling	-0.048	0.953	0.747 – 1.215	0.696
Skin color/ethnicity				
White	-0.329	0.719	0.401 - 1.292	0.270
Black/Afro-Brazilian	0.083	1.087	0.447 - 2.643	0.854
Mixed-race	-0.414	0.661	0.317 – 1.381	0.271
Asian-Brazilian	0.284	1.328	0.558 – 3.160	0.521
Other	-	-	-	-
Marital Status (lives without spouse)	-0.037	0.964	0.596 – 1.558	0.880
Gestation	-0.002	0.998	0.934 – 1.066	0.952
Vaginal deliveries	-0.027	0.974	0.905 – 1.047	0.471
Cesarean deliveries	-0.115	0.891	0.644 – 1.233	0.488
Abortions	0.217	1.242	1.001 – 1.540	0.048
Physical activity (yes)	0.286	1.331	0.832 – 2.128	0.233
Sexually active(yes)	-0.803	0.448	0.173 – 1.161	0.098
Smoker (yes)	-0.025	0.976	0.302 – 3.150	0.967
Constipation (yes)	-0.047	0.954	0.535 – 1.703	0.874
Diabetes (yes)	-0.411	0.663	0.373 – 1.177	0.161
Systemic Arterial Hypertension (yes)	0.911	2.488	1.523 – 4.063	0.000
Abdominal surgery (yes)	0.597	1.817	1.102 – 2.996	0.019
Urogynecological Surgery(yes)	0.889	2.432	1.459 – 4.053	0.001
Geriatric depression scale	0.149	1.160	1.064 – 1.266	0.001
Beck anxiety scale	0.068	1.070	1.042 – 1.098	0.000

RR= risk ratios; CI = Confidence interval.

Tabela 3. Univariate logistic regression to verify factors associated with overactive bladder syndrome. Distrito Federal, 2016.

Variables	Multivariate analysis			
	b-weights	RR	95% CI	*p*-value
Age	-0.038	0.963	0.900 – 1.030	0.267
Body Mass Index	0.057	1.059	0.972 – 1.152	0.189
Abortions	0.200	1.221	0.861 – 1.731	0.262
Sexually active(yes)	-1.233	0.292	0.089 – 0.954	0.041
Diabetes (yes)	-1.057	0.348	0.122 – 0.993	0.048
Systemic Arterial Hypertension (yes)	0.737	2.090	0.824 – 5.300	0.120
Abdominal surgery (yes)	0.623	1.864	0.751 – 4.628	0.179
Urogynecological Surgery(yes)	1.131	3.098	1.372 – 6.999	0.007
Geriatric depression scale	0.089	1.094	0.932 – 1.282	0.271
Beck anxiety scale	0.045	1.046	1.000 – 1.094	0.050

RR= risk ratios; CI= Confidence Interval.

These results indicate that maintaining an active sex life and the diagnosis of diabetes reduce the odds of having OBS by 70.8% and 65.2%, respectively, while a history of urogynecologic surgery increases the risk of OBS 3.098 times.

DISCUSSION

The present study identified a high prevalence of OBS among elderly women in the community studied (58.9%), a finding similar to other studies[17-19]. The risk factors assessed were: age; BMI; parity (gestations, vaginal deliveries, cesarean deliveries and abortions), schooling, previous abdominal and urogynecologic surgeries, physical activity, smoking, hypertension, depression, anxiety, diabetes mellitus and constipation.

The present study found that individuals in the case group had a higher BMI than those in control group, although this difference was not significant (p=0.05). Many studies have reported that high BMI is a factor associated with OBS[12,18]. Brown et al.[20] affirmed that obesity is directly associated with UI and urinary symptoms such as micturition urgency, polyuria and nocturia, a fact that has also been observed by other authors[21,22]. In the present study, however, no significant difference in BMI was found when the group of elderly women with OBS and those without OBS were compared, although univariate logistic regression analysis identified an association between BMI and OBS when considered separately. The relationship between OBS and BMI is not well defined in literature, as authors such as Oliveira et al.[9] and Cheung et al.[23] did not observe such an association, and so further studies on the subject are required.

The diagnosis of SAH was more frequent among elderly women in the case group of the present study, and univariate logistic regression analysis indicated that this diagnosis was a factor associated with OBS. The same was observed in a study of 1,410 men and 1,546 women aged over 65 in Japan by Hirayama et al.[11], in which the diagnosis of SAH was equally and significantly greater in individuals with symptoms of OBS. Ekundayo[24] performed a review considering the presence of OBS in hypertensive patients and observed that there was an association between the use of diuretics and increased urinary frequency and urgency, but not with UI. These authors stated that alterations in micturition may be related to treatments for hypertension, as antihypertensive medications and diuretics increase urine output, which exacerbates symptoms in patients with voiding dysfunction. Reis et al.[25] cite in their study that some medications, including diuretics and other medicines used in the treatment of hypertension, are possible causes of UI in the elderly. However, Jardim et al.[26] performed an integrative review of SAH and UI among the elderly and found no evidence of the relationship between the two conditions.

The case group in the present study scored higher in the GDS questionnaire, which suggests that this group may have more depressive symptoms than the control group. This result was also observed by other authors, such as Ikeda et al.[18], in a study of 414 elderly men and 419 elderly women in Japan, the objective of which was to measure the prevalence of risk factors for OBS in elderly persons with questionnaires. The authors described a mean OBS prevalence of 17.6% in men and 19.1% in women, and stated that the risk for developing OBS was significantly higher in individuals with depressive symptoms and alcoholic habits and who were overweight. Alves et al.[6], conducted a study in Brazil with 161 elderly women that evaluated the association between OBS and depression. The authors observed a high prevalence of OBS (76.3%), with 42.6% of sufferers presenting mild or severe depression, revealing a significant correlation between OBS and depression.

Hirayama et al.[11] conducted a similar study in Japan with 1,410 men and 1,546 women. Its objective was to evaluate the incidence and remission rate of OBS and its risk factors for new cases among the elderly. The authors observed that the incidence and remission rates in one year were 11.9% and 29.8%, respectively. They also observed a relationship between urinary symptoms and alcohol consumption and smoking, hypertension, and a depressive state in individuals with recent-onset OBS, all of which were significantly higher than in individuals without OBS.

When the BAS results of the groups were compared, the mean overall score of the case group was higher, suggesting a higher level of anxiety. This result is consistent with those described in the literature. Studies have shown that anxiety symptoms are common among the elderly and in

the majority of patients with symptoms of OBS[27,28]. Knight et al.[28] carried out a study comparing the electromyography of the pelvic floor muscles of women with OBS symptoms and the BAS score of women without urinary complaints. Although the authors reported no difference in electromyography between the groups, the group with symptoms of OBS had significantly higher anxiety scores.

Lai et al.[27] studied the relationship between anxiety and OBS. These authors observed that 48% of individuals with symptoms of OBS also had symptoms of anxiety, with 24% of these suffering from moderate to severe anxiety. The authors state that the anxiety scores of individuals with OBS were significantly higher than the control results. Alves et al.[21] also investigated this relationship, and observed a correlation between anxiety and OBS (r=0,345).

The elderly women in the case group presented significant differences in terms of prior history of abdominal and urogynecologic surgery and abortions, and these variables were presented as factors associated with OBS when analyzed in isolation. This relationship is not yet fully clarified in literature, with few studies specifically addressing these issues. Additional studies with long-term follow up periods are therefore required to prove such results.

In terms of surgeries, the multivariate analysis of the present study found that those who underwent urogynecological surgeries had a 3.098 greater chance of OBS. Abraham and Vasavada[29] performed a review on urgency after sling surgery. The authors reported an estimated 40% post-operative urgency rate, which may be due to urinary tract infection (7.4-17.4%), bladder outlet obstruction (1.9-19.7%), urinary tract perforation (0.5-5%) and/or idiopathic urgency (0-28%). Duru et al.[30] performed a systematic review in order to analyze urodynamic outcomes before and after a total hysterectomy for benign conditions and to report whether urinary function was altered after the hysterectomy. The authors observed that the urodynamic diagnosis of detrusor overactivity and UI symptoms were significantly reduced after a hysterectomy. The authors therefore concluded that a hysterectomy does not adversely affect urodynamic outcomes, nor does it increase the risk of adverse urinary symptoms, and may even improve some urinary functions.

While it was observed in the present study that maintaining an active sex life reduces the chance of developing OBS, no articles were found in literature to prove this finding, making it an excellent topic for future research. It is possible to find works such as that of Coyne et al.[31], a cross-sectional study that evaluated the symptoms of OBS and the sexual activity of men and women through internet questionnaires in the United Kingdom, Sweden and the USA. The authors observed worse sexual health in individuals with OBS in comparison with those who did not suffer from the condition and warned about the importance of assessing the sexual health of men and women with OBS.

Chen et al.[32] carried out a literature review that observed the relationship between urinary symptoms and female sexual dysfunction. The authors noted that sexual and urinary problems are often comorbid and have been associated with a wide range of sexual response deficiencies, including declines in desire, arousal, lubrication, orgasm, general sexual satisfaction and increased sexual pain, when compared with women without urinary symptoms. The authors stated that paying attention to urinary problems can improve women's sexual quality of life.

In this study, having diabetes was shown as a protective factor for OBS, a fact that contradicts results found in literature, such as those of the studies of Wen et al.[12] and Ikeda et al.[10]. Wen et al.[12] evaluated the prevalence of risk factors associated with OBS in China with 3,129 men and 6,676 women aged over 40 years. They observed that prevalence increased with age in both sexes, and was also higher in individuals with diabetes and with a BMI above 29. Likewise, a study carried out in Japan by Ikeda et al.[10], involved the application of questionnaires on the presence of OBS symptoms in 652 diabetic patients and identified a prevalence of cases of 24.2% in the study population. The authors stated that this prevalence was twice as high as that of the general Japanese population. These results indicate the need to carry out further studies with larger and more representative samples.

A potential limitation of this work is difficulty in finding studies that refer to factors associated with OBS that mainly involve elderly women. This is an incentive for further research as there are still many

issues to be addressed. Another limiting factor was the large number of exclusions due to missing data in the questionnaires, which limited the sample.

One probable bias that should be considered in the present study is the use of questionnaires through interview. While questionnaires are important tools in data collection, both for diagnosis and for epidemiological studies, there is no consensus on how best to use them. It is not possible to predict how the patient understands/perceives the questions or how they will respond. Thus, the routine used during the completion of this instrument directly affects the quality of the data collected. Bowling[33], after conducting a systematic review, stated that different ways of applying questionnaires affect the quality of the data collected. This author affirms that there is no gold standard for the use of this instrument and that all forms have advantages and biases. However, despite the possibility of bias in the method employed, it is unlikely that the use of another technique could have significantly altered the quality or results presented here.

CONCLUSION

The present study identified urogynecologic surgery as a factor associated with overactive bladder syndrome. In contrast, a diagnosis of diabetes and maintaining an active sex life were protective factors in elderly women in the community studied. However, additional studies are needed to prove these results.

Overactive bladder syndrome should be considered a public health problem as it is highly prevalent among elderly women. It is therefore necessary to elaborate new care strategies and actions of prevention and health promotion that contribute to healthier aging and quality of life.

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Influence of a protocol of Pilates exercises on the contractility of the pelvic floor muscles of non-institutionalized elderly persons

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Abstract

Objective: To investigate the influence of a protocol of Pilates exercises on the functionality and contractility of the pelvic floor muscles (PFM) of older women living in the city of Campo Grande, Mato Grosso, Brazil. *Method*: Ten women (median age of 63.4±4.5 years) with little or no pelvic floor dysfunction were subjected to 24 sessions of Pilates exercises lasting one hour each, for 12 weeks. The pressure of the pelvic floor muscles (PFM) was assessed using a perineometer (cmH_20) and contractility was assessed with the PERFECT scheme. Data were described as median ± interquartile range and inferential analysis was performed using the Wilcoxon paired test, with a significance level of 5%. *Results*: In view of the proposed treatment, the degree of voluntary contraction of the PFM of the participants increased from 79.0±83.5 to 90.0±82.0 cmH_20, with a statistically significant difference in paired comparison (p=0.012). According to the PERFECT scheme, there was an increase in contraction time (from 5.0±0.1 to 7.0±4.7 seconds) and in the number of fast repetitions (from 7.0±4.5 to 8.0±4.7), with a statistically significant difference for both variables (p=0.017 and p=0.008, respectively). *Conclusion*: The results indicate that the Pilates method increased the contractility and pressure of the PFM of elderly women with little or no PFM impairment. Further studies are required to determine whether the Pilates method is an effective method for the treatment of women with severe pelvic floor dysfunction.

Keywords: Aged. Exercise Movement Techniques. Physical Therapy Modalities.

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INTRODUCTION

Pilates emerged as a method of rehabilitation during World War I, when Joseph Hubertus Pilates applied his knowledge to rehabilitate injured men. The popularity of the method grew most in the 1980s[1,2]. More recently, Pilates has been used by health care professionals to integrate the mind and body of subjects, resulting in improved fitness (flexibility, strength and balance) and body consciousness. The method features ground and apparatus-based exercises created by Joseph Pilates[1-4].

There are six key principles involved in Pilates: concentration, control, precision, fluidity of movement, breathing and center of strength[1,3,5]. The center of strength, also called the "core", "power house" or "engagement" refers to the region of specific groups of muscles (anterior abdominal wall, spinal extensors, hip extensors, hip flexors and pelvic floor muscles).

The pelvic floor (PF) consists of muscles, fascia and ligaments that occupy the region of the lower pelvis. These muscles are classified as skeletal striated or voluntary contraction muscles, and thus respond to training techniques just like the other skeletal muscles of the human body. There are two hypotheses about the mechanisms by which the strengthening of this muscle group can prevent or treat urinary incontinence and pelvic organ prolapse. These are: (1) women develop the ability to consciously contract the pelvic floor muscles before and during the increase of intraabdominal pressure; and 2) the strengthening of this muscle group can build support for the bladder and uretra[6].

Due to the fact that most Pilates exercises are performed in conjunction with the recruitment of PF muscle fibers, many Pilates instructors believe that the method can produce a significant increase in the force or contractility of the muscles. Furthermore, if Pilates promotes an improvement in the functioning of the pelvic floor muscles (PFM), it may be an alternative for the treatment and prevention of pelvic floor dysfunction.

Urinary incontinence, pelvic organ prolapse and other manifestations of pelvic floor dysfunction are highly prevalent in women, especially in old age[7]. These symptoms are associated with a number of factors that lead to damage to the integrity of the pudendal nerve or skeletal muscle fibers of the levator ani or coccygeus muscles[8].

Due to the high prevalence of pelvic floor dysfunction among the elderly, the present study aimed to verify the influence of a protocol of Pilates exercises on the functionality and contractility of the PFM of elderly women.

METHODS

The study consisted of an initial sample of 30 volunteers who were enrolled at the Universidade Aberta para a Terceira Idade (the Open University for the Third Age) at the Federal University of Mato Grosso do Sul (UnAPI / UFMS), in the city of Campo Grande, Mato Grosso, Brazil. The subjects were invited to participate in the survey via telephone. However, eleven did not meet the inclusion criteria, six declined the invitation and three alleged personal reasons that prevented them from attending the exercise therapy sessions. The present study therefore adopted a longitudinal design, in which ten elderly women were accompanied during the execution of the procedure. The sample size calculation was based on the delimitation of type 1 error at 5% (α=0.05), a power of 80% (1-β=0.20), under a bicaudal curve, and an effect size of 0.50. Due to the lack of studies addressing the impact of Pilates on the PFM, it was not possible to use data published in literature to calculate the effect size. Thus, the delimitation of this topic was carried out using the hypothesis of improvement initially stipulated by the authors. From the calculations, the ideal sample size should be at least 28 subjects. This fact led us to an initial screening of 30 subjects, as shown in Figure 1.

The inclusion criteria involved healthy, sedentary women (normal weight, without psychiatric and/or neurological diseases), the Metabolic Equivalent of Task (MET) of whose self-reported daily activities did not exceed three times the baseline value. The women were aged over 60 years, sexually active, non-smokers, non-alcoholics, with no clinical diagnosis of pelvic floor dysfunction, no history

of urinary tract infection, and no previous history of gynecological surgery (in previous five years) or neurological or endocrine-metabolic disorders. Women who were allergic to latex gloves or condoms or who did not complete three Pilates sessions were excluded from the study. Based on these criteria, the initial sample suffered considerable losses and included ten participants, as detailed in figure 1.

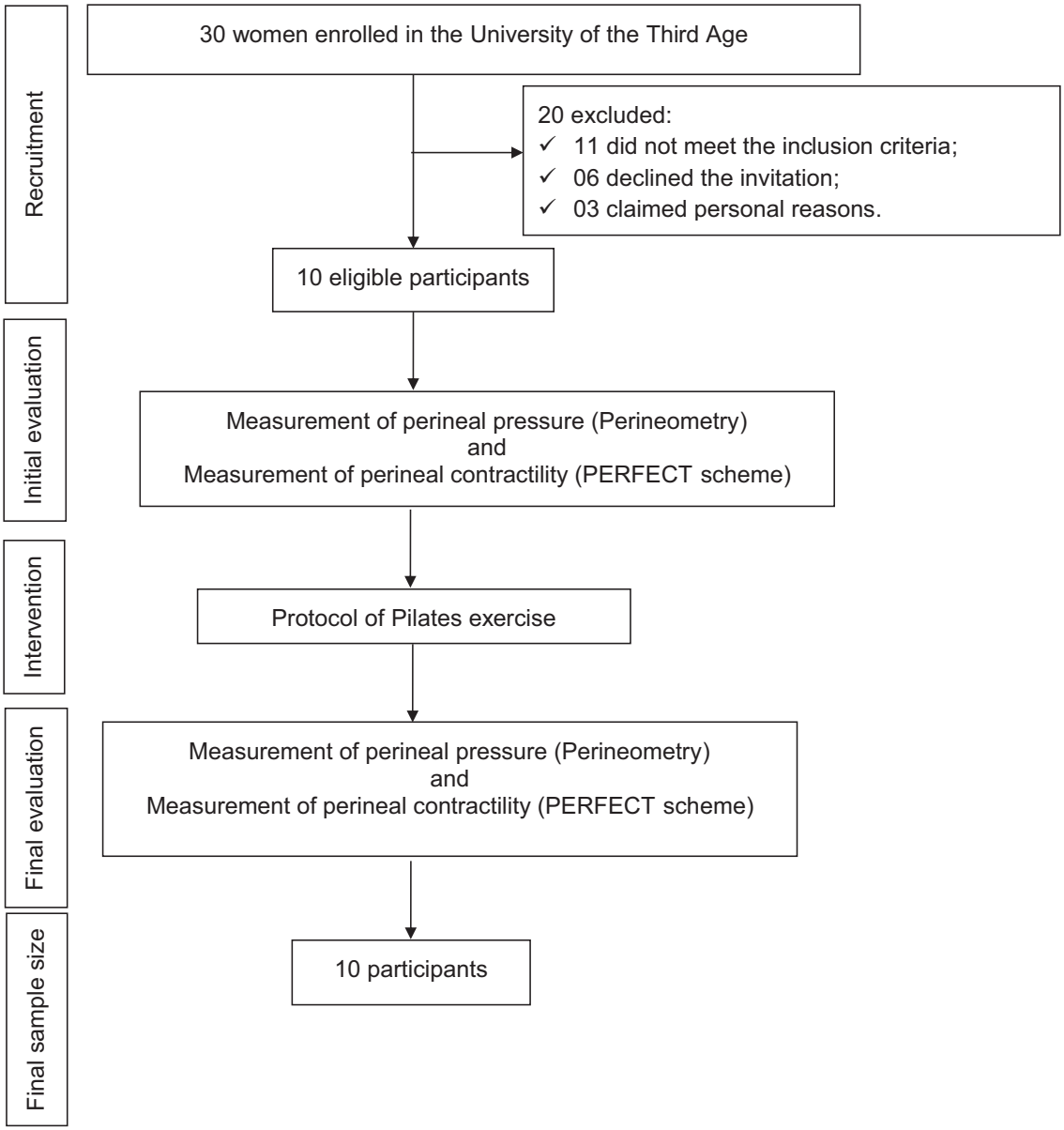

Figure 1. Study flow chart. Mato Grosso do Sul, 2015.

The participants were previously informed about the data collection procedures, and all signed a free and informed consent form. Assessments and reassessments were performed by the same researcher. Anamnesis was performed initially, and soon after the pressure and contractility of the PFM were assessed, performed with the patient in the dorsal lithotomy position[8].

The measurement of intracavitary perineal pressure was performed using a perineometer (Perina, QUARK, Piracicaba, São Paulo, Brazil), graduated from 0-48 cm H2O. Perineometry is a pressure gauge which captures the pressure generated during the activation of the PFM, providing a reading on the display of the device on a scale in cmH2O. The equipment has an attached latex vaginal probe (25X90 cm) inflated by a pear type control[9].

The PERFECT scheme consists of seven items and was developed and validated to assess the functionality of the PFM[10]. The "P" (power/force) indicator evaluates the intensity of the contraction of the PFM, graded using the modified Oxford scale. The "E" (endurance/resistance) result evaluates how long the contraction is maintained and sustained in seconds, until a loss of 35% or more. The "R" (repetitions) result assesses the number of repetitions of the sustained contraction (up to 10) that the participant is able to perform with satisfactory duration (5 seconds), with 4 seconds between each contraction. The "F" (fast/rapid contractions) result is evaluated after a short rest break (1 minute), and measures the number of contractions lasting one second each (up to ten contractions).

During the vaginal probe measurements the probe is coated a non-lubricated condom and inserted into the vaginal canal of the participant to capture the contractions. After the observing and recording of the intensity in cmH2O of five maximal voluntary contractions, with a 5 second interval between each, the average was calculated. Perineal contractions were held during expiration, and the participants were instructed on the correct contractile movement of the PFM, avoiding the use of the accessory muscles.

There was a rest interval of two minutes between perineometry assessment and the evaluation of vaginal palpation. The participants were instructed to contract the PFM following the commands given by the examiner, which followed the steps determined by the PERFECT scheme and the intervals of rest[10]. All evaluations were performed before and after the 12-week follow-up period.

Chart 1 demonstrates the Pilates protocol realized in the present study. It consisted of 11 different Pilates postures: Pilates Breathing, Spine Stretch, Swan, Shoulder Bridge, Hundreds, Double Leg Stretch, Footwork, Roll up, Single Leg Stretch, Leg Pull Back, Kick front and back. It was performed twice a week, with each session lasting 60 minutes, for 12 weeks, totaling 24 sessions. The progression of the exercises was based on increasing the number of repetitions of the exercise, and variations in posture from beginner to intermediate and advanced, for each exercise. The movements were repeated six to eight times each.

Statistical analysis of the data was performed through descriptive and inferential analysis. Due to the non-parametric character of the data, the results were initially detailed as median ± interquartile range. The Wilcoxon paired test was used for inferential analysis, while still respecting the non-parametric sum of the data. The delimitation of the null hypothesis (hypothesis of equality between pre- and post-intervention evaluations) in relation to the alternative hypothesis (hypothesis of difference between pre- and post-intervention evaluations) adopted a significance level of 5% (p<0.05).

Ethical approval was previously obtained from the institutional review board, and the research was registered under number 18879713.1.0000.0021. The study complied with Resolution 466/2012 of the Health Council of the Brazilian Ministry of Health.

Chart 1. Exercise protocol applied to the subjects. Mato Grosso do Sul, 2015.

Exercises (Week 1-12)	Description
Pilates breathing	Breathe slowly and concentrate on diaphragm movement. As air is exhaled, with pursed lips, perform isometrics in the "power house".
Spine Stretch	Sitting to standing height, legs stretched out on the mat, knees slightly bent, chin to chest, roll, flexing the trunk forward without losing the neutral position of the pelvis, forming the letter "C" with the body, and return to starting position.
Swan	Prone, pelvis and spine neutral. Legs straight and lateral rotation. Bent arms next to the torso. Inhale and stretch arms and raise the trunk.
Shoulder Bridge	Lying supine, legs bent and feet parallel. The movement is initiated by the activation of the power house, followed by gluteal contraction, retroversion of the pelvis and lifting of the pelvis. The return is targeted to the starting position.
Hundred	Lying supine, knees bent, feet flat on the floor, arms at sides. Inhale and raise the head and trunk until reaching the base of the shoulder blades. Arms stretch forward as if reaching the feet. Pump arms up and down with short, quick movements. Inhale for 5 pulses and perform the cycle to complete 100 pulsations.
Double leg stretch	Lying supine, supported trunk, hips and knees bent, raise the cervical spine, hold the ankles with the hands. Extend legs and arms simultaneously to 45 degrees and back to the starting position, without letting the feet touch the ground.
Footwork	Standing, neutral pelvis, heels together, raise the body, resting the hands on a bar, bend the knees and hips with hip external rotation, power house drive. Return to starting position.
Roll up	Supine, both arms extended above the head and with the knees bent. Participants must move from lying to sitting, arms extending toward the feet, flexing the trunk and holding the arms outstretched. A deep breath should be taken at the beginning of preparation and exhaled when starting the roll-up. Return to the original position.
Single leg stretch	Lying supine raise the shoulders and keep the chin toward the chest, raise one leg and hold the ankle, return to the starting position and switch legs.
Leg pull back	Fours on the ground in the prone position. Align hands/elbows to hips. Legs at the width of the hips. Extend one leg at a time. Inhale as lift leg and exhale while returning to the ground.
Kick front and back	In the lateral position with the lower arm extended above the head. Position the other arm to the front of the torso, resting the palm on the mat. Lift the leg from the mat and flex the hip, placing the hallux on the mat twice. Extend the leg and repeat.

RESULTS

The present study included ten women duly enrolled in UnAPI/UFMS, who were aged 63.4±4.5 years at entry. Table 1 details the general characteristics of the participants.

Table 2 shows the results of the comparative analysis of the intensity of PFM pressure and contractility before and after 12-weeks of follow-up. The results indicate an increase in PFM pressure and contractility (p=0.012). Regarding the PERFECT scheme, the benefits of the intervention was observed in the endurance (p=0.017) and number of fast repetitions (p=0.008) variables. No apparent benefit of the Pilates method was observed in the power (p=0.157) and number of slow repetitions variables (p=0.156).

Table 1. General characteristics of the participants. Mato Grosso do Sul, 2015.

Variables	Prevalence (%)
Final sample size	10 (100.0)
Marital status	
Single / divorced	0 (0.0)
Married	7 (70.0)
Widowed	3 (30.0)
Children	
0	8 (80.0)
1 to 3	0 (0.0)
More then 3	2 (20.0)
Hormone replacement therapy	
Yes	1 (10.0)
No	9 (90.0)
Loss of urine when coughing	
Yes	2 (20.0)
No	8 (80.0)
Daytime urinary urgency	
Yes	1 (10.0)
No	9 (90.0)

Table 2. Initial and final values of the participants regarding maximal voluntary contraction and the PERFECT scheme. Mato Grosso do Sul, 2015.

Variables	Initial values (median ± interquartile range)	Final values (median ± interquartile range)	*P*
Perineometry (cm H_2O)	79.0 ± 83.5	90.0 ± 82.0	.012
P - Power	3.0 ± 1.0	3.0 ± 1.0	.157
E - Endurance	5.0 ± 0.1	7.0 ± 4.7	.017
R – Repetitions	3.0 ± 2.5	5.5 ± 3.2	.156
F - Fast contractions	7.0 ± 4.5	8.0 ± 4.7	.008

Inferential analysis was performed using the Wilcoxon test.

DISCUSSION

The subjects of the present study were elderly women (median age of 63.4±4.5 years) with little or no pelvic floor dysfunction, who were all non-smokers and had few children (average number of children of two). These inclusion criteria were proposed to volunteers who had one muscle in the entire PF which could respond to training[11].

Two recent Cochrane systematic reviews have recommended the training of the PFM through Kegel exercises as the first line of conservative treatment for urinary incontinence, urgency and mixed as well as fecal incontinence[12,13]. However, PF training with Kegel exercises requires proper instruction to be effective and a long follow-up period for the results to be maintained. Glazener et al.[14] described improvement of the symptoms of pelvic floor dysfunction after

childbirth by training with Kegel exercises among a group of highly motivated women. However, the improvement did not persist due in part to the loss of adherence to the exercise program over time. Other authors likewise report major short-term benefits provided by Kegel exercises, but also describe a low compliance rate in the long-term[15,16].

The study by Sluijs et al.[17] described greater adherence among patients to training programs which featured positive feedback and a shorter interruption in activities of their daily routine. Thus, it can perhaps be inferred that Pilates training that provides positive feedback and is easily adapted to the individual's routine is necessary to keep patients motivated. These exercises promote flexibility, the strengthening of the entire body and produce greater physical fitness and body and mind integration[18,19].

Due to the fact that the activation of the "core" recruits the deep muscles of the pelvis, the present study identified improved functionality and contractility of the PFM after training with the proposed protocol. Thus, older women can benefit from the comprehensive training that this technique provides to improve PF functionality, and thus prevent the PF distortion that is so common in older women.

Cullingan et al.[20] compared changes in the strength of the pelvic floor muscles achieved by young women after a 12-week Pilates program or a 12-week program of Kegel exercises. Both groups achieved significant increases in the intensity of PFM pressure in cmH2O, with no difference between the groups. It was found that Pilates was as effective at promoting the strengthening of the PFM as the traditional exercises developed by Kegel [21].

However, a study that evaluated young women who performed Pilates and non-Pilates practitioners found no difference between the two groups regarding maximum voluntary contraction (cmH20) and standardized vaginal palpation through the PERFECT scheme[21]. It is believed that the divergence of results found can be justified by the findings of a FERLA study that assessed contractility and PFM functionality among women who practiced Pilates. In this study, PFM assessments were carried out before the initial voluntary training with the proposed protocol. During the functional evaluation of the pelvic floor, the volunteer was instructed how to correct the PFM without the interference of the accessory muscles, so promoting information and body awareness. The volunteer therefore uses this knowledge during the exercises, especially in the recruitment of PFM which occurs during the activation of the "powerhouse" for the effectiveness of the technique.

A randomized controlled trial[22], with the evaluation of PF prior to treatment, compared the Pilates method with a Kegel exercise program, and demonstrated the effectiveness of the Pilates method to treat male urinary incontinence.

Evaluation of the PF is essential for the development of appropriate treatment and the monitoring of results. There is currently no assessment tool that is considered gold standard, though the ICS recommends that the evaluation of PFM is carried out through vaginal palpation and perineometry, among others[23], as was performed in this study.

Functional assessment of prior pelvic floor training is generally not performed in Pilates studios or clinics that use this method in physical therapy. It would be extremely useful if the objectives of such training included the strengthening of the deep pelvic muscles. It is common for healthy women to fail to properly contract the PFM, as they are internal, deep location, muscles, and are not always recruited during physical activities[24].

It is important to consider some limitations of this study. The small sample size is due to the fact that some of the women did not meet the "being sexually active" inclusion criteria of the study while another individual refused to participate in the evaluation because of shame or embarrassment. Another possible criticism of this study could be the absence of a control group, but it is believed that it would be impossible to provide a credible Pilates placebo treatment protocol.

Finally, the present study indicates the need for further studies with symptomatic patients, adapting the Pilates protocol for women with urinary incontinence and other PFM disorders.

CONCLUSION

Training with the exercises devised by Joseph Pilates increased the pressure resistance and the number of rapid contractions of the pelvic floor muscles. The results of the present study are encouraging and may eventually lead to enhanced therapeutic Pilates use to treat or prevent disorders of the pelvic floor, especially in periods in which these muscles are most required, such as pregnancy, vaginal postpartum or in old age.

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Socioeconomic, regional and demographic factors related to population ageing

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Abstract

Objective: the present study aims to investigate the association between population ageing in municipal regions in the state of Rio Grande do Norte, and socioeconomic, demographic and regional factors. *Method:* an ecological study that used municipal regions of the state of Rio Grande do Norte as a unit of analysis was carried out. Data collection was conducted through databases from the Brazilian Institute of Geography and Statistics, the Institute of Applied Economic Research and the Atlas of Human Development. The factor of *Increased Age* was created based on factor analysis, which was related to socioeconomic, demographic and regional variables. The chi-squared test with a significance level of 5% was used in addition to the Hosmer and Lemeshow technique for logistic regression. *Result:* it was found that municipal regions in the Central mesoregion have an older/ageing population, while those with intermediate populations have the oldest individuals. Furthermore, it was found that municipal regions with unequal income distribution and higher levels of education have an older population. *Conclusion:* it can be concluded that municipal regions classified as older/more aged were associated with the mesoregion to which the municipal region belongs; and those with intermediate population size were associated with favorable educational levels and unequal income distribution.

Keywords: Aging. Socioeconomic Factors. Demography.

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INTRODUCTION

Population aging is a new challenge in today's world. This process has occurred in both developed and developing countries, and its origins lie in socioeconomic transformations in developed nations in the nineteenth century. Significant changes in demographic variables in such countries were only identified at the turn of the twentieth century, however. In developing countries, social inequalities have led to the aging process being more rapid and unstructured[1-4].

The number of older people in Brazil rose from three million in 1960 to 20 million in 2008, an increase of almost 700% in less than 50 years[5]. The main determining factor of the phenomenon of demographic aging is fecundity, followed by mortality. However, migration is also a variable that cannot be dispensed with or disregarded in the analysis of this process, especially in the planning and elaboration of public policies aimed at the elderly[6].

The processes of demographic and epidemiological transition in Brazil are clearly heterogeneous and are associated, in large part, with the inequality of the country's social conditions. The elderly represent a highly differentiated population, both among themselves and in relation to other age groups, in terms of social conditions and demographic and epidemiological aspects[7].

These changes directly reflect the way of life of the elderly and the extent to which the same depends on the socio-economic situation of family members. Accidents and urban violence, statistics that were until very recently restricted to young people, are today considered as causes of death among the elderly. Cultural indicators, in turn, show that elderly persons today are much more immersed in social events, literate and well informed[8].

It is known that education, income, nutrition and lifestyle are potential determinants of longevity. These factors are usually dependent on the care of relatives or even society[9]. However, it is not enough to offer the elderly individual extra years of life, without such years being accompanied by dignified living conditions[5].

In the state of Rio Grande do Norte the reality is no different from the rest of Brazil, with an increase in the number of elderly people. Data from the IBGE census showed that 8.2% of the population were over 60 years old in 1991, with this percentage rising to 9% in the year 2000 and increasing to 9.25% in the population count of 2010[10].

The present study therefore aims to investigate the aging profile of the state of Rio Grande do Norte, Brazil, and its association with regional, demographic and socioeconomic factors.

METHODS

An ecological study was carried out based on data from the databases of the Instituto de Pesquisa Econômica Aplicada (the Institute of Applied Economic Research) (IPEA), the Instituto Brasileiro de Geografia e Estatística (the Brazilian Institute of Geography and Statistics) (IBGE), and the Human Development Atlas. Sixty-one of the 167 municipal regions of the state of Rio Grande do Norte were considered, except for the relatively recently created region of Jundiá, for which not all the data used in the analysis was available. Following the removal of the *outliers* (Frutuoso Gomes, Maxaranguape and Natal), the final sample was 163 municipal regions.

In order to evaluate the aging indicators the following data were collected from the IBGE site for the year 2011: data on elderly dependence (elderly population /number of individuals aged 15-59 years), the aging index (elderly population/number of Individuals aged 1-14 years), active age population replacement rate (elderly population/number of individuals aged 15-19 years), percentage of elderly persons (elderly population/total population), over aging (population aged 80 years old or over/elderly population X 100) and extreme old age (population aged over 90/elderly population X 100). From these last three the "Increased Age" factor was created, in the form of a factorial, with the factor extraction method based on analysis of the main components. *Increased Age* was considered the dependent variable of the study.

For the evaluation of socioeconomic, demographic and regional aspects, the indicators used were:

mesoregion to which the municipal region belongs; Rate of Urbanization; Total population of municipal region; Theil, Human Development Index (HDI) income and education; Rate of participation of economically active population in the labor market; Victims of accidents rate; Homicide rate; Firjan Municipal Development Index (FMDI) employment and income; education and health; Illiteracy rate; Literacy rate; Percentage of poverty; Gender ratio; Mean years of study of people aged 25 years and over; Household income per capita - 1st quintile; Household income per capita - 5th quintile and Gini Index[11,12], collected from the Human Development Atlas and the IPEA website, for the year 2000. The data refer to the year 2000 as it is believed that the changes in the economy, society and demography of the previous decade represent a real interference in the current society, as a reflection of the previous years.

The association between socioeconomic, demographic and regional variables and the outcome of *Increased Age* was verified using the chi-squared test with a confidence level of 95%. The magnitude of effect of the associations was measured by the odds ratio, and for logistic regression, the Hosmer and Lemeshow technique.

RESULTS

A total of 166 municipal regions in the state of Rio Grande do Norte were evaluated, distributed into the Agreste (42), Central (37), West (62) and Coastal (25) mesoregions. Table 1 shows the descriptive statistics of the independent contextual variables, in relation to the phenomenon of aging in the municipal regions of Rio Grande do Norte.

Table 1. Mean and standard-deviation of study variables. Natal, Rio Grande do Norte, 2014.

Variable	Mean
Urbanization Rate	0.626 (±0.187)
Total population	19.062.921 (±67.148.051)
Theil	0.489 (±0.085)
HDI income	0.522 (±0.050)
HDI education	0.710 (±0.051)
Participation rate	0.456 (±0.067)
Victim of accidents rate	13.507 (±17.309)
Murder rate	6.869 (±11.034)
FMDI employment and income	0.260 (±0.126)
FMDI education	0.502 (±0.085)
FMDI health	0.561 (±0.080)
Illiterate population	34.689 (±6.910)
Literacy rate	65.313 (±6.909)
Poverty percentage	65.874 (±10.458)
Gender ratio	1.007 (±0.040)
Years of study (mean among people aged 25 years or more)	3.439 (±0.776)
Household income per capita (mean of 1st quintile)	7.778 (±8.480)
Household income per capita (mean of 5th quintile)	281.993 (±118.854)
Gini	0.577 (±0.045)

HDI: Human Development Index; FMDI: FIRJAN Municipal Development Index

Based on the data presented, it can be seen that, on average, the municipal regions of the state of Rio Grande do Norte are poorly populated, with a larger urban than rural population. The population is poor, with little schooling, and there are equal percentages of men and women.

Factorial analysis, with factor extraction based on principal components analysis (KMO =0.666 and Bartlett sphericity test Bartlett – $p<0.001$), produced a single factor that explained 74.06% of the variation of all variables remaining in the model. This single factor was called *Increased Age* and corresponded to the variables percentage of elderly in the population, over-aging and extreme old age. The factor produced explained 67.8%, 73.9% and 80.5%, respectively, of the variance of each of these variables, and its distribution revealed low values for most municipal regions in coastal areas.

Table 2 shows the association of the contextual variables with the *Increased Age* factorial variable, with notable results for those variables whose association was statistically significant.

Table 2. Association between *Increased Age*, categorized by the median and socioeconomic, demographic and regional variables. Natal, Rio Grande do Norte, 2014.

Variable	More elderly n (%)	Less elderly n (%)	PR	CI 95%	*P*
Mesoregion					
Coastal	2(8.7%)	21(91.3%)	1.00	-	<0.001
Agreste	22(52.4%)	20(47.6%)	0.17	0.04-0.64	
Central	25(67.6%)	12(32.4%)	0.13	0.03-0.49	
West	34(55.7%)	27(44.3%)	0.16	0.04-0.60	
Urbanization Rate					
0.127 to 0.639	41(50.0%)	41(50.0%)	0.96	0.71-1.30	0.813
0.640 to 1.0	42(51.9%)	39(48.1%)			
Theil					
0.34 to 0.471	46(55.4%)	37(44.6%)	1.20	0.88-1.63	0.242
0.472 to 0.937	37(46.3%)	43(53.8%)			
HDI (Income)					
0.395 to 0.514	43(51.2%)	41(48.8%)	1.01	0.75-1.37	0.943
0.515 to 0.746	40(50.6%)	39(49.4%)			
HDI (Education)					
0.59 to 0.705	43(50.6%)	42(49.4%)	0.97	0.53-1.80	0.929
0.706 to 0.887	40(51.3%)	38(48.7%)			
Participation rate					
0.220 to 0.454	42(50.6%)	41(49.4%)	0.99	0.73-1.33	0.934
0.455 to 0.67	41(51.3%)	39(48.8%)			
Victims of accidents rate					
8.745 to 109.17	47(58.0%)	34(42.0%)	1.32	0.97-1.80	0.071
0.00 to 8.744	36(43.9%)	46(56.1%)			

to be continued

continued from Table 1

Variable	More elderly n (%)	Less elderly n (%)	PR	CI 95%	*P*
Murder rate					
0	56(56.6%)	43(43.4%)	1.34	0.96-1.87	0.073
0.01 to 56.59	27(42.2%)	37(57.8%)			
Gini					
0.58 to 0.73	44(60.3%)	29(39.7%)	1.39	1.03-1.88	0.031
0.47 to 0.57	39(43.3%)	51(56.7%)			
FMDI (Education)					
0.505 to 0.697	50(61.7%)	31(38.3%)	1.53	1.12-2.10	0.006
0.319 to 0.504	33(40.2%)	49(59.8%)			
FMDI (employment and income)					
0.046 to 0.247	50(61.0%)	32(39.0%)	1.50	1.09-2.05	0.010
0.248 to 0.781	33(40.7%)	48(59.3%)			
FMDI (health)					
0.386 to 0.54	47(56.6%)	36(43.4%)	1.26	0.93-1.71	0.138
0.55 to 0.772	36(45.0%)	44(55.0%)			
Illiterate population					
12.2 to 35.34	41(51.3%)	39(48.8%)	1.01	0.75-1.37	0.934
35.35 to 49.40	42(50.6%)	41(49.4%)			
Literacy rate					
50.56 to 64.654	41(49.4%)	42(50.6%)	0.94	0.70-1.27	0.692
64.655 to 87.84	42(52.5%)	38(47.5%)			
Gender ratio					
0.89 to 1.003	44(55.7%)	35(44.3%)	1.20	0.89-1.62	0.237
1.004 to 1.11	39(46.4%)	45(53.6%)			
Years of study					
2.13 to 3.28	40(48.2%)	43(51.8%)	0.90	0.66-1.21	0.478
3.29 to 7.2	43(53.8%)	37(46.3%)			
Income 1st quintile					
0.0 to 4.7	46(55.4%)	37(44.6%)	1.20	0.88-1.63	0.242
4.8 to 32.86	37(46.3%)	43(53.8%)			
Income by 5th quintile					
142.55 to 254.087	40(48.2%)	43(51.8%)	0.90	0.66-1.21	0.756
254.088 to 1165.44	43(51.8%)	40(48.2%)			
Total population					
Less Populous	29(50.8%)	28(49.2%)	1.00	-	0.006
Intermediate Population	36(65.5%)	19(34.5%)	1.50	1.13-2.01	
More Populous	18(33.4%)	36(66.6%)	0.79	0.58-1.09	

HDI: Human Development Index; FMDI: FIRJAN Municipal Development Index

In the analysis of the variables it was verified that the municipal regions of the Central Mesoregion had older elderly persons than the other regions of the state. There was no significant association between the variables Urbanization Rate, Theil, HDI income, HDI education, labor market participation, Victims of accidents rate, Murder Rate, FMDI Health, Illiterate population, Literacy rate, Gender ratio, Years of study, 1st and 5th quintile income and the *Increased Age* factor.

With regard to the association between the representative variable of the categorization of the population by terciles, it was found that, when comparing the strata obtained with the stratum of the most populous municipal regions, the municipal regions with an intermediate population had a higher *Increased Age* factor. In relation to FMDI Education, it was found that individuals with higher levels of education were older than those with unfavorable levels of education.

When the municipal regions of Rio Grande do Norte were stratified according to the values of the FMDI employment and income variables, it was observed that the municipal regions with lower levels of employment and income had older populations than those with higher rates of employment and income. In addition, it was found that municipal regions with unequal income distribution also had an older population.

However, when the variables that presented a significant association underwent logistic regression, there was a loss of statistical significance in relation to the distribution of the *Increased Age* factor for the indicators FMDI employment and income (Table 3).

Table 3. Comparison of the proportions of the "Increased Age" factor with the socioeconomic, demographic and regional variables, and their gross and adjusted prevalence ratios. Natal, Rio Grande do Norte, 2014.

Variable	More aged n (%)	Less aged n (%)	PR	CI 95%	*p*	PR Ad	CI Ad 95%	*p***
Mesoregion 2*								
Central	25(67.6%)	12(32.4%)	1.47	1.10-1.97	0.021	1.51	1.06-2.16	0.024
Other regions	58(46.0%)	68(54.0%)						
Gini								
0.58 to 0.73	44(60.3%)	29(39.7%)	1.39	1.03-1.88	0.031	1.44	1.02-2.05	0.041
0.47 to 0.57	39(43.3%)	51(56.7%)						
FMDI (Education)								
0.505 to 0.697	50(61.7%)	31(38.3%)	1.53	1.12-2.10	0.006	1.65	1.17-2.31	0.004
0.319 to 0.504	33(40.2%)	49(59.8%)						
Population 1*								
Intermediate Population	36(65.5%)	19(34.5%)	1.50	1.13-2.01	0.008	1.44	1.02-2.02	0.040
Other populations	47(43.5%)	61(56.5%)						

* Dummy Variables; ** Model adjusted for variables: Murder rate and 1st quintile Income (Hosmer and Lemeshow =0.735); FMDI: FIRJAN Municipal Development Index.

DISCUSSION

The demographic transition experienced by Latin America over the last century has occurred rapidly and belatedly in comparison with developed countries. One of the consequences of this phenomenon is the rapid aging of the population of the region[13].

This phenomenon is explained by improved survival rates, with declining mortality levels benefiting the elderly population and contributing to population aging, coupled with a rapid and marked reduction in fertility[14]. However, such effects are debated and balanced by other schools of thought[13], with migration considered to be an important factor for heterogeneous aging among different regions[14].

Mortality in Brazil has declined since the beginning of the process of industrialization and urbanization following World War II. Added to this is a growing decline in fertility rates in the country since 1960, exacerbated in recent decades. In Rio Grande do Norte, this rate declined from 2.54 children per woman of childbearing age in 2000 to 1.99 in 2010, a decrease of 21.5% and below the population replacement level of 2.1[15,16].

Also in relation to mortality and as a consequence of this process of population aging, an increase in the participation in deaths of the population of 70 years or more, which in the 2010 Census was 43.9%, has been noted. In Rio Grande do Norte, the share of deaths of this population segment was the highest among all the states, reaching 50.2%. The reason for this participation is the emigration of the younger population from the state. Rio Grande do Norte is characterized as an expeller of younger populations, especially those in the 20 to 24 years of age group, resulting in the residence of an older population[15].

Considering this population dynamic, demographic growth in Brazil has proved to be an important factor in the development of the economy, and improved income distribution, since the economically active population tends to concentrate in urban areas, where labor supply is higher, while the economically inactive population concentrates in less developed localities.

These "demographic inequalities", in turn, may exacerbate social differences[17], especially in a vulnerable section of the population such as the elderly, historically neglected by the state and in the planning of public policies.

PNAD data reveals an improvement in the health conditions of the elderly in the period between 1998 and 2003, a probable reflection of the increase of their educational level and socioeconomic status, and greater access to health services[5]. This improvement in socioeconomic conditions may reflect, among other things, the growing presence of younger elderly people in the workforce, and the improvement of the economic conditions of the population as a whole, which in turn affects the family economy, in which the elderly play an increasingly important role.

The aging of the Brazilian population is not spatially homogeneous, in part due to migratory movements that tend to rejuvenate populations that receive migrants and age those that lose them[14].

The *Increased Age* factor captured all the aging processes of the municipal regions of Rio Grande do Norte, as it contemplated the total aging of the population, as well as the participation of the elderly in the make-up of such populations.

Population migration among municipal regions is an important contributory factor for the aging of the population of the interior of the state, since young people tend to migrate to the capital and more populated cities, where, for the most part, greater economic dynamism is found. These young people seek employment opportunities and better living conditions in such places. In Rio Grande do Norte, this reality is observed in coastal cities, where there is a concentration of younger people and younger elderly persons[15].

In 2011 in Rio Grande do Norte about 40% of the population of municipal regions were not born in such regions, while 11% of the total population of the state were not born within its borders, demonstrating the intense migratory movement that exists in the state[15].

This results in a more aged population in the rural hinterland, who are also more economically

inactive, resulting in an uneven distribution of income. This is clear from the analysis of the Gini index and the distribution of the elderly in regions with less employment and income, as revealed by the FMDI employment and income statistic. In more economically developed cities, the percentage of elderly persons is lower, corroborating the idea that in cities with greater employment the population is younger and more active in terms of labor. This fact is a national trend across Brazil, proven by research carried out in other states[17,18].

The present study verified the presence of elderly persons in municipal regions with better levels of education. This can be explained by the significant increase in the percentage of literate elderly, as well as the increased level of education of such individuals[15]. With specific public policies and the rural pension scheme, the possibility of elderly people remaining in rural areas has increased, while the lack of incentives for the younger population makes them seek out large urban cities, generating an accumulation of individuals with lower levels of education in large municipalities[19].

It was observed that more older elderly persons reside in the Central region of the state of Rio Grande do Norte, confirming that other more economically developed regions are home to younger elderly persons, who may still able to work.

The older elderly persons are more concentrated in cities with an intermediate Total Population. In other words, these elderly persons do not live in small towns, where a phenomenon of the expulsion of the individuals of this age group occurs, possibly due to a lack of social policies, such as adequate health care or even the phenomenon of seeking social support at more advanced ages. Nor are these older elderly persons found in the larger urban centers, possibly because a younger and more economically active population resides in such regions.

The presence of these elderly people, especially in low-income municipal regions, is highly desirable in households, since the incomes of Brazilian elderly people, including those related to work and retirement, represent an increasing share of the composition of income per household and played an important role in reducing poverty[20]. National PNAD data from 2011 show that around 30% of the elderly interviewed were economically active. When stratified by region of residence, 16% lived in rural areas, of whom more than half were economically active, while only 25% of the elderly in urban areas were economically active. In other words, the elderly living in rural environments remain in paid work longer than the urban elderly[15].

In the study of population aging, attention must be paid to migratory flows, especially in rural areas, as de-ruralization continues to mark Brazilian territorial structure, with evident regional differences. It should be considered that the rural population varies by region and that the decrease or increase of the migratory flow of this group has a variable impact on total age structure[20]. The present study did not evaluate migratory flow variables. Studies are therefore needed to quantify and evaluate this migratory flow to establish robust relationships between population aging and population migrations.

The selective nature and masculinization of the population exodus and aging are not isolated phenomena and have a strong social influence. The understanding of this dynamic and related factors is important to modify, ameliorate and adapt the current framework to future perspectives. Public policies are therefore needed that consider these new realities[19].

CONCLUSION

Population aging in the municipal regions of Rio Grande do Norte is related to the size of their populations, with those of intermediate size exhibiting the strongest associations, as well as the area where the municipal region is located. This relationship becomes more evident in the municipal regions of the central mesoregion of the state. In addition, municipal regions with older populations were associated with favorable educational levels and unequal income distribution.

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Variables associated with the life satisfaction of elderly caregivers of chronically ill and dependent elderly relatives

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Abstract

Objective: to compare the life satisfaction of family caregivers, taking into account their gender, age, time since starting care, health, religion, perceived burden and quality of life, and the level of physical and cognitive dependence of the elderly person receiving care, and to investigate the associations between these variables and low life satisfaction. *Methods:* a total of 148 caregivers in Indaiatuba and Campinas, in the state of São Paulo, Brazil, selected using the convenience method, were interviewed at home, in private medical clinics and outpatient units, using questionnaires about the sociodemographic characteristics, health conditions, time since starting care, scales of life satisfaction, religiosity, perceived burden and quality of life of the caregiver, and the physical and mental health of the elderly person receiving care. Descriptive, Multivariate and Univariate Logistic Regression analysis were used. *Results:* caregivers who exhibited low life satisfaction included more frail individuals, with three or more chronic diseases and depression, greater perceived burden and lower self-fulfillment and pleasure, and control and autonomy, scores, which are factors of the Perceived Quality of Life Scale. Elderly caregivers who scored low in self-fulfillment factor and pleasure (OR=101.29; CI=28.68 – 357.73) and who scored high in perceived burden (OR=5.89, CI=2.13 to 16.24) had a greater chance of having low life satisfaction scores. *Conclusions:* The assessment of caregivers of their satisfaction with life is more influenced by subjective than objective variables, and low satisfaction seems to be strongly associated with poor quality of life, high burden, and caregiver frailty.

Keywords: Personal Satisfaction. Family Caregivers. Aged. Quality of Life.

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INTRODUCTION

Life satisfaction, one of the cognitive indicators of subjective well-being linked to negative and positive affects, is a widely studied concept in gerontological literature[1]. According to Campbell, life satisfaction is defined as the distance between the individual's perception of their own reality and their aspirations and desires[2].

Research aimed at specific populations, such as family caregivers of dependent elderly people, has identified paradoxical results. There are indications that being a caregiver negatively affects an individual's satisfaction with life, as they feel unprepared and physically and psychologically exhausted, as well as unsupported in the performance of their role[3,4]. However, some authors note that caregivers are as satisfied as non-caregivers, which can be explained by their ability to adapt to difficulties and create strategies to overcome problems and challenges, as well as the perception that they benefit by caring for others, in terms of learning and self-confidence[5,6].

Research also shows that gender and age may influence the perception of satisfaction of caregivers. According to Hajek and König, being female increases the chances of low life satisfaction, which can be explained by the fact that women are more susceptible to chronic diseases and disabilities, as well as having to adopt other roles in their households[8]. The age of caregivers may also influence their perception of life satisfaction, as verified by a study conducted by Anderson et al.[9], in which caregivers aged 18-64 years were 7.6 times more likely to feel dissatisfied than caregivers aged more than 64 years. However, Tomomitsu et al.[10] when verifying the levels of life satisfaction of caregivers of elderly persons, did not find significant differences between groups of caregivers aged 65-69, 70-74, 75-79 and 80 years and over, which may be explained by the fact that younger caregivers suffer less from burden and physical overload than older caregivers, yet have more responsibilities and demands in addition to providing care, which may make the caregiver groups equal.

The health conditions of caregivers and the degree of physical and cognitive dependence of the elderly care recipient also influence the satisfaction of caregivers with their lives. Individuals who care for elderly people who are dependent for physical reasons tend to be more satisfied than those who care for elderly persons who are dependent because of cognitive impairments, as this second group often must deal with the mood and behavioral changes of the elderly, aspects that negatively affect well-being[11]. In addition, caregivers who report having poor health or diseases are significantly more dissatisfied than those who do not have any illness, as the association between poor health and the burden of care affect the perception of satisfaction of the caregiver[5,12].

Life satisfaction is significantly associated with depressive symptoms, as shown by a study conducted by Moreno et al.[13]. Caregivers with the greatest risk of developing depression are those who score lower for life satisfaction. In addition to depression, burden, a concept that encompasses physical, emotional, financial and social aspects[14], directly affects the perception of caregivers of their life satisfaction and well-being. High levels of life satisfaction seem to be a protective factor against burden and depressive symptoms[15,16].

The quality of life of caregivers has been extensively explored in literature. Quality of life is directly related to high levels of life satisfaction among this group, since these two factors influence each other and evolve in a mutual fashion[17,18].

Considering the significant increase in the number of elderly persons who have some kind of dependency and who require the care of another elderly person, the aim of the present study was to produce useful knowledge to better understand this model in the context of Brazil, as well as to contribute to theoretical support for the planning and evaluation of instrumental and social skills training programs; the development of knowledge about care strategies, and the understanding and improvement of cognitive-emotional self-regulation plans aimed at family caregivers of chronically ill and dependent elderly persons. Thus, the present study aimed to analyze the life satisfaction of elderly caregivers of elderly persons, considering the variables gender and age, time since starting care, health conditions, the burden and perceived quality of life of the caregiver, as well as the level of physical and cognitive dependence of the elderly person receiving care, and to investigate associations between these variables and low life satisfaction.

METHOD

A cross-sectional study was conducted based on a convenience sample of 148 elderly caregivers living in the cities of Jundiaí, Vinhedo, Indaiatuba and Campinas, Brazil, who cared for equally elderly relatives. The participants were suggested by public and private health care services, home care, doctors, professionals of the Family Health Program and Basic Health Units and the Geriatrics Outpatient Clinic of a university hospital.

The sample size of 148 caregivers required for the correlation analysis between the scores of the scales used was calculated based on the Pearson model, with Fisher's transformation, considering a significance level of 1%, a test power of 90 %, a zero correlation of 0.10, and a minimum correlation of 0.40.

Caregivers had to be 60 years of age or older and have been caring for an elderly relative for at least six months to be eligible for the survey. Caregivers aged 60 to 69 years who scored 22 points or less and caregivers aged 70 and over who scored 19 points or less on the cognitive test Cognitive Abilities Screening Instrument – Short Form were excluded[19].

The interviews were conducted from October 2014 to October 2015. Each interview lasted about one hour and was conducted in the homes of the individuals, private doctors' surgeries and the Geriatrics Outpatient Clinic of a university hospital. Seven trained interviewers, originating from a master's and doctorate program in Gerontology, carried out the interviews in locations and schedules previously agreed with the participants.

The main study entitled "Psychological well-being of elderly caregivers of elderly persons in a family context" included several blocks of variables, as listed below:

a) Life satisfaction: evaluated with the Global Life Satisfaction Scale[20], with five items in Likert format, each with seven points, which, in the present study, were adjusted by the authors and reduced to five. For analysis, these were grouped into low satisfaction (17 points or less), moderate satisfaction (between 18 and 21), high satisfaction (22 and more), scores validated for the Brazilian population.

b) Sociodemographic characteristics: questions about gender, date of birth and age in years.

c) Time since starting care (in months): single question about how long the caregiver has performed the function.

d) Health conditions: self-reported measures of chronic diseases, frailty and depressive symptoms. Diseases were measured through nine items evaluating whether a doctor told the elderly person that they had one or more chronic illnesses. The numbers of diseases were grouped into bands (none, 1 or 2 and 3 or more). The frailty measure included five self-reported questions, with caregivers who scored zero in all the criteria classified as either robust or non-frail; those who scored in one or two criteria classified as pre-frail, and those who scored in three or more criteria classified as frail[21]. The depressive symptoms were analyzed by the Geriatric Depression Scale, 15 item version, using a cut-off point greater than or equal to six points, as adopted in Brazil[22].

e) Level of impairment in Activities of Daily Living: the degree of dependency of the elderly caregiver for the performance of Instrumental Activities of Daily Living (IADL) and Basic Activities of Daily Living (BADL) was evaluated respectively by the Lawton and Brody Scale. The response options are totally independent, need partial help or need total help. The BADL and IADL that the elderly persons were unable to perform without total or partial help were added together and, from the total value, the elderly were considered capable (zero to six impaired activities), moderately incapable (seven to twelve impaired activities) and incapable (13 and more impaired activities).

f) Cognitive status: we used the Clinical Dementia Rating (CDR)[23] instrument, which scores the degree of impairment of memory, orientation, judgment and problem solving, community relations, home and hobbies, and personal care from zero to three. The classification adopted for a low level of impairment was from zero to 0.5 points, for a moderate degree of impairment, from 1 to 2 points and, for a high degree of impairment, 3 points.

g) Religious involvement: Measured through the Duke University Religion Index (DUREL)[24]. With five items, the stipulated ranges were: <19 = low religious involvement; 20 to 22 = moderate religious involvement and 23 points and more = high religious involvement.

h) Perceived burden: Evaluated through the Zarit and collaborators Burden Scale, which consists of 22 items that reflect aspects of the caregiver's discomfort with their health, personal and social life, financial situation, emotional well-being and interpersonal relationships[25]. In this study, the scale was divided into three factors: role-related stress, intrapsychic tensions and competence and expectations related to care. Cronbach's α was 0.87, indicating good internal consistency of the scale items as a whole. The distribution of the total scores of caregivers was divided into terciles: 19 points or less corresponded to low burden, 20 to 27 moderate burden and 28 or higher to high burden.

i) Quality of life: measured through the CASP-19[26] scale, which has 19 items in Likert format and a score ranging from zero to 57. The distribution was divided into terciles: 40 points or less indicated a poor quality of life, 41 to 47 points moderate quality of life and 48 points and more, high quality of life. The acronym CASP means control, autonomy, self-realization and pleasure, which are the factors of the scale. In this study two factors were considered: self-realization and pleasure (factor 1) and control and autonomy (factor 2): generated by confirmatory factor analysis.

The levels of life satisfaction of caregivers (low <17, moderate=18-21 and high >22) were compared based on the independent variables. Because of the non-normal nature of the distributions, chi-square and Fisher's exact tests were used to compare the categorical variables between the three groups. For the comparisons with numerical variables or scores between the three Life Satisfaction groups, the Kruskal-Wallis test was used, due to the absence of normal distribution of the variables, followed by Dunn's multiple comparisons test.

To study the variables associated with lower life satisfaction and the independent variables, univariate and multivariate logistic regression analyzes were used, with stepwise variable selection criteria. The level of significance adopted for the statistical tests was 5%.

The project was approved by the Ethics Research Committee of the Universidade Estadual de Campinas (Campinas State University) (CAAE nº 35868514.8.0000.5404) (Annex 1), which also approved the Free and Informed Consent Form (FICF), which was read and signed by all caregivers after they were informed about the objectives, content and duration of the interview, the conditions of participation and the rights of the participants.

RESULTS

There was a tendency of greater burden among those who with low life satisfaction. More caregivers with high scores for factors 1 (role-related tensions) and 2 (intrapsychic tensions) had intermediate levels of satisfaction, and more elderly patients with high satisfaction had a low score in terms of perceived burden. A lower total score on the quality of life scale and factors 1 (self-realization and pleasure) and 2 (control and autonomy) were observed in caregivers with a low life satisfaction score. However, 96.4% of the elderly who had a high life satisfaction score also obtained a high score in perceived quality of life, with the same results obtained for the self-realization and pleasure and control and autonomy factors. The Kruskal-Wallis test and the Multivariate Regression Analysis indicated that caregivers with low life satisfaction had significantly higher means for frailty, chronic diseases, depression and burden, while lower mean life satisfaction scores were observed among caregivers with low satisfaction than among those with intermediate and high satisfaction (Table 1).

Table 1. Caregivers with low, intermediate and high scores in life satisfaction, considering the subjective variables related to caregivers. *Psychological well-being of elderly caregivers of elderly persons in a family context* study. São Paulo, Brazil, (2014-2015).

Variables	N	Caregivers according to life satisfaction scores			Means and standard-deviations of three levels of life satisfaction		
		≤17 n (%)	18-21 n (%)	≥22 n (%)	≤17	18-21	≥22
		p<0.352			p=0.219		
Religious Involvement	148						
≤19	45	33.3 (15)	31.2 (15)	27.2 (15)	20.3 ± 3.5	20.2 ± 3.6	21.0 ± 4.2
20 to 22	48	33.3 (15)	39.6 (19)	25.4 (14)			
≥23	55	33.4 (15)	29.2 (14)	47.4 (26)			
		p<0.001			p<0.001		
Perceived burden	148						
≤19	50	8.9 (4)[a]	**35.4** (17)[c]	**52.8** (29)[c]	**33.6±13.9**	26.5 ± 13.5	19.3 ± 9.3
20 to 27	48	31.1 (14)[a]	29.2 (14)[a]	36.3 (20)[a]			
≥28	50	**60.0** (27)[b]	35.4 (17)[a]	10.9 (6)[a]			
		p<0.005			p<0.001		
Factor 1 of burden scale: Role-related stress	140						
≤9					**17.2± 9.4**	14.1 ± 8.2	10.1 ± 7.4
10 to 15	50	22.7 (10)[a]	33.3 (15)[a]	**49.1** (25)[c]			
≥16	40	22.7 (10)[a]	28.9 (13)[a]	33.3 (17)[a]			
	50	**54.6** (24)[b]	**37.8** (17)[b]	17.6 (9)[a]			
		p=0.011			p=0.004		
Factor 2 of burden scale: Intrapsychic stress	146						
≤1					**5.2±5.0**	4.3 ± 4.9	2.2 ± 2.4
2 to 3	52	22.6 (12)[a]	25.5 (12)[a]	**51.9** (28)[c]			
≥4	39	22.3 (10)[a]	32.0 (15)[a]	25.9 (14)[a]			
	55	**51.1** (23)[b]	**42.5** (20)[b]	22.2 (12)[a]			
		p=0.042			p<0.001		
Factor 3 of burden scale: Competence and expectations related to care	146						
≤3	56	27.2 (12)[a]	41.3 (19)[a]	**45.5** (25)[c]	**8.9±5.6**	5.9 ± 4.9	4.6 ± 4.1
4 to 7	37	15.9 (10)[a]	26.1 (12)[a]	27.2 (15)[a]			
≥8	53	**56.9** (23)[b]	32.6 (15)[a]	27.3 (15)[a]			

to be continued

continued from Table 1

Variables	N	Caregivers according to life satisfaction scores			Means and standard-deviations of three levels of life satisfaction		
		≤17 n (%)	18-21 n (%)	≥22 n (%)	≤17	18-21	≥22
		p<0.001			p<0.001		
Total quality of life score	148						
≤40	50	**80.0** (36)[b]	25.0 (12)[a]	3.6 (2)[a]	**33.5±7.2**	44.6 ± 6.1	48.6 ± 5.2
41 to 47	50	20.0 (9)[a]	**39.5** (19)[b]	**40.0** (22)[c]			
≥48	48	0.0 (0)[a]	35.5 (17)[a]	**56.4** (31)[c]			
Factor 1 of quality of life scale: self-realization and pleasure	143						
≤22	45	**80.0** (36)[b]	16.7 (8)[a]	2.0 (1)[a]	**19.0±4.6**	25.4 ± 3.7	28.1 ± 1.9
23 to 27	53	20.0 (9)[a]	**52.1** (25)[b]	38.0 (19)[a]			
≥28	45	0.0 (0)[a]	31.2 (15)[a]	**60.0** (30)[c]			
		p<0.001			p<0.001		
Factor 2 of quality of life scale: control and autonomy	144						
≤9	40	**54.5** (24)[b]	16.6 (8)[a]	15.4 (8)[a]	**9.0±2.0**	11.2 ± 2.3	12.4 ± 2.6
10 to 12	51	31.8 (14)[a]	**48.0** (23)[b]	26.9 (14)[a]			
≥13	53	13.7 (6)[a]	35.4 (17)[a]	**57.7** (30)[c]			

The values above refer to the application of the Kruskal-Wallis test (p<0,05).

Table 2. Caregivers with low, intermediate and high scores in life satisfaction, considering the subjective variables related to the caregivers. *Psychological well-being of elderly caregivers of elderly persons in a family context* study. Campinas, São Paulo, Brazil, 2015-2016.

Variables	N	Caregivers according to life satisfaction scores			Means and standard-deviations of three levels of life satisfaction		
		≤17 n (%)	18-21 n (%)	≥22 n (%)	≤17	18-21	≥22
		p<0.352			p=0.219		
Religious Involvement	148						
≤19	45	33.3 (15)	31.2 (15)	27.2 (15)	20.3±3.5	20.2±3.6	21.0±4.2
20 to 22	48	33.3 (15)	39.6 (19)	25.4 (14)			
≥23	55	33.4 (15)	29.2 (14)	47.4 (26)			
		p<0.001			p<0.001		
Perceived burden	148						
≤19	50	8.9 (4)[a]	**35.4** (17)[b]	**52.8** (29)[c]	**33.6±13.9**	26.5±13.5	19.3±9.3
20 to 27	48	31.1 (14)[a]	29.2 (14)[a]	36.3 (20)[a]			
≥28	50	**60.0** (27)[b]	35.4 (17)[a]	10.9 (6)[a]			
		p<0.005			p<0.001		
Factor 1 of burden scale: Role-related stress	140						
≤9	50	22.7 (10)[a]	33.3 (15)[a]	**49.1** (25)[c]	**17.2±9.4**	14.1±8.2	10.1±7.4
10 to 15	40	22.7 (10)[a]	28.9 (13)[a]	33.3 (17)[a]			
≥16	50	**54.6** (24)[b]	**37.8** (17)[b]	17.6 (9)[a]			
		p=0.011			p = 0.004		
Factor 2 of burden scale: Intrapsychic stress	146						
≤1	52	22.6 (12)[a]	25.5 (12)[a]	**51.9** (28)[c]	**5.2±5.0**	4.3±4.9	2.2±2.4
2 to 3	39	22.3 (10)[a]	32.0 (15)[a]	25.9 (14)[a]			
≥4	55	**51.1** (23)[b]	**42.5** (20)[b]	22. (12)[a]			
		p=0.042			p<0.001		
Factor 3 of burden scale: Competence and expectations related to care	146						
≤3	56	27.2 (12)[a]	41.3 (19)[a]	**45.5** (25)[c]	**8.9±5.6**	5.9±4.9	4.6±4.1
4 to 7	37	15.9 (10)[a]	26.1 (12)[a]	27.2 (15)[a]			
≥8	53	**56.9** (23)[b]	32.6 (15)[a]	27.3 (15)[a]			

to be continued

continued from Table 2

Variables	N	Caregivers according to life satisfaction scores			Means and standard-deviations of three levels of life satisfaction		
		≤17 n (%)	18-21 n (%)	≥22 n (%)	≤17	18-21	≥22
		p<0.001			p<0.001		
Total quality of life score	148						
≤40	50	**80.0** (36)[b]	25.0 (12)[a]	3.6 (2)[a]	**33.5±7.2**	44.6±6.1	48.6±5.2
41 to 47	50	20.0 (9)[a]	**39.5** (19)[b]	**40.0** (22)[c]			
≥48	48	0.0 (0)[a]	35.5 (17)[a]	**56.4** (31)[c]			
Factor 1 of quality of life scale: self-realization and pleasure	143						
≤22	45	**80.0** (36)[b]	16.7 (8)[a]	2.0 (1)[a]	**19.0±4.6**	25.4±3.7	28.1±1.9
23 to 27	53	20.0 (9)[a]	**52.1** (25)[b]	38.0 (19)[a]			
≥28	45	0.0 (0)[a]	31.2 (15)[a]	**60.0** (30)[c]			
		p<0.001			p<0.001		
Factor 2 of quality of life scale: control and autonomy	144						
≤9	40	**54.5** (24)[b]	16.6 (8)[a]	15.4 (8)[a]	**9.0±2.0**	11.2±2.3	12.4±2.6
10 to 12	51	31.8 (14)[a]	**48.0** (23)[b]	26.9 (14)[a]			
≥13	53	13.7 (6)[a]	35.4 (17)[a]	**57.7** (30)[c]			

The values above refer to the application of the Kruskal-Wallis test (p<0,05).

Table 3. Caregivers with low, intermediate and high scores in life satisfaction, considering variables related to elderly persons receiving care. *Psychological well-being of elderly caregivers of elderly persons in a family context study*. Campinas, São Paulo, Brazil, 2015-2016.

Variables	N	Caregivers according to life satisfaction scores			Means and standard-deviations of three levels of life satisfaction		
		≤17 n (%)	18-21 n (%)	≥22 n (%)	≤17	18-21	≥22
		p=0.527			p<0.001		
Impaired Activities of Daily Living in elderly persons receiving care	147						
0 to 6	38	20.0 (9)	23.0 (11)	32.7 (18)	9.5±3.8	9.0±3.7	8.6±3.8
7 to 12	54	40.0 (18)	52.0 (18)	32.7 (18)			
13	55	40.0 (18)	25.0 (18)	34.6 (19)			
Cognitive status of elderly persons receiving care (CDR)	148		p=0.290			p=0.269	
0 to 0.5	66	33.3 (15)	54.1 (26)	45.4 (25)	1.6±1.2	1.2±1.2	1.3±1.2
1 to 2	36	29.0 (13)	16.7 (8)	27.3 (15)			
3	46	37.7 (17)	29.2 (17)	27.3 (15)			

A greater frequency of frail than pre-frail and non-frail caregivers was observed among those with low satisfaction scores, and higher frequencies of robust and pre-frail caregivers among those who achieved high and intermediate satisfaction scores. More caregivers with low satisfaction scores reported having three or more chronic diseases than elderly persons who reported having one, two, or none. There were proportionately more elder persons with one, two or no illnesses among those with high life satisfaction scores, and older patients with one or two chronic diseases than three or more, or none, among those with intermediate satisfaction scores. There were more elderly caregivers who scored for depression among those who had low life satisfaction, and more caregivers who did not score for depression among those who had high and intermediate levels of life satisfaction (Table 4).

Univariate logistic regression analysis also revealed that the variable with the most robust association with low life satisfaction was self-realization and pleasure, factor 1 of the quality of life scale. Caregivers who scored below the first tercile in this factor were 100 times more likely to score for low satisfaction than those who scored above the third tercile. Those who scored below the second tercile in this variable had a 4.17 times greater chance of a low satisfaction score.

Other variables that presented a statistically significant association with low life satisfaction were: total perceived burden scale score, control and autonomy (factor 2 of the quality of life scale), intrapsychic stresses (factor 2 of the burden scale), depression, role-related stress (factor 1 of the burden scale) and competence and expectations related to care (factor 3 of the burden scale), frailty and total score in the quality of life scale.

Caregivers with intermediate levels of life satisfaction, control and autonomy and perceived burden were, respectively, 2, 3 and 2.5 times more likely to score for low satisfaction than the caregivers taken as a reference (Table 4).

Table 4. Results of univariate logistic regression analysis for low life satisfaction (n=148). *Psychological well-being of elderly caregivers of elderly persons in a family context* study. Campinas, São Paulo, Brazil, 2015-2016.

Variables and Categories	*p*-value	O.R.*	CI 95% O.R.*
Time since start of care (years)			
≥5	---	1.00	---
2-4,9	0.441	1.32	0.65 – 2.71
<2	0.291	1.51	0.70 – 3.22
Gender of caregivers			
Male	---	1.00	---
Female	0.266	1.50	0.74 – 3.05
Age of caregivers			
60-64	---	1.00	---
65-74	0.641	0.85	0.42 – 1.71
≥75	0.463	0.74	0.33 – 1.66
Level of frailty of caregivers			
Robust	---	1.00	---
Pre-frail	0.553	0.78	0.34 – 1.77
Frail	0.018	2.85	1.20 – 6.77
Number of diseases of caregivers			
0	---	1.00	---
1-2	0.966	1.02	0.46 – 2.23
≥3	0.084	2.10	0.91 – 4.86
Score above depression scale cut-off point (caregiver)			
No	---	1.00	---
Yes	<0.001	7.69	3.46 – 17.06

to be continued

continued from Table 4

Score of caregivers in religious involvement scale (in terciles)			
≥23	---	1.00	---
20-22	0.155	1.68	0.82 – 3.45
≤19	0.201	1.61	0.78 – 3.34
Total score of caregivers in perceived quality of life scale (in terciles)			
≥48	---	1.00	---
41-47	0.010	2.86	1.29 – 6.35
≤40	<0.001	47.24	17.29 – 129.08
Score of caregivers in factor 1 of quality of life scale: Self-realization and pleasure (in terciles)			
≥28	---	1.00	---
23-27	<0.001	4.17	1.83 – 9.50
≤22	<0.001	100.51	32.17 – 314.01
Score of caregivers in factor 2 of quality of life scale: Control and autonomy (in terciles)			
≥13	---	1.00	---
10-12	0.003	3.04	1.45 – 6.38
≤9	<0.001	8.93	3.84 – 20.77
Total score of caregivers in perceived burden scale (in terciles)			
≤19	---	1.00	---
20-27	0.22	2.45	1.14 – 5.26
≥28	<0.001	9.27	4.11 – 20.90
Score of caregivers in factor 1 of perceived burden scale: Role-related stress (in terciles)			
≤9	---	1.00	---
10-15	0.445	1.36	0.62 – 2.95
≥16	<0.001	4.05	1.90 – 8.64
Score of caregivers in factor 2 of perceived burden scale: Intrapsychic stress (in terciles)			
≤1	---	1.00	---
2-3	0.177	1.71	0.79 – 3.72
≥4	0.001	3.34	1.62 – 6.90
Score of caregivers in factor 3 of perceived burden scale: Competences and expectations related to care (in terciles)			
≤3	---	1.00	---
4-7	0.997	0.99	0.45 – 2.21
≥8	0.008	2.59	1.28 – 5.22
Number of impaired Basic and Instrumental Activities of Daily Living in elderly persons receiving care (in terciles)			
0-6	---	1.00	---
7-12	0.154	1.73	0.81 – 3.68
13	0.214	1.65	0.75 – 3.62
CDR classification of elderly persons receiving care			
0-0.5	---	1.00	---
1-2	0.622	1.21	0.57 – 2.55
3	0.233	1.53	0.76 – 3.06

*OR (*Odds Ratio*) = Odds ratio for lower life satisfaction; (n=45 com ≤17, n=48 with 18-21 and n=55 with ≥22); CI 95% OR = 95% confidence interval for risk ratio; proportional risks models.

Multivariate logistic regression analysis revealed that the variables that were significantly associated with low life satisfaction scores were self-realization and pleasure (factor 1 of the quality of life scale) and total perceived burden scale score. Thus, caregivers with the greatest risk of poor life satisfaction were those with the lowest score in factor 1 of CASP-19 (with a chance 6.3 and 101.3 times greater for those who scored in the second tercile and above the third tercile, respectively), and those with the highest overall score on the Zarit scale (risk 3.0 and 5.9 times greater for those who scored in the second tercile and who scored above the third tercile, respectively), as shown in Table 5.

Table 5. Results of multivariate logistic regression analysis for low life satisfaction (n=129). *Psychological well-being of elderly caregivers of elderly persons in a family context* study. Campinas, São Paulo, Brazil, 2015-2016.

Selected Variables and Categories	Value-*p*	O.R.*	CI 95% O.R.*
Score of caregivers in factor 1 of perceived quality of life scale (in terciles)			
≥28	---	1.00	---
23-27	**<0.001**	6.29	2.42 – 16.35
≤22	**<0.001**	101.29	28.68 – 357.73
Total score of caregivers in perceived burden scale (in terciles)			
≤19	---	1.00	---
20-27	**0.022**	3.02	1.17 – 7.80
≥28	**<0.001**	5.89	2.13 – 16.24

* OR (*Odds Ratio*) = Odds ratio for lower life satisfaction; (n=41 com ≤17, n=41 com 18-21 and n=47 com ≥22); CI 95% OR = 95% confidence interval for risk ratio; *Stepwise* variable selection criteria; proportional risks models.

DISCUSSION

In terms of age, the present study did not find significant differences in life satisfaction between the 60-64, 65-74 and 75-year-old and older groups. This data resembles that obtained by Tomomitsu et al.[10]. However, there is a paradox between surveys conducted with age groups that also include young and old caregivers. A study conducted by Anderson[9] using data from the Behavioral Risk Factor Surveillance System found that caregivers between the ages of 18 and 64 were 7.6 times more likely to feel dissatisfied or very dissatisfied with life than caregivers aged over 65 years of age, as younger individuals have other tasks, such as work, in addition to the caring role. On the other hand, Borg and Hallberg[12] found that life satisfaction indexes decreased with the advancing age of the caregiver. The hypothesis described by the authors is that the elderly have less social resources to assist them in the task of caring, which negatively impacts their perceptions of life satisfaction.

No significant differences between life satisfaction and the gender of caregivers were observed in the present study. Some authors point out that being female and acting as an informal caregiver negatively impacts the satisfaction of male caregivers, as women have other roles in the home besides caring, and generally do not receive support for such tasks[7]. However, literature describes similar findings to those of the present study, such as in the works by Tomomitsu et al.[10], Hansen and Slagsvold[8] and Pinquart and Sörensen[27], who similarly did not find significant differences in the life satisfaction of male and female caregivers, which can be attributed to the difficulties that men face in performing such a role, as they have less experience than women and suffer barriers resulting from male stereotypes. These divergences in data suggest that this theme should be studied in greater depth with larger samples of caregivers of older adults, aiming to compare characteristics such as gender and age and perception of life satisfaction.

The caregivers of the present study who were considered frail, scored low for life satisfaction when compared to those considered robust or pre-frail. In addition to frailty, number of diseases was also negatively associated with the perception of life

satisfaction of elderly caregivers. Those who reported having three or more diseases were dissatisfied with life, while those who reported having one or two or no diseases, scored high for life satisfaction. Previous research has presented similar data, such as the cross-sectional study conducted by Lenardt et al.[5], which evaluated the health and life satisfaction conditions of 208 caregivers of elderly people with Alzheimer's Disease and found that those who reported having a disease were significantly more dissatisfied with life than those who reported having no diseases. Confirming these results, Tomomitsu et al.[6], when analyzing 338 caregivers of the elderly, observed that there was a higher frequency of reports of having three or more diseases among those with lower satisfaction. Thus, the association between the health condition of the caregiver and their overall life satisfaction is clear, which can be explained by the set of burdens arising from the task of caring combined with the presence of disease.

The association between the presence of depressive symptoms and low life satisfaction was also evident in the present study. Caregivers with high life satisfaction scores scored lower for depression than dissatisfied life individuals. This finding is consistent with findings in literature, as verified by a study by Moreno et al.[13] Among the 102 caregivers evaluated, those who scored high for depression scored low for life satisfaction. Hansen and Slagsvold[8] evaluated 2,553 caregivers of spouses and reported similar data. Caregivers with higher levels of depressive symptoms were more dissatisfied with life. However, this data was applied only to female caregivers, despite the fact that male caregivers also experienced negative emotions and low average life satisfaction.

Among those who scored low for life satisfaction there was a greater tendency to score high in total perceived burden and in the specific factors role-related stresses (factor one of the burden scale), intrapsychic tensions (factor two of the burden scale) and competence and expectations related to care (factor three of the burden scale). The results in literature agree with those found in the present study, as Schüz et al.[15] observed in a study of 346 informal caregivers. Those with higher levels of burden had lower levels of life satisfaction. Chiao et al.[28] verified similar data in a bibliographic review on the subject. The studies analyzed found that caregivers with subjective well-being were less burdened than those with low levels of well-being. It should be emphasized that life satisfaction is a protective factor against the perception of burden, and does not mean that the caregiver does not experience negative emotions and events caused by caring[16].

The association between life satisfaction and quality of life is an important in the present study. Caregivers with low quality of life scores were 100 times more likely to also score low in life satisfaction. In addition, 94.6% of those with high life satisfaction scores also scored highly in total quality of life score and in the factors self-realization and pleasure (factor 1 of the quality of life scale) and control and autonomy (factor 2 of the quality of life scale). This data is consistent with findings in literature. Dahlrup et al.[17], Perrin et al.[18] and Moreno et al.[13] found that caregivers with high levels of life satisfaction also have high quality of life and, since both are directly associated and influence each other, some authors use measures of life satisfaction as a means of measuring the total quality of life of caregivers[29,30].

In the present sample of caregivers, the time elapsed since starting to provide care did not significantly influence the perception of poor life satisfaction of the group. Likewise, religious involvement did also not interfere with the life satisfaction of the elderly caregivers of the present study. A possible hypothesis to justify such results would be that religious involvement is quite broad and multidimensional, a factor that may hinder its measurement and association with other factors[31].

In addition to these variables, the health status of the elderly care recipient did not appear to influence the caregiver's life satisfaction in the present study, since no significant data were found when comparing these factors. This relationship does not corroborate the main findings of gerontological literature, which tends to show that caregivers of individuals who are more dependent in ADL reported feeling more dissatisfied[32], while those who cared for an elderly person dependent because of cognitive impairments are less satisfied than those who cared for an individual who was dependent due to physical impairments[33].

Some limitations of the present study should be considered, such as the non-identification of temporal relationships, as this is a cross-sectional study and is therefore unable to clarify whether the relationship between the variables is casual or not.

CONCLUSION

In the present study, life satisfaction among caregivers of the elderly seems to be an outcome greatly influenced by their quality of life, their perception of burden and their physical and mental health conditions. The data found are in agreement with most of the findings of gerontological literature on the subject and, although they are not unpublished data, the results are robust and may contribute further to the psychological well-being of these individuals. There are still few studies exclusively dedicated to elderly caregivers and their peculiarities. In this sense, the present study emphasizes the importance of conducting specific research covering this group. Since the reality of elder care becomes increasingly common in the Brazilian and world scenario, it is necessary to develop and apply new strategies of support focusing on this specific and emerging population.

One possible outcome of this research is the investigation of different interventions in the short and medium term, such as support groups, and whether they positively influence the life satisfaction of elderly caregivers, even in the presence of the negative factors verified here, such as frailty and depression. New and more in-depth studies are therefore necessary to produce theoretical support for the planning and development of knowledge about care strategies, as well as for the understanding and improvement of strategies of cognitive-emotional self-regulation aimed at family caregivers of chronically ill and dependent elderly persons.

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Prevalence of Geriatric Depression and Alexithymia and their association with sociodemographic characteristics in a sample of elderly persons living in Buenos Aires, Argentina

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Abstract

Objective: to evaluate the prevalence of Geriatric Depression and Alexithymia and their association with sociodemographic characteristics in independent elderly persons without known depression. *Method:* a cross-sectional study was conducted, based on a non-probabilistic, intentional type sampling strategy. A total of 176 independent men and women aged over 60 years residing in the city of Buenos Aires, Argentina, were evaluated through individual interviews using the following instruments: a sociodemographic (ad hoc) questionnaire, an adapted version of the questionnaire of the Yesavage Geriatric Depression Scale (V-15) and the Latin American Alexithymia LAC TAS-20 Scale. The Chi-squared and Student's t-tests were used and the Odds Ratio was calculated, with a probability of error less than or equal to 0.05. *Results:* The mean age was 73 years (±7.1 years) and 72.7% of the participants were women. The prevalence of Geriatric Depression was 35.8%, while that of Alexithymia was 50.6%. The presence of Geriatric Depression was significantly associated with the female gender and with individuals who did not work. High Alexithymia values were observed among those with primary education and a low occupational level. *Conclusion:* The evaluation of Geriatric Depression and Alexithymia in clinical care is recommended, and the social determinants of the health of the elderly should also be considered in the diagnosis and treatment of these conditions.

Keywords: Depression. Alexithymia. Elderly.

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INTRODUCTION

The aging of the world population is an intrinsic process of demographic transition. In Argentina, 14% of the population is made up of 60-year-old adults and the city of Buenos Aires is considered to have the oldest population in the country (17%)[1].

Analyzing the process of aging involves considering how the socio-cultural system influences the lifestyle of the senescent. Psychosocial factors affect the etiology of diseases by determining the attitudes and behaviors of individuals in relation to the health-disease process[2]. Although the developments within successful aging show that aging is not synonymous with disease, an increase in the number specific pathologies that affect health are also observed in this stage of the life cycle[3].

In this context, the study of depression in the elderly has become one of the most significant problems for public health[4]. Specifically, Geriatric Depression is one of the most frequent and incapacitating health conditions among this population. It is estimated that around 10% of the elderly living in the community and between 15% and 35% of those residing in geriatric institutions suffer from depressive disorders[5]. Balmón Cruz and Dorado Primo[6] describe how, from 70 years of age onwards, these symptoms become more common due to the increase of physical health problems and disabilities, as well as affective and economic losses.

In recent decades the association between Major Depressive Disorders and Alexithymia has also begun to be studied[7]. Rojas Ramírez y García Méndez[8] describe how Sifneos was the first to propose using the Greek term Alexithymia to describe the difficulties in identifying and communicating feelings, limited imaginary capacity, rigid and stereotyped interpersonal relations and predominance of operative thinking suffered by psychosomatic patients.

Different positions can be observed when analyzing the relationship between Depression and Alexithymia: López-Ibor Aliño[9] argues that the characteristics of Alexithymia coincide with certain manifestations of Depression, whereas Taylor et al.[10] affirmed that Alexithymia is an independent construct and distinct from Depression.

Fisch[11], meanwhile, suggests that Alexithymia is concomitant with Depression, causing it to be masked through somatic symptoms, and describes it as a multidimensional construct that responds to situational stressors. Despite the controversy that surrounds this link, studies that analyze the association of high levels of Alexithymia and Anxiety and Depression in elderly persons have begun to thrive[12].

Regarding sociodemographic characteristics and their relation to the appearance of depressive symptoms, scientific literature emphasizes that the different types of losses that appear in old age, as well as the limitations of access to activities that promote well-being, could influence the increase of the prevalence of chronic diseases, which contribute to the emergence of depression. The interruption of work[13] leads to a number of deprivations (income, purchasing power, the social role of working, etc.) and produces a change in the social clock. It has also been observed that both psychic morbidity and coping behavior are different in males and females[14,15.] In this regard, some studies have highlighted factors associated with the appearance of depressive symptoms, such as the female gender, advanced age and living alone[16]. Arancibia and Behar[7], in a bibliographic review on the subject, point out the probable association between age, gender, educational level and Alexithymia and Depression[8,9].

Based on the above, the objective of this study was to evaluate the prevalence of Geriatric Depression and Alexithymia and their association with the sociodemographic characteristics of independent elderly persons without known depression.

METHODS

A cross-sectional study was performed[17]. The subjects of the sample were selected from the target population (elderly persons, middle socioeconomic level and residents of the city of Buenos Aires and its areas of influence, Argentina) through a non-probabilistic, intentional type sampling strategy, in the clinical care area of the Instituto de Neurociencias Buenos Aires (the Buenos Aires Neurosciences Institute) (INEBA), the Instituto de Investigaciones Cardiológicas Profesor Dr. Alberto C. Taquini (the Professor Dr. Alberto C. Taquini Cardiological Investigation Institute) and the Hospital Dr. César Milstein.

The research protocol and informed consent form were approved by the respective Ethics and Research committees of the institutions described.

The inclusion criteria were male and female independent subjects who were older than 60 years. Likewise, those with a previously known diagnosis of major depression, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition[18] (DSM V), (Alzheimer's Disease, Frontotemporal Dementia, Parkinson's Disease, and other neurodegenerative diseases), or who were diagnosed with Schizophrenia, Substance and/or Alcohol Abuse or Dependence, according to the DSM V[18], were excluded. This information was provided by general practitioners from medical records. Following the pilot study the evaluation protocol selected was administered to the elderly through an individual interview conducted by the lead researcher of the project, and lasted approximately 40 minutes. The instruments used were: a) a socio-demographic data questionnaire: in order to obtain the socio-demographic and cultural profile of the elderly, a questionnaire was used, elaborated on an *ad hoc* basis, consisting of 22 questions, open and closed with fixed options, information about the variables of age, gender, nationality, marital status, education, level of employment and current employment status; b) an adapted version of the Yesavage Geriatric Depression Questionnaire[5]: this is one of the most used instruments among the elderly population and is recommended by the Spanish Society of Family and Community Medicine. It is a self-administered scale that was designed by Yesavage et al.[19] specifically for the elderly population. For the present study, the version adapted and validated into Spanish by Martínez de la Iglesia et al.[5]. This is composed of 15 items, and has an internal consistency was 0.99, using the Kuder-Richarson test (a variation of Cronbach's Alpha for dichotomous variables). The sensitivity was 81.1% and the specificity was 76.7%. The cut-off scores of the scale are: 0 to 4 normal, 5 to 8 mild depression, 8 to 11 moderate depression and 12 to 15 severe depression; C) the Latin American Consensual Toronto Alexithymia Scale LAC TAS-2020: through a Likert scale, this evaluates Alexithymia by means of three factors or subscales: I) difficulty identifying feelings and distinguishing between feelings and the bodily sensations of emotional arousal, (II) difficulty in describing feelings to others, and (iii) externally oriented thinking. The overall reliability was calculated by Varela et al.[20] through Cronbach's Alpha, yielding values between 0.77 and 0.78, considered adequate for this type of study. It is composed of 20 items with five possible response options. According to their answers, the subjects are placed in a continuum of between 20 and 100 points, with the cut-off scores: <40 non-Alexithymic, between 41 and 55 indefinite Alexithymia, >56 defined Alexithymia.

A population prevalence of 10% of depression, a confidence limit of +5% of absolute precision and a 95% confidence interval were used to calculate the sample size to estimate frequencies, and a sample of 139 subjects was calculated.

Regarding statistical analyzes, the sociodemographic variables and the prevalence of Geriatric Depression and Alexithymia were described in the total sample according to the distribution of the data. Likewise, the χ^2 (Chi-squared) test of statistical independence was used to evaluate the probable association between the variables Geriatric Depression and Alexithymia. Finally, the χ^2 test and Student's t-test were used to evaluate the association of sociodemographic variables with Geriatric Depression and Alexithymia, respectively.

To assess the strength of the statistically significant associations, Odds Ratio and 95% confidence intervals were calculated. For these statistical analyzes, a probability of error value of less than or equal to 0.05 was used.

RESULTS

During the period from January 2013 to March 2015, 237 possible candidates were registered for participation in the study. Of these, 22 did not meet the inclusion criteria, 39 met one of the exclusion criterion (12 had moderate cognitive impairment, four had Parkinson's disease, 16 had already experienced depression and seven were excluded for other reasons). Therefore 176 subjects were analyzed. The mean age was 73 years (±7.1 years) and 72.7% of the participants were women. The rest of the demographic characteristics are shown in Table 1.

The prevalence of Geriatric Depression in the sample was 35.8% (95%CI 29.1-43.1), taking into account all levels of severity. The prevalence of Alexithymia at all levels of severity, meanwhile, was 50.6% (95%CI: 43.2-57.9) among the participants interviewed.

The means and deviations of the factors that make up Alexithymia are described in Table 2. When Alexithymia is present, Geriatric Depression is almost three times more likely, OR 2.79 (95%CI 1.47-5.39), p 0.0014.

Regarding the relationship between these variables and the presence of Geriatric Depression, statistically significant associations were found with the female gender, OR 2.30 (95%CI 1.08-4.92) *p* value 0.031 (χ^2=4.76; phi= 0.165, gl=1, *p*=0.01) in favor of women; and one's labor situation (X^2=3.956, phi=-0.15, gl=1, *p*=0.01), in favor of those who did not work, with an OR 1.96 (95% CI 1.03-3.79), *p* 0.025.

With reference to the comparison of sociodemographic variables and levels of Alexithymia, it was observed that those with a primary educational level and a low occupational level had higher levels of Alexithymia, with a *p* value <0.001 for both cases.

Table 1. Sociodemographic profile of total sample (n=176). Buenos Aires, Argentina, 2015.

Variables	n (%)
Gender	
Male	48 (27.3)
Female	128 72.7)
Age range (years)	
Younger elderly persons (from 60 to 69)	128 (72.7)
Older elderly persons (from 70 to 99)	48 (27.3)
Nationality	
Argentinian	158 (89.8)
Others	18 (10.2)
Marital Status	
Single (Single, Widowed, Separated)	67 (38.1)
With Partner (Married, Civil Union)	109 (61.9)
Level of schooling	
Primary	102 (26.7)
Secondary/Tertiary/University	74 (73.3)
Currently working	
No	101 (57.4)
Yes	75 (42.6)
Occupational level	
Low (craftsman, worker, tradesman)	63 (35.8)
Medium/High (sales, employee, teacher, professional, executive)	113 (64.2)

Table 2. Prevalence and levels of Geriatric Depression and Alexithymia (n=176). Buenos Aires, Argentina, 2015.

Variables	n (%)	m	(de)
Geriatric depression			
Absent	113 (64.2)		
Mild depression	47 (26.7)		
Moderate/severe depression	16 (9.1)		
Alexithymia			
Absent	87 (49.4)		
Indefinite Alexithymia	42 (23.9)		
Definite Alexithymia	47 (26.7)		
Factors			
DIF*		13,9	(±6,8)
DDF*		10,7	(±5,4)
EOT*		19,1	(±7,5)

*DIF: difficulty identifying feelings and distinguishing between feelings and the bodily sensations of emotional arousal; * DDF: difficulty describing feelings to other people; * EOT: a stimulus-bound, externally oriented thinking.

Table 3. Association between sociodemographic variables and geriatric depression (n=176). Buenos Aires, Argentina, 2015.

Variables	Geriatric Depression		*p**
	No. n (%)	Si. n (%)	
Gender			
Male	37 (21.1)	11(6.2)	
Female	76 (43.2)	52 (29.5)	0.031
Age range (years)			
Younger elderly persons (from 60 to 69)	54 (30.7)	28 (15.9)	
Older elderly persons (from 70 to 99)	59 (33.5)	35 (19.9)	0.092
Nationality			
Argentinian	103 (58.5)	56 (31.8)	
Others	10 (5.7)	7 (4)	0.964
Marital Status			
Single (Single, Widowed, Separated)	41(23.3)	26 (14.8)	
With Partner (Married, Civil Union)	72 (40.9)	37 (21)	0.521
Level of schooling			
Primary	27 (15.3)	20 (11.4)	
Secondary/Tertiary/University	86 (48.9)	43 (24.4)	0.699
Currently working			
No	59 (33.5)	43 (24.4)	
Yes	54 (30.7)	20 (11.4)	0.025
Occupational level			
Low (craftsman, worker, tradesman)	38 (21.6)	23 (13)	
Medium/High (sales, employee, teacher, professional, executive)	78 (44.4)	37 (21)	0.673

* Chi-squared test

Table 4. Comparison between sociodemographic variables and levels of Alexithymia (n=176). Buenos Aires, Argentina, 2015.

Variables	Alexithymia		
	m	De	*p**
Gender			
Male	45.89	17.33	0.546
Female	43.15	17.39	
Age range (years)			
Younger elderly persons (from 60 to 69)	44.1	17.38	0.568
Older elderly persons (from 70 to 99)	43.35	17.49	
Nationality			
Argentinian	43.23	17.09	0.835
Others	50	19.2	
Marital Status			
Single (Single, Widowed, Separated)	43.68	17.16	0.617
With Partner (Married, Civil Union)	44.03	17.57	
Level of schooling			
Primary	47.23	18.98	0.001
Secondary/Tertiary/University	39.11	13.47	
Currently working			
No	45.3	19.36	0.592
Yes	41.72	13.97	
Occupational level			
Low (craftsman, worker, tradesman)	40.02	19.71	0.001
Medium/High (sales, employee, teacher, professional, executive)	39.11	13.47	

* Student's t-test

DISCUSSION

The present study assesses the prevalence of Geriatric Depression and Alexithymia and their association with the sociodemographic characteristics of elderly persons without known depression.

A prevalence of Depression of 35.8% was found, considering the total score of the different levels (mild, moderate and severe). This finding coincides with other prevalence studies carried out in recent years, where the increase of these symptoms based on age was identified[6,21,22]. The World Health Organization (WHO)[23], states that the greatest occurrence of Depression occurs in adults over 65 years old, and highlights the complexity of performing a correct differential diagnosis. This difficulty is due to the presentation of the condition (somatizations), the misattribution of coexisting diseases, as well as polypharmacy, which is common among older adults. Geriatric Depression may be a new episode in an individual who has previously experienced depression, or may represent the late appearance of depression in someone who has never suffered from the condition. Also, some authors consider that the late presentation of Depression is more frequent among the elderly, and is more influenced by environmental factors than by genetic load[7]. Alexopoulos[24] points out that in the last years of life different types of losses occur (physical, economic and psychosocial), which, together with the changes associated with the aging process (vascular and degenerative),[25] may predispose the individual to the emergence of Depression.

A prevalence of 50.6% of Alexithymia was found in the present study. The relative newness of the concept, and the fact that analysis has mainly been carried out among the psychosomatic population (chronic asthma, hypertension, chronic urticaria, rheumatoid arthritis, psoriasis, hyperthyroidism, obesity and others) limits comparison with prevalence studies in the general population. In this sense, the results of the present study provide empirical evidence for the study of Alexithymia at a local level, and coincide with the prevalence indicated by Urrutia et al.[26] in a validation and adaptation of the TAS-20 instrument for Latin America. In this study, a sample of 670 subjects belonging to a general population (non-patients) found a prevalence of Alexithymia of 43.5% in the subgroup of elderly adults (n=42; mean age of 63.4% years).

Similarly, and considering the type of design of the present study, it is noteworthy that only an association between Alexithymia and Geriatric Depression was identified. In this sense, the results are partially coincident with other studies that link Alexithymia with a greater severity of anxious, depressive symptoms, and a worse response to pharmacological treatment. Other researchers point to Alexithymia as a trigger and/or perpetuator of psychophysiological disorders, and as an index of prognosis in chronic diseases[3,7,27]. Also, studies[28] have emphasized that the perceptive decline of emotions during old age produces a reduction in spontaneous expression, as well as the accentuation of an anchoring in immediate reality. Therefore, Alexithymia can be considered to be a factor associated with the deterioration of the health of the elderly.

When analyzing Geriatric Depression and sociodemographic variables, significant associations were found with gender and work. Thus, women presented higher levels of Geriatric Depression than men (29.6% and 6.2%, respectively). These results coincide with those of Lopes et al.[22], who highlighted a higher frequency of Depression among older adult women. Similarly, Matud et al.[29], observed that levels of depression remained stable throughout the life cycle of women, until they became senior citizens, when there was a notable increase. Although gender differences have traditionally been analyzed as a consequence of constitutional, genetic and/or endocrine factors, in recent decades the predominance of socio-cultural variables, such as those that condition the way in which men and women manifest and cope with psychological suffering, have been highlighted[22].

Regarding labor activity, the present study found an association between the absence of work and high levels of Geriatric Depression. These results were in agreement with other studies that described the link between the interruption of work (due to retirement, unemployment, voluntary retirement, or withdrawal from work due to a sick family member, among other reasons) and the presence of depressive symptomatology[30]. As the activity of work is an axis that organizes daily life, it can become both a source of family conflicts and a buffer against such conflicts. Therefore, the absence of work will modify the social relations of the individual and especially the bond between couples. Thus, this new situation may ease or accentuate binding conflicts, and depending on how the subject deals with these changes, the psychic health of the elderly may be affected[13]. In this regard, Vélez Álvarez et al.[31] found that elderly persons who perform some type of informal work have a good perception of their quality of life and value their health positively. The authors concluded that work gives older adults a sense of meaning in their lives, favoring an active and healthy aging.

Finally, when analyzing Alexithymia and sociodemographic variables significant differences were found, indicating that elderly persons with primary and low occupational levels have high levels of Alexithymia. Similar findings were published by Honkalampi et al.[32] and Shibata et al.[33] and, in Argentina, by Urrutia et al.[26], who found that people with a low educational level had higher Alexithymia scores. Although the study by Urrutia et al. was performed among the general population, as mentioned above, Alexithymia was found to be associated with different psychosomatic diseases. Therefore, educational level and subsequent occupational level could also condition the state of health of a person. In this regard, the WHO[34] describes the Social Determinants of Health as those circumstances and contexts that determine the life cycle of a person, from birth to old age. The structural determinants of health are represented by socioeconomic and political context and by the position that individuals occupy in society, according

to social class, gender, age, ethnicity and territory. They act through intermediary determinants, which are shaped by conditions of employment and work, income and economic situation, lifestyle, psychosocial, behavioral and biological factors, and the health system[35].

Regarding the limitations of the present study, the selection of the sample was intentional, rather than representative, and therefore the data cannot be generalized to the entire population. Furthermore, with regard to the association between Alexithymia and Geriatric Depression, the future undertaking of a cohort design study is required to verify if this association is causal, and it is important to carry out more evaluation interviews for the purpose of analyzing the factors that make up the Alexithymia scale.

CONCLUSION

From the results obtained, it is recommended that the evaluation of Geriatric Depression and Alexithymia is included in the clinical care of the elderly, as well as the consideration of the social determinants of health, not only for diagnosis and treatment, but also for the promotion of healthy behavior.

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Factors associated with polypharmacy among elderly people receiving care under the family health strategy

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Abstract

Objective: to identify the medication profile, the prevalence of polypharmacy and associated factors among elderly people receiving care from Family Health Strategy teams. *Method:* an analytical, document-based, cross-sectional survey with a quantitative approach was conducted in Brazlândia in the Distrito Federal, Brazil, with a sample of 211 elderly people enrolled in and receiving care from one of the local Family Health Strategy teams. Data were submitted to bivariate analysis and multiple analysis through logistic regression. *Results:* a considerable number of the elderly (62, 29.4%) were undergoing polypharmacy. The majority (56, 26.5%) used three different classes of drug, with antihypertensive drugs the most used. Diabetes mellitus, cardiovascular complications and the use of antihypertensive drugs were factors associated with polypharmacy. *Conclusion:* polypharmacy is a worrying reality and demands a new approach on the part of professionals, as this important aspect of geriatrics should be carefully evaluated to avoid harm and iatrogeny among the elderly.

Keywords: Aged. Health Services for the Aged. Polypharmacy.

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INTRODUCTION

The elderly population today comprises more than a fifth of the Brazilian population. In the Distrito Federal (the Federal District) the increase in the elderly population has been five times greater than the national average. This population group is therefore becoming increasingly important and should be considered in health care management and planning. Health services, such as the Family Health Strategy (FHS), should include perspectives that provide a suitable response to the growing demands of the elderly population[1,2].

Elderly patients residing in territories served by the FHS generally present a series of health problems that, when associated with unfavorable socioeconomic conditions, can compromise their autonomy and independence[3]. The FHS, as a structure of the Sistema Único de Saúde (the Unified Health System) (SUS), should provide privileged care for the elderly in an ascending manner within the health system, presupposing the integrality of care for the elderly[4,5].

The elderly population is more often affected by chronic diseases, and so is arguably the most medicalized group in society [1]. In addition, elderly persons are more likely to use a number of drugs as they undergo more physiological changes in pharmacokinetics and pharmacodynamics due to their age[6]. The frequent simultaneous use of many drugs by the elderly has also been identified. This may be related to the attempt to ease situations that arise due to the aging process, as well as acting as a treatment for diseases that are common in the aging process[7]. The elderly are vulnerable to adverse events related to the use of medications, and their clinical individualities should also be considered[8]. Polypharmacy is therefore an important issue in the health care of the elderly, although it does not always indicate a risk. When properly recommended and when side effects are monitored polypharmacy may be the only option for the adequate treatment of comorbidities[6].

Identifying the characteristics and factors associated with the consumption of drugs by Brazilian elderly persons can therefore help to plan actions that promote the rational use of medications, and consequently promote a better quality of life for this age group, especially when there remains a gap in the knowledge of age-based differentials in pharmacotherapy by the elderly[9].

The present study aims to identify the drug profile of elderly persons receiving care under the Family Health Strategy, as well as describing the prevalence of polypharmacy and associated factors among this group.

METHOD

An analytical, document-based, cross-sectional study was carried out with a quantitative approach. It is based on an analysis of the profile of medications prescribed in the Family Health Units for elderly persons living in Brazlândia in the Distrito Federal, Brazil, receiving care through the Family Health Strategy.

All the medical records of patients aged 60 and over registered and residing in the area covered by the FHS teams of the administrative district of the Government of the Federal District of Brazlândia were considered. According to information from the Sistema de Informação da Atenção Básica (the Basic Care Information System) (SIAB), around 60% of the Brazlândia region is covered by family health teams, with around 34,000 registered residents. Of the registered population, 2,879 are aged 60 years or over. There are currently 11 Family Health Teams. However, for the present study, only the five teams with electronic medical records were considered. Thus, for the purposes of the sample calculation, the 1,709 elderly people registered with these five teams were considered.

For the definition of the sample size, simple random sampling was used. The calculations used in this process were based on a 15% proportion of elderly persons in the general population, a population of 1,709 elderly persons enrolled in the SIAB, a margin of error of 3% and a level of confidence of 95%. The number identified (176) was increased by 20% for possible losses. Thus, the minimum number of elderly individuals for the study, defined by the sample calculation, was 211 individuals.

The 211 elderly persons were randomly selected using simple random sampling, considering the percentage of elderly people in each FHS team, using data from Form A (home-based registration records). When there were problems with the records of the elderly persons, for reasons such as not fulfilling the study criteria, a new medical record was drawn, always respecting the randomization of the sample.

Data were collected from April to May 2015. The inclusion criteria were: people aged 60 and over, with electronic medical records, who reside in Brazlândia, are registered with one of the Brazlândia FHS teams and use at least one drug on an ongoing basis. The medical records of patients which contained less than one year of information, as well as medical records with incomplete data, were excluded. SIAB data were also surveyed, as well as those from Forms A and B, which are completed and updated on a monthly basis by the family health team.

The drugs prescribed for the elderly were evaluated in terms of drug class, dose, and posology. The drugs were grouped and standardized according to the Anatomical Therapeutic Chemical Classification (ATC). This categorization is standardized by the World Health Organization (WHO) for research involving drugs[10].

The independent variables that were studied and dichotomized were: gender (male vs. female); age (<70 years x ≥70 years, with the mean considered the cut-off point, and the data found to present symmetrical distribution); presence of self-reported chronic behaviors and morbidities - smoking, alcoholism, hypertension, diabetes mellitus, osteoporosis, cardiovascular complications, mental suffering, gastrointestinal diseases (yes x no); systolic pressure (<139 mmhg x ≥140 mmhg); diastolic pressure (≤9 mmhg x > 9 mmhg).

The collected data were organized and analyzed, initially through a descriptive analysis of the data that made up the drug profile, and the prevalence of polypharmacy was then identified. Polypharmacy was defined as the concomitant use of five or more medications[11]. For this purpose, the variable of polypharmacy was constructed based on the categorization of the amount of medication used. Thus, polypharmacy was considered practiced by those elderly persons who used five or more drugs throughout the day and not practiced by those who used less than five drugs[11]. The dependent variable was therefore defined for the analysis of factors associated with polypharmacotherapy.

In order to verify the existence of associations between the sociodemographic and clinical variables and the polypharmacy-dependent variable, bivariate analysis was carried out using the Pearson chi-square test. Logistic regression analysis was used to define the factors associated with polypharmacy in the final model. For this stage of the final model, all the variables that showed an association up to a level of 20% ($p \leq 0.20$) in bivariate analysis were analyzed together. The final significance level was 5% ($p \leq 0.05$), with the presentation of the Odds Ratio (OR) and respective confidence intervals of 95%.

This study was conducted in accordance with Resolution 466/12 of the National Health Council. The research project was evaluated and approved by the Ethics Research Committee of the Fundação de Ensino e Pesquisa da Saúde (the Health Teaching and Research Foundation) (FEPECS)/Secretaria de Estado de Saúde (State Health Secretary) (SES) of the Distrito Federal, under Consolidated Opinion nº. 1.020.135 and Certificate of Presentation for Ethical Evaluation (CAAE) 38201714.1.0000.5553.

RESULTS

A total of 211 medical records of elderly persons were considered for the study. The concomitant use of 5 or more drugs, or polypharmacy, was identified in the medical records of 62 (29.4%) of the elderly.

Among the elderly persons in the present study, the majority (56, 26.5%) used three different classes of drug (Table 1).

In the bivariate analysis, the following factors ($p < 0.05$) were associated with polypharmacotherapy: systolic blood pressure (BP), diabetes, arterial hypertension, and cardiovascular complications (table 2). There was a significant association with all classes of drug except anti-depressants and steroids.

Table 1. Quantity of classes of drug per patient among elderly persons in Brazlândia (n=211). DF, 2015.

Quantity of different classes of medication	N **(%)**
None	5 (2.4)
One only	18 (8.5)
Two classes	30 (14.2)
Three classes	56 (26.5)
Four classes	40 (19.0)
Five classes	19 (9.0)
Six classes	18 (8.5)
Seven classes	10 (4.7)
Eight classes	8 (3.8)
Nine classes	7 (3.3)
Total	211 (100.0)

Table 2. Bivariate analysis between polypharmacotherapy and sociodemographic, clinical, and related variables and diseases (n=211). DF, 2015.

Sociodemographic and Clinical Variables	Polypharmacy		*p* value
	Yes N (%)	No N (%)	
Gender			
Male	20 (24.1)	63 (75.9)	0.11
Female	42 (32.8)	86 (67.2)	
Age(years) (mean=70 years; sd=8.6)			
Up to 70	34 (30.1)	79 (69.9)	0.12
More than 70	28 (28.6)	70 (71.4)	
Smoker			
No	60 (29.0)	147 (71.0)	0.33
Yes	2 (50.0)	2(50.0)	
Alcoholism			
No	61 (29.2)	148 (70.8)	0.50
Yes	1 (50.0)	1 (50.0)	
Systolic Blood Pressure			
Up to 139 mmHg	22 (21.0)	83 (79.0)	0.00
Over 140 mmHg	39 (37.5)	65 (62.5)	
Diastolic Blood Pressure			
Up to 9 mmHg	51 (28.3)	129 (71.7)	0.31
More than 9 mmHg	10 (34.5)	19 (65.5)	
Glycemia (mean=161 mg/dl;sd=70)			
Diabetes			
No	22 (15.2)	123 (84.8)	0.00
Yes	40 (60.6)	26 (39.4)	

to be continued

continued from Table 2

Sociodemographic and Clinical Variables	Polypharmacy Yes N (%)	No N (%)	*p* value
Hypertension			
No	10 (17.9)	46 (82.1)	0.01
Yes	52 (33.5)	103 (66.5)	
Osteoporosis			
No	54 (28.6)	135 (71.4)	0.29
Yes	8 (36.4)	14 (63.6)	
Cardiovascular complications			
No	28 (19.2)	118 (80.8)	0.00
Yes	34 (52.3)	31 (47.7)	
Mental Suffering			
No	53 (31.0)	118 (69.0)	0.19
Yes	9 (22.5)	31 (75.5)	
Gastrointestinal Diseases			
No	57 (29.4)	137 (70.6)	0.59
Yes	5 (29.4)	12 (70.6)	

Table 3. Bivariate analysis of polypharmacy and drug classes used (n=211). DF, 2015.

Drug classes	Polypharmacy Yes N (%)	No N (%)	*p* value
Anti-Hypertensives			
No	3 (6.2)	45 (93.8)	0.00
Yes	59 (36.2)	104 (63.8)	
Diuretics			
No	13 (15.1)	73 (84.9)	**0.00**
Yes	49 (39.2)	76 (60.8)	
Calcium channel betablockers			
No	43 (25.4)	126 (74.6)	**0.01**
Yes	19 (45.2)	23 (54.8)	
ACE inhibitors			
No	31 (22.6)	106 (77.4)	**0.00**
Yes	31 (41.9)	43 (58.1)	
AT1 Blockers			
No	38 (24.8)	115 (75.2)	**0.01**
Yes	24 (41.4)	34 (58.6)	
Adrenergic Inhibitors			
No	38 (22.5)	131 (77.5)	**0.00**
Yes	24 (57.1)	18 (42.9)	
Hypoglycemic agents			
No	30 (17.3)	141 (82.5)	**0.00**
Yes	32 (80.0)	8 (20.0)	

to be continued

continued from Table 3

Sulfonylureas			
No	31 (17.9)	142 (82.1)	**0.00**
Yes	30 (81.1)	7 (18.9)	
Biguanides			
No	26 (16.0)	137 (84.0)	**0.00**
Yes	36 (75.0)	12 (25.0)	
Insulin			
No	58 (29.1)	141 (70.9)	0.75
Yes	4 (33.3)	8 (66.7)	
Anti-hypercholesterolemic agents			
No	39 (21.9)	140 (78.2)	**0.00**
Yes	23 (71.9)	9 (28.1)	
Statins			
No	42 (23.2)	139 (76.8)	**0.00**
Yes	20 (66.7)	10 (33.3)	
Anti-aggregation platelet			
No	33 (19.3)	138 (80.7)	**0.00**
Yes	29 (72.5)	11 (27.5)	
Cardiovascular Cardiotonics			
No	53 (26.6)	146 (73.4)	**0.00**
Yes	9 (75.0)	3(25.0)	
Anti-depressants			
No	53 (30.8)	119 (69.2)	0.22
Yes	9 (23.1)	30 (76.9)	
Corticoids			
No	60 (30.2)	139 (69.8)	0.26
Yes	2 (16.7)	10 (83.3)	

ACE: angiotensin converting enzyme inhibitors; AT1:Angiontensin1

As shown in table 4, in the multiple analysis, the variables that remained associated with polypharmacy were diabetes mellitus, cardiovascular complications and the use of anti-hypertensive drugs. As about 70% of study participants had hypertension and probably used antihypertensive drugs, the variable hypertension was not considered for the final model, in order to avoid possible confusion.

Table 4. Final model of factors associated with polypharmacy among the elderly. DF, 2015.

Independent Variables	Adjusted OR	CI 95%	*p* value
Diabetes			
No	1		
Yes	17,77	7,25-23,52	0,00
Cardiovascular Complications			
No	1		
Yes	7,76	3,27-8,40	0,00

DISCUSSION

The data of the present study reveal a high prevalence of elderly people being treated with polypharmacy (29.4%). A similar reality was observed in a cross-sectional study with elderly patients attending a FHS unit in São Paulo, Brazil (30.6%) [12]. A study conducted with elderly residents of Goiânia, in the state of Goiás found an average of 3.63 medications per elderly, as well as a prevalence of polypharmacy of 26.4%, similar to the prevalence found in the present study. A higher prevalence was found in a municipality in the extreme south of Rio Grande do Sul (31.86%)[13]. A study carried out among elderly people attended by the FHS in the urban area of Recife, Pernambuco, identified a prevalence of polypharmacy of 11%, lower than that found in the present study[14]. A survey conducted in southern Brazil, comparing elderly residents in urban and rural areas, found a prevalence of polypharmacy of 13.9%, close to that found in the aforementioned study in the northeast (11%). These variations may be related to regional inequalities related to health care and policies regarding the availability of medications, which can vary considerably in the different regions of Brazil.

In the present study, the class of drugs most commonly prescribed were those used to control blood pressure levels. Several studies agree that such medications are the most prescribed drug class[14,15]. This finding can be explained by the high prevalence of hypertension in Brazil, especially among the elderly, which can be as high as 50% in the various regions of the country[16]. As hypertension is a factor that is known to influence the practice of polypharmacy, it was not considered in the final model in order to allow the expression of little known variables.

The use of up to six different types of antihypertensive drugs was observed in another study carried out in Montes Claros, Minas Gerais. However, such use should be performed with care, as it makes possible the occurrence of adverse events, drug interactions and iatrogenies[17]. The findings identified in the present work and in the cited studies are significant and worrying, reinforcing the importance of careful guidance, especially for an elderly population that is at a stage of life that requires more attention and greater care. Especially when there are difficulties with the identification of medicines, such situations can promote inappropriate use, as well as causing damage that further compromises health[18]. One way of avoiding the high prevalence of hypertension and its consequent impact on the excessive use of medicines is investment in preventive measures to influence behavior and lifestyle so that the occurrence of this disease is lower in the long term[16].

The present study revealed that in addition to the use of antihypertensive drugs, diabetes and cardiovascular complications were factors associated with polypharmacy. An average consumption of 5.7 medications was found among hypertensive elderly persons, 4.8 among diabetics and 6.2 among hypertensive diabetics[17]. Other similar data have been found in research on the subject. A cross-sectional epidemiological study was carried out with 167 elderly people living in an area covered by a basic health unit in the municipal region of Uruguaiana, Rio Grande do Sul, where it was found that the diseases most frequently described by the elderly persons were cardiovascular complications, and that the use of drugs to control these morbidities was common[19]. Other studies in São Paulo and Florianopolis in the state of Santa Catarina have described how the main problems described were arterial hypertension and found that the majority of elderly persons (88.0%) made use of medications[11,20].

Chronic diseases and clinical manifestations due to aging can be considered the main elements involved in the etiology of polypharmacy.[11] The fact that the presence of hypertension, diabetes, heart problems, osteoporosis and mental suffering increase the risk of elderly persons using more than five medications has, to some extent, a logical explanation. It is known that pharmacological therapy is a necessary intervention in many cases, and can provide an improvement in the health status of the elderly patient, provided that medications are properly used[19]. However, the absence of integrated health care programs for the elderly may jeopardize the rational use of drugs[21].

In a similar manner to this research, one investigation found that the most prescribed drug classes were those aimed at problems of the cardiocirculatory system and antihypertensive drugs, followed by drugs of systemic use and those that

work in the digestive system and the metabolism[16]. In a study on the use of antihypertensive and antidiabetic drugs among the elderly in Belo Horizonte, Minas Gerais, the most commonly used antihypertensive classes were diuretics, ACE inhibitors and β-blockers, probably because they were supplied by SUS[17]. Similarly, in a retrospective study of medical records of 382 elderly individuals belonging to four FHS units, it was found that thiazides were the most prescribed drugs, both as monotherapy and in association with other classes. Angiotensin-converting enzyme inhibitors were the second most used class of antihypertensive drugs, both in isolation and in combination. Beta-blockers, calcium channel blockers, and loop diuretics were less commonly used[20].

These results highlight the need to implement treatment protocols for hypertension and diabetes in health institutions and to make prescribers of medication aware of their use, with a view to improving quality of care and favoring therapeutic effectiveness and therapeutic[17]. In addition, knowledge of the sociodemographic, health and polypharmacy characteristics of these elderly people favors the implementation of specific actions for this age group by health professionals, especially those who work in Primary Health Care, as focusing on the population in question, prevention and permanent monitoring, as well as integration between the levels of health care are important for specialized care and for the adequate management of the pathologies that affect this public[19].

Some limitations should be considered when interpreting the results of the present study, such as the limited geographical space. Only 60% of the residents of Brazlândia, DF, receive medical care from the FHS, and of the 11 teams of this service only five had electronic medical records. This was one of the criteria for inclusion in the research. Another limiting fact is the lack of standardization in filling out medical records. Many professionals do not take proper care when writing down details about physical examinations, anamnesis and medications being used and prescribed. This is especially detrimental to studies of medical records, which can also lead to harm to patients and professionals in epidemiological as well as technical and legal matters. However, it is important to note that the present study was conducted with a representative sample of elderly people in a region where the subject had not yet been studied, and therefore provides relevant data.

CONCLUSIONS

The present study allowed the evaluation of polypharmacy among elderly persons receiving care through the FHS, and the identification of related factors. The prevalence of polypharmacy was high; most individuals used three different drug classes, while diabetes mellitus, cardiovascular complications and the use of antihypertensive drugs were the factors associated with a high prevalence of polypharmacy.

This is a worrying reality that demands new postures on the part of the professionals. Polypharmacy should be carefully evaluated, in order to avoid harm to the elderly such as iatrogenics. It is necessary to implement measures that alert and make family health professionals, especially prescribers of medication, aware of the importance of the issue, in order to improve the quality of care provided to the elderly population and to achieve therapeutic rationality. In addition, specific actions are required and should be contextualized to the singularities of the elderly in the context of the FHS, focusing on appropriate assistance to this public and the problem of polypharmacy.

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Dietary patterns and associated factors among the elderly

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Abstract

The aim of the present study was to identify dietary patterns among the elderly, and associate the same with sociodemographic characteristics, health and lifestyle. A cross-sectional study was carried out with a non-probabilistic sample of 295 elderly residents of both genders of the city of São Caetano do Sul, São Paulo, Brazil, who were users of public health units. Dietary patterns were identified considering 44 food items identified through 24-hour dietary recall. Factor analysis by the principal components method was used, adopting loads greater than 0.25 as the cut-off point, followed by Varimax orthogonal rotation. The associations were analyzed by the linear regression method, with variables with $p<0.20$ in univariate regression selected, and those with $p<0.05$ maintained in the multivariate model. There was a greater percentage of elderly females (85.1%) and those aged 60-69 years (46.4%). Three dietary patterns were identified: the "traditional" pattern was associated with the male gender ($\beta=0.59$, $p<0.001$) and physically active individuals ($\beta=0.39$, $p=0.020$); the "Pastas, pork and sweets" pattern was associated with the male gender ($\beta=0.38$, $p=0.025$) and retired individuals ($\beta=0.55$, $p=0.017$); and the "Coffee with milk and bread and butter" pattern was associated with an age of 80 years or older ($\beta=0.55$, $p=0.004$) and elderly persons who had difficulty chewing ($\beta=0.38$, $p=0.013$). The dietary patterns identified show that the elderly tend to maintain similar eating habits to the Brazilian population in general, and that diet changes to a similar degree as health and life style conditions.

Keywords: Aging. Food consumption. Factor Analysis, Statistical.

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INTRODUCTION

Knowledge of the food consumption of an individual of any age group is essential to the evaluation of their nutritional status. Studies are therefore carried out to identify eating habits and their possible correlation with health status. The Academy of Nutrition and Dietetics[1] analyzed factors that may interfere in the choice of foods, such as age, socioeconomic conditions, psychosocial factors, environmental conditions, lifestyle, religion and body composition, which are affected by influences such as governmental sectors, private industry and marketing.

One of the ways to analyze food consumption is to identify dietary patterns, which consists of evaluating the main food groups consumed by individuals or groups, and correlating these with their characteristics, such as aging.

Studies that seek to identify dietary patterns in the elderly are scarce both in Brazilian[2,3] and international literature[4-7], despite the importance of this issue for the scientific community. Food consumption is directly related to nutritional status and consequently to the emergence or non-emergence of diseases, in particular Chronic Noncommunicable Diseases, which tend to increase with advancing age.

In non-Brazilian literature, Anderson et al.[8] identified six dietary patterns among 3,075 elderly people from different regions of the United States who participated in the Health, Aging and Body Composition - Health ABC study, related to the influence of genotyping and insulin sensitivity.

In Brazil, Ferreira et al.[2] carried out a study with 355 elderly people in the city of Botucatu, São Paulo, and identified the following patterns: *Healthy, Snacks and weekend meal*, *Fruits, Light and Integral*, *Soft diet and Traditional*, and verified their adherence to sociodemographic characteristics.

Given the specificities of the aging process, the demographic transition that Brazil is undergoing and the importance of nutrition in factors that affect the quality of life of the elderly, it is necessary to carry out studies to identify the food choices of such individuals in order to support public policies and nutritional counseling among this age group.

The objective of the present study was to identify the dietary patterns of elderly users of public health units living in the municipal region of São Caetano do Sul, São Paulo, Brazil, and to associate these with sociodemographic variables, nutritional status and lifestyle.

METHODS

A descriptive cross-sectional study was performed with 295 elderly individuals, aged 60 years and older, of both genders, who were users of public health units in the municipal region of São Caetano do Sul, São Paulo, Brazil, distributed among the districts of the city. Data collection took place over twelve months between February 2014 and February 2015.

The sample studied was non-probabilistic and chosen for convenience, and the sample size was determined according to the main objective of evaluating the diet of the elderly. The methodology of Hair et al.[9] was applied, which states that the sample size should be five times greater than the number of items in the Food Frequency Questionnaire (FFA), which contains 57 groups. In addition, a sample of at least 288 individuals was estimated for multivariate regression analysis, guaranteeing a 95% confidence level, and a sampling error of 5% was applied. All the elderly persons registered with the public health units that agreed to participate were included, while those with cognitive deficits who were unable to respond to the interview were excluded.

Data were collected by a team of trained nutritionists who displayed posters at public health units and conducted daily visits during local activities, inviting the elderly to participate and explaining the objectives and procedures. Those who were interested in participating provided their name and telephone number, and were informed of the date and time of the appointment of their choice, with a nutritionist contacting them 24 hours earlier to confirm. A structured questionnaire was developed based on the *Saúde, Bem-estar e Envelhecimento* (the Health, Welfare and Aging) survey of the Pan American Health Organization (SABE/OPAS)[10]. Socio-demographic data (age, gender, schooling, marital status, family composition and income) were collected, as well as clinical and lifestyle data (smoking, reported morbidities/diseases, use of

nutritional supplements, oral cavity conditions and gastrointestinal tract). The elderly declared whether they *performed physical activity* or *did not perform physical activity*, regardless of the frequency and/or intensity of the same. The per capita income was calculated by the amount received per month (retirement, family allowance, rent or bank investments, government programs and others) divided by the minimum salary applicable in 2014, which was R$724.00.

Anthropometric variables were used to verify nutritional status, with weight and height measured to calculate the body mass index (BMI=weight in kg/height in m²) and waist circumference (WC) also measured. BMI was classified according to age group, as recommended by the Pan American Health Organization[11], into underweight (BMI<23 kg/m²), normal weight (BMI≥23 and <28 kg/m²), overweight (BMI≥28 and <30 kg/m²) and obesity (BMI≥30kg/m²). The World Health Organization (WHO) standard, which predicts the risk of metabolic complications associated with obesity, was used in the classification of waist circumference, based on gender, as follows: high risk for men (WC≥94cm) and women (WC≥80cm) and very high risk for men (WC ≥102) and women (WC≥88cm).

A 24-hour dietary recall (24HR) was used to identify food consumption. The elderly were instructed to note the food consumed on the eve of the interview in order to reduce the risk of forgetfulness. The 24HRs were analyzed to transform the quantities of the foods and preparations described into the usual measures of grams or milliliters. The data obtained from the 24HRs were entered in the *Nutrition Data System for Research* (NDS-R) software program[12].

The interviews were conducted in order to contemplate all the days of the week and months of the year, considering the variability of the patterns of food consumption in different seasons.

To obtain the dietary patterns, exploratory factorial analysis by principal components (PCA) was performed, considering the food from the R24H in grams or milliliters. The 529 foods/beverages reported in 24HR were grouped based on the 57 items of the Food Frequency Questionnaire (FFQ) adapted for the present study[13], with those that were not reported by at least 5% of the elderly persons excluded. Following a number of regrouping tests based on nutritional similarity, 44 food items were maintained to identify dietary patterns.

In the first phase of PCA, the Cattell plot (scree plot) was evaluated and 19 consumption patterns with eigenvalues greater than 1.0 were identified. This value indicates a greater ability to explain the variance of the data than an original variable could describe individually[14,15].

Varimax orthogonal rotation was then used to increase the interpretability of the data and the food items the factor loading of which was greater than 0.25 were maintained in the matrix. To verify the appropriateness of the use of the analysis, the uniformity of the data was tested by the Kaiser-Meyer-Olkin test, and presented a satisfactory result (0.56). The homogeneity of variance was confirmed by the Bartlett sphericity test (p<0.001). The scores of each participant were computed to identify the factors associated with the patterns obtained[14].

The study variables were categorized with the purpose of performing descriptive and inferential statistical analysis, and a significance level of 5% was adopted.

For inferential analysis of the identified dietary patterns, the linear regression method was chosen, with the scores obtained in each pattern for each individual used as the dependent variable. In univariate linear regression analysis, independent variables that obtained a value of p<0.20 were selected for inclusion in multiple regression and the model was adjusted by gender. The stepwise forward strategy was used, and variables with p<0.05 were maintained in the final model. Measures of central tendency and dispersion were also calculated.

The study was approved by the Ethics Research Committee of the Fundação Municipal de Saúde de São Caetano do Sul (the Municipal Health Foundation of São Caetano do Sul) and the Universidade São Judas Tadeu (São Judas Tadeu University), according to approval nº71/2013 and nº470.062 (CAAE 24855113.6.0000.0089), respectively. A letter of consent was received from São Caetano do Sul City Council permitting the carrying out of the data collection and the participants signed a Free and Informed Consent Form (FICF).

RESULTS

A total of 295 elderly people participated in the present study, of whom 85.1% were female, 46.4% were aged between 60 and 69 years old, 44.7% were married, 74.6% lived with a partner, 41.7% had from zero to four years of schooling, 62.4% were retired and 44.1% had a per capita income between one and three minimum salaries. Regarding health and lifestyle characteristics, 95.6% were non-smokers, 84.7% practiced physical activity, 74.6% stated that their eating habits had not changed and 64.4% had not used food supplements in the last year. Regarding nutritional status, 43.7% of the elderly were overweight (overweight or obese) and more than half (64.4%) presented a very high risk of metabolic complications associated with obesity.

Three dietary patterns were identified by factorial analysis, and were named according to the main food items that constituted each one, according to the foods habit of the Brazilian population and based on the contribution (factorial loading) of food items in each pattern. Pattern 1, entitled *Traditional*, explained 5.45% of consumption variation and presented food commonly consumed by the Brazilian population in main meals: beans, rice, vegetables, olive oil, vegetables and chicken. Pattern 2 (*Pasta, pork* and *sweets*), was so-called due to the presence of sweets, soft drinks, pasta with sauce and pork, explaining 4.94% of the variation of consumption. Finally, standard 3 (*Coffee with milk and bread and butter)* included foods that constitute a typical Brazilian breakfast or snack: butter/margarine, toast, bread, sugar, coffee and whole milk, which explained 4.69% of the variation in consumption. Together, the three patterns explained 15.08% of the total intake variance (Table 1).

Table 1. Factorial loads obtained by analysis of the major components of dietary patterns of the elderly. São Caetano do Sul, São Paulo, 2015.

Foods/Groups	Dietary Patterns		
	Traditional	Pasta, pork and sweets	Cafe with milk and bread with butter
Beans	0.6990	0.1461	0.1180
Rice	0.6935	-0.1942	0.0805
Vegetables	0.5227	-0.0870	-0.2291
Olive oil	0.5108	-0.0938	-0.2690
Vegetables & cruciferous vegetables	0.2783	0.1141	0.1380
Chicken	0.2510	0.0535	0.0583
Pasta without sauce	-0.4022	0.0351	-0.0773
Cream cheese	-0.3511	-0.0591	-0.0059
Sweets and ice cream	0.0446	0.7699	0.0639
Soft drinks	0.0252	0.6394	-0.0244
Pasta with sauce	0.0735	0.6281	0.0166
Pork	0.0726	0.5671	-0.2193
Butter/margarine	0.1935	-0.1056	0.4843
Toast	0.0437	-0.1338	0.4590
Bread	-0.0007	-0.0772	0.4211
Sugar	-0.0087	-0.1061	0.3545
Coffee	0.1576	0.0049	0.3005
Whole milk	0.0866	-0.1075	0.2545
Yoghurt	0.1405	-0.1112	-0.4558
Oilseeds	0.0896	-0.1911	-0.3269

to be continued

continued from Table 1

Foods/Groups	Dietary Patterns		
	Traditional	Pasta, pork and sweets	Cafe with milk and bread with butter
Cereals	0.1049	-0.0954	-0.3244
Fish	0.0260	-0.1707	-0.3040
Legumes	-0.0084	-0.1421	-0.2830
Skimmed milk	-0.1906	0.0498	-0.1584
Cheeses	0.0135	0.0406	-0.0787
Sweet biscuits	-0.1281	0.1959	-0.0534
Simple cake	-0.1684	-0.1471	0.0565
Jelly/milk pudding	0.0817	-0.1055	0.2246
Root vegetables	-0.0875	0.0649	-0.0148
Flours	-0.1055	-0.0199	-0.0945
Soups	-0.2331	-0.0617	0.1385
Beef	0.1603	0.1456	0.1781
Cold cuts	-0.0456	-0.0056	0.0594
Fruit	-0.0547	0.1728	-0.2050
Natural and concentrated juice	-0.1001	-0.1016	-0.2397
Processed juice	-0.0674	-0.0465	-0.0571
Teas	0.0052	-0.1701	0.0494
Chocolate	0.0408	0.0889	0.0522
Chocolate milk	-0.0026	0.0646	0.0347
Tomato Sauce	-0.1498	0.0445	0.1137
Sweet bread	0.0830	-0.0103	0.1307
Salty crackers	-0.0540	0.0430	-0.0116
Savory snacks, sandwiches and pizza	-0.2284	-0.0275	-0.1010
Tomatoes	0.2320	0.0086	-0.2023
Explained variance (%)	5.45	4.94	4.69
Total explained variance (%)	5.45	10.39	15.08

It should be noted that food items that contributed inversely to the pattern presented negative loads, indicating that they did not form part of the same consumption occasion. The *Traditional* pattern presented an inverse participation for the consumption of pasta without sauce (-0.4022) and cream cheese (-0.3511) and the *Coffee with milk and bread and butter* pattern showed an inverse participation for yoghurts (-0,4558), oilseeds (-0.3269), cereals (-0.3244), fish (-0.3040), vegetables (-0.2830) and olive oil (-0.2690) (Table 1).

The degree to which each food item comprises the composition of the three consumption patterns can be seen in Figure 1.

In terms of the relationship between the characteristics of the elderly persons and dietary patterns, it was observed that the *Traditional* pattern was positively associated with males (β=0.59, $p<0.001$) and those who performed physical activity (β=0.39, $p=0.020$), and inversely with elderly patients who used dental prostheses (β=-0.25, $p=0.034$). In the *Pasta, pork and sweets* pattern, there were associations with males (β=0.38, $p=0.025$) and retired elderly persons (β=0.55, $p=0.017$). However, separated/divorced/widowed elderly persons (β=-0.24, $p=0.041$) had an inverse association with this pattern. The *Coffee with milk and bread and butter* pattern was associated with age ≥80 years (β=0.55; $p=0.004$) and with elderly persons that had difficulty chewing (β=0.38; $p=0.013$) (Table 2).

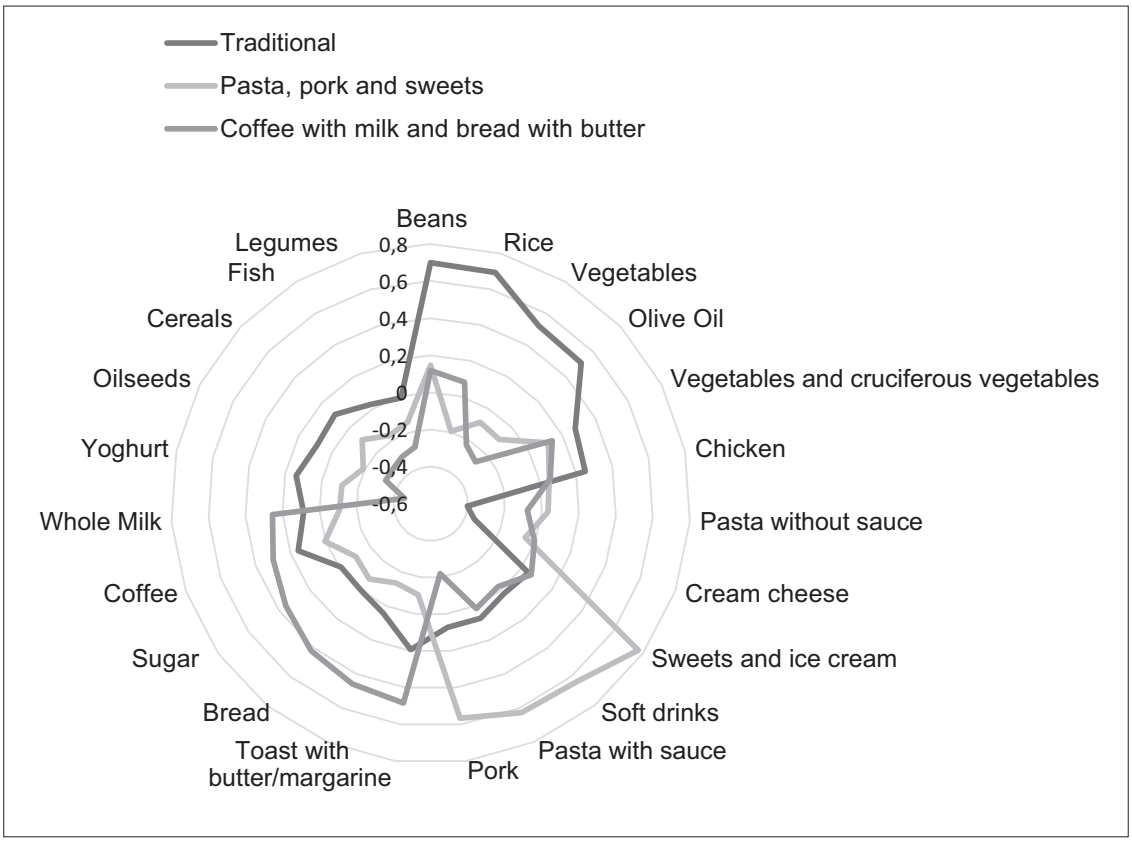

Figure 1. Graphical representation of food items that comprise dietary patterns of the elderly. São Caetano do Sul, São Paulo, 2015.

Table 2. Association between dietary patterns and the characteristics of the elderly. São Caetano do Sul, São Paulo, 2015.

Variables	N (%)	Traditional Pattern		Pasta, pork and sweets pattern		Coffee with milk and bread with butter pattern	
		Linear regression		Linear regression		Linear regression	
		β	p	β	p	β	p
Gender							
Female	251 (85.1)						
Male	44 (14.9)	0.59	<0.001	0.38	0.025	–	
Age range (years)							
60 to 69	137 (46.4)						
70 to 79	124 (42.0)	–		–		-0.02	0.905
80 or more	34 (11.5)					0.55	0.004
Marital status							
Married	132 (44.7)						
Separated/Divorced/Widowed	163 (55.3)	–		-0.24	0.041	–	
Lives alone							
Yes	75 (25.4)						
No	220 (74.6)	–		–			

to be continued

continued from Table 2

Variables	N (%)	Traditional Pattern		Pasta, pork and sweets pattern		Coffee with milk and bread with butter pattern	
		Linear regression		Linear regression		Linear regression	
		β	p	β	p	β	p
Schooling (years of study)							
0-4	123 (41.7)						
5-8	62 (21.0)	–		–		–	
9-12	53 (18.0)						
12 or more	57 (19.3)						
Occupational activity							
Work	21 (7.1)						
Retired	184 (62.4)	–		0.55	0.017	–	
Homemaker	86 (29.2)			0.06	0.642		
Information not given	4 (1.3)			0.28	0.575		
Per capita income (MS: minimum salary)							
No information	6 (2.0)						
No income	29 (9.8)	–		–		–	
Up to 1 MS	62 (21.0)						
>1 to ≤3 MS	130 (44.1)						
>3 MS	68 (23.1)						
Smoker							
No	282 (95.6)						
Yes	13 (4.4)	–		–		–	
Nutritional status							
Normal weight	125 (42.4)						
Underweight	41 (13.9)	–		–		–	
Overweight	38 (12.9)						
Obesity	91 (30.8)						
Waist circumference							
Low risk	52 (17.6)						
High risk	53 (18.0)	–		–		–	
Very high risk	190 (64.4)						
Physical Activity							
Doesn't perform	45 (15.3)						
Performs	250 (84.7)	0.39	0.020	–		–	
Difficulty chewing							
No	263 (89.2)						
Yes	32 (10.8)	–		–		0.38	0.013
Dentition							
Own teeth	124 (42.0)						
Dentures	171 (58.0)	-0.25	0.034	–		–	

DISCUSSION

To characterize the food consumption of the elderly, three dietary patterns were identified, which helped with the understanding of the food choices of the elderly and their associated factors. This methodology was chosen as its results can be used for the planning and implementation of public policies. Although widely used in academia, research on the dietary patterns of the elderly on a national level is still scarce.

The *Traditional* pattern consisted of foods commonly consumed by the Brazilian population in their main meals: rice, beans, chicken, greens, vegetables, and olive oil, and was positively associated with male elderly persons and physical activity. In the study of Brazilian adults by Neumann et al.[16], dietary patterns were associated with a risk of the development of cardiovascular disease, and the *Traditional* pattern, composed of cereals, beans and infusions, unlike the present study, was associated with the female gender. Ferreira et al.[2] identified dietary patterns in the elderly, including a *Traditional* pattern, with composition similar to the present study, whose main components were rice and beans. Selem[17] identified three dietary patterns in adults and elderly persons in the city of São Paulo, noting that one, also entitled *Traditional* (Rice, beans, butter/margarine, whole milk, coffee/tea and sugar), was positively associated with non-hypertensive individuals.

Nascimento et al.[18] with the objective of identifying dietary patterns in different Brazilian regions, used data from a nationally representative sample and observed that elderly persons in the southeast region of the country are more related to a *Mixed* pattern (vegetables, fruits, root vegetables, breads, cookies, dairy products, fish, butter or margarine and sugary drinks) than the other pattern found, which was named *Rice and Beans*. Both the *Traditional* pattern found in the present study and the *Mixed* pattern of the Brazilian population indicated the habit of the elderly of consuming vegetables (greens and vegetables). The *Traditional* pattern items observed in the present study are similar to foods that belong to a pattern often called *Prudent* and associated with a reduced risk of chronic diseases and frailty in the elderly[16,17,19], and these data may corroborate the association of the pattern with the practice of physical activity, and also reveal that part of the sample is composed of elderly people who traditionally consume foods considered to be "healthier" than other studies.

The second dietary pattern found was called *Pasta, pork and sweets* and was composed of pasta with sauce, pork, sweets and soft drinks. Compared with other scientific findings, it was noticed that, for the most part, the pasta and sweets appeared as isolated patterns, and not as positive factor loadings for the composition of a single pattern, as meals are composed of a variety of food items, and not only of one food, which ends up hampering the power of comparative analysis[4,6,19-21]. In the study by Selem[17] the *Contemporary* pattern (soft drinks, savory snacks/sandwiches/pizzas, yellow cheeses, pasta, sauces, alcoholic beverages, sweets and processed meats) was similar to the *Pasta, pork and sweets* pattern. It is also worth noting that these food items are commonly found in non-Brazilian studies and are named the *Western* standard, composed of foods that are easy to prepare[22], which may justify the positive association of this pattern with the male gender and retired individuals, as was also observed by Selem[17]. This is a relevant finding for primary health care teams, which can be used to stimulate retired elderly people to continue giving preference to more "traditional" meals, and to warn that in the majority, foods that are easy to prepare and eat possess excess sodium, sugars and fats, damaging the health of those who consume them more often.

The third dietary pattern entitled *Coffee with milk and bread and butter* (butter/margarine, toast, bread, sugar, coffee and whole milk) was associated with elderly people aged 80 years or older and with difficulty chewing. Food items that make up this pattern usually make up the breakfast and snacks of Brazilians, especially in the southeast, or substitute main meals. Santos et al.[3] identified dietary patterns in adult and elderly meals in the city of São Paulo, and found the *Coffee with milk and bread* pattern present at dinner. A qualitative study that sought to identify obstacles to the consumption of fruit and vegetable in adults and elderly people in Belo Horizonte, demonstrated the discontinuity of the habit of eating dinner, highlighted by the following discourse: "*I drink milk, eat a piece of bread, but I rarely eat a proper dinner...*"[23]. This is because these foods

are easier to acquire, prepare and consume, due to issues related to the reduction of economic power and the chewing difficulties presented by the elderly, especially long-lived elderly persons, and should become a target of actions of nutritional attention and oral health for this age range, as the substitution of a main meal for a snack in individuals with greater nutritional needs than others, can increase frailty in the development of diseases, as well as making effective treatment more difficult.

In addition, studies have indicated a preference for the *Coffee with milk and bread* pattern among Brazilian elderly men, as described by Freitas et al.[24] in an analysis of the foods most consumed by the elderly, in which whole milk occupied fifth position and French bread seventh. Data from the most recent Pesquisa de Orçamentos Familiares (Family Budget Survey) (POF) 2008-2009 showed that when the consumption of drinks among adolescents, adults and the elderly is compared, whole milk was consumed in the greatest quantities in the age groups older than 60 years[25]. A study by Nascimento et al.[18], which used the same data, showed that among foods belonging to the main food pattern of the elderly in the southeast of Brazil were bread, dairy products and butter/ margarine.

Massarani et al.[26] conducted a study using data from the National Food Survey, evidencing that dietary patterns are directly related to family aggregation in the Brazilian population, describing the patterns: *Traditional snack* (*coffee, bread, fats and oils, and cheese*), *Large traditional meal (rice, beans and other vegetables, and meats), and Fast food style snacks* (sandwiches, processed meats, soft drinks, salads and pizzas), which were similar to the patterns identified in the present study, and which suggest the influence of family in lifelong eating habits.

It should be noted that although the fruit group did not appear in any dietary pattern in the present study, the frequency of fruit consumption was observed in all the other samples, with more than half of the elderly (58%) consuming three or more fruits daily[27], and Figueira et al.[28] stating that one of the factors that promotes fruit consumption is that such items are eaten in intervals between meals, and perhaps because of this are not associated with a particular eating occasion, together with other food items.

One important point to consider is the use of factorial analysis by the principal components method. This analysis and the identification of patterns are described in literature as subjective, as it is up to the researcher to decide and justify, with the aid of other statistical analyzes, the food grouping, the number of factors to be extracted, and the nomenclature adopted for the patterns, which may hamper the power of comparison with other studies, in addition to the analysis of differences in social, economic and demographic characteristics[29]. However, it should be considered that the similarity of the methodology chosen for data analysis, when searching for dietary patterns, allows us to establish a profile of food behavior that allows the explanation of certain health outcomes associated with the pattern. Furthermore, Newby et al.[30] observed that even with less comparative power, studies that demonstrated similarity in the constituents of the patterns identified can be considered to possess reasonable reproducibility and data consistency, corroborating the findings of the present study, and can serve as a support for public policies and interventions for the public studied.

It is worth highlighting some limitations of the present study, such as the use of a non-probabilistic sample, which reduces the power of comparison between Brazilian and non-Brazilian population studies. However, to reduce this bias, the elderly were selected from different neighborhoods in the city, with different social, demographic and economic characteristics, but which were also similar to the official data of the Census of the municipal region[31]. Another possible limitation is age, as common alterations in aging, such as concentration difficulty and decreased memory, may increase the duration of the interview and require more attention on the part of the interviewer. In this sense, the training of the research nutritionists and the available space for data collection were essential to ensure the reliability of the information collected and used in the analysis and the results obtained.

CONCLUSION

Three dietary patterns were identified in the elderly: the *Traditional* pattern, which was associated with males and lifestyle (physical activity), the *Pastas,*

pork and sweets pattern, which was associated with gender and being retired, and the *Coffee with milk and bread and butter*, which was associated with elderly persons aged 80 years or older and who had difficulty chewing. The results of the present study serve as a basis for the development of intervention strategies and specific public policies in this municipal region and age group, as municipal-level studies are important, as they can identify differences that cannot always be observed in national studies. Identifying the food patterns of the elderly population contributes to the discussion among care professionals about the impact of food and nutrition on the quality of life and health of the elderly population in Brazil.

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University of the Third Age: the impact of continuing education on the quality of life of the elderly

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Abstract

Objective: To verify, among elderly participants of the University of the Third Age (UnATI) of PUC Goiás, Goiania, Brazil, whether quality of life was higher or lower among veteran or first-year participants of the UnATI, and to evaluate if there was a statistically significant difference between the quality of life of men and women or first-years and veterans. *Method:* An observational case-control study with a quantitative approach was performed with 100 elderly individuals from the UnATI. Fifty first-years and fifty veterans were involved. Two questionnaires were applied, one with sociodemographic data and the other using the World Health Organization Quality of Life – Old (WHOQOL-OLD) scale, which evaluates the quality of life of the elderly. Variance analysis (ANOVA) and multivariate variance analysis (MANOVA) were performed, with $p \leq 0.05$ applied to the relevant statistics. *Result*: The vast majority of the sample were women (90%), aged between 60 and 86 years old (average of 68.37±5.28 years old). The overall quality of life score was 3.68±0.50 (first-years) and 3.87±0.55 (veterans). There was a statistically significant difference in the areas: sensory functioning (veterans =4.28±0.65 and first-years =3.95±0.80) (p=0.025) and past, present and future activity (veterans =4.0±0.72 and first-years =3.59±0.79) (p=0.008). Multivariate variance analysis identified that the overall quality of life scores of both men (veterans =3.15 and first-years =4.21) and women (veterans =3.78 and first-years =3.86), were highest after they became veteran students (p=0.007). *Conclusion:* Veterans had a higher quality of life than first-years. The continuing education provided by UnATI has a positive impact on the quality of life of the elderly.

Keywords: Elderly. Quality of Life. University of the Third Age.

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INTRODUCTION

The subject of population aging is currently a much-discussed due to its global nature and the epidemiological, political, economic and social changes that it causes. About 8% of the world's population is made up of people aged 65 or over, and it is expected that this percentage will continue to increase[1].

This age growth is the reason for the realization of many studies that seek to identify the perception of the elderly about this new stage in their lives and the context in which they are inserted. The aim is to relate the effect of these perceptions on the quality of life of the elderly, emphasizing the importance of active aging in a society increasingly composed of people over 60 years of age[1-4].

In old age, quality of life can be influenced by objective factors such as living conditions, social relations, educational level, occupation of free time and economic capacity, and subjective factors such as personal experiences, affective reactions and psychological constructs such as happiness, mental health, feelings of control, social competence, stress and perceived health[5].

The focus of the current therapeutic and scientific approach of geriatrics and gerontology is based on the concept of active aging. This refers to the "process of the optimization of opportunities of health, participation and safety, with the objective of improving quality of life as people get older"[6]. This perspective is also anchored in the concepts of autonomy, independence, quality of life and healthy life expectancy [6].

In this context, there is a new social sensitivity towards old age, which has been reflected in the creation of public policies focused on the needs of the elderly[3,7]. For example, university programs have been developed for the elderly population. Originally conceived by Pierra Vellas in 1973 in France, these spaces were created to improve the health of the elderly and modify their image among society[8].

In Brazil, this model was readapted and instituted by Dr. Américo Piquet Carneiro in 1992 in Rio de Janeiro. Entitled Open Universities of the Third Age (U3A), these spaces aim to offer an alternative way in which the elderly can use their free time in a cultural, social and sporting manner. In addition, they also aim to integrate the elderly with different generations, as well as updating and acquiring new knowledge, enabling integral participation and the elevation of self-esteem, aiming to improve the quality of life of this population groupl[7-9].

The Pontifícia Universidade Católica de Goiás (Pontifical Catholic University of Goiás) (PUC Goiás), *lócus* of the present study, offers this service, which is linked to the Social Gerontological Extension Program of the institution. In PUC Goiás, the U3A has been running for 22 years and offers 39 workshops distributed into 52 class groups with the aim of offering continued education.

But, what is the relationship between continuing education through a U3A and the quality of life of the elderly? The present article is motivated by the fact that although there are a large number of studies about the quality of life of the elderly and factors related to it, little is known about the effectiveness of the educational programs for the elderly provided by U3As in improving quality of life. Is there a statistically significant difference between veteran and first-year students of the U3A PUC Goiás in terms of quality of life in aspects of sensory functioning, autonomy, past, present and future activities, social participation, death and dying, intimacy and general quality of life? In addition to the biological aspects of the elderly, and diseases, medications and treatments, there is a need to understand more about this population and the factors inherent to their quality of life.

In this sense, the focus of the analysis of the issue studied is the perspective of elderly people who already participate in U3A PUC Goiás as veteran students and those who are new to the activities of the institution, and their quality of life. The aim of this study was to verify whether quality of life is greater or lesser among the cases (veterans participating in the U3A) or the controls (first-year students) and to evaluate if there is a statistically significant difference between men and women, first-years and veterans in obtaining quality of life.

METHOD

An observational case-control study was performed[10]. The research was conducted at U3A PUC Goiás, Goiânia, Brazil. Elderly persons of both genders were studied and separated into two groups: a) students (veterans) who had participated in the activities of the U3A for more than two years; B) students beginning U3A activities in the semester in which the research was carried out, between February and May 2016 (first-years). Fifty students were interviewed in each group, according to the sample plan described below.

The representativeness of the participants of the research was calculated from the formula chosen by the convenience selection method[11], since the choice of the sample was made intentionally, based on the ease of access and availability of the students of the U3A, who have little available time to take part in studies. Thus, the definition of sample size met the inclusion and exclusion criteria.

The inclusion criteria for the veterans were: attend the university for more than two years, with participation in three workshops with the aim of developing aspects of quality of life (sensory functioning, autonomy, social participation, death and dying, intimacy, past, present and future activities); and be aged 60 years or over.

The inclusion criteria for the first-years were: participation in the U3A of PUC Goiás for the first time; age 60 years or over; and participation for the first time in workshops with the aim of developing aspects of quality of life (sensory functioning, autonomy, social participation, death and dying, intimacy, past, present and future activities).

Exclusion criteria (veterans and first-years): did not respond to more than three items from one of the domains that make up the scales; and participated in other institutions that aim to improve the quality of life of the elderly.

After choosing the participants according to the inclusion criteria, the case group had 57 veteran students who could participate in the study and the control group had 53 first-year students. By entering the numbers of veteran students and first-years in the sample formula, it was found that at least 50 veterans and 47 first-years were required to participate in the survey. Thus, since it was possible to collect data from 50 veteran students and 50 first-years, we chose two case and control groups of 50 participants each, following the criteria for finite populations, with a confidence level of 95% (σ=1.96), p=0.50, for q=0.50 and E^2=5% (E=0.05)[12].

Two instruments were used to carry out the research. The first was a questionnaire to evaluate sociodemographic and occupational issues with questions related to participation in the U3A (first-year or veteran), age, gender, skin color/ethnicity, religion, personal income, marital status, children, housing, education and initiative to participate in the program.

The second instrument used was a questionnaire to evaluate the quality of life of the elderly person, the World Health Organization Quality of Life-Old (WHOQOL-OLD). This questionnaire, developed by the World Health Organization (WHO), was adapted and validated in Brazil by researchers from the Federal University of Rio Grande do Sul[13]. It seeks to develop and test quality of life in elderly persons and can be used in a wide variety of studies, including cross-cultural investigations, health monitoring, epidemiology, service development, and clinical intervention studies[13]. The WHOQOL-OLD is a measuring instrument consisting of 24 items, the answers to which follow a Likert scale ranging from 1 (not at all, very dissatisfied, or very unhappy) to 5 (extremely, very satisfied, or very happy) attributed to six facets, which are: Sensory Functioning, Autonomy, Past, Present and Future Activities, Social Participation, Death and Dying and Intimacy. Each of the facets has 4 questions, with responses ranging from 4 to 20. The higher the scores, the better the quality of life is considered to be. There are three ways of presenting the data: total (from 4 to 20), mean (1 to 5) and percentage (0 to 100).

In this study, we chose to perform the analyzes based on the means, and so the results regarding quality of life can be assessed according to the scale: needs to improve (when the mean is from 1 to 2.9); fair (when the mean is from 3 to 3.9); good (when the mean is from 4 to 4.9) and very good (when the mean is 5)[13,14].

The WHOQOL-OLD was evaluated based on the syntax proposed by the *WHOQOL-OLD Group*[13,14]. The scale values were first inverted for questions 1, 2, 6, 7, 8, 9 and 10; and each question was then grouped into its domain.

The next step was to perform a descriptive analysis of the variables using mean, frequency and standard deviation. Thus, the means of the items were calculated and they were then grouped in each domain, according to the standardization of the WHOQOL-OLD correction proposed by the authors[13,14]. As the psychological attributes are mostly of an interval nature an interval scale was created, so that the constructs related to quality of life could be evaluated through inferential statistics[15].

The variance analysis (ANOVA) and multivariate analysis of variance (MANOVA) were used to evaluate whether or not there were statistically significant differences ($p \leq 0.05$) between the independent and multiple variables.

All the items of the occupational sociodemographic questionnaire were categorized and described by means of frequency and percentage, except for age, which was treated as a scalar variable and, therefore, frequency, percentage, mean, standard deviation and age range were described.

Before the application of the questionnaire all the elderly persons read and signed a Free and Informed Consent Form, which clearly explained the guarantee of confidentiality regarding the identity of the participant. The study was registered on the Plataforma Brasil (the Brazil Platform) of the Department of Health under protocol number CAAE: 52509215.7.0000.0037, approved by the Ethics Research Committee of the Pontifícia Universidade Católica de Goiás under opinion nº 1.420.660.

RESULTS

The survey included 100 U3A students from PUC Goiás, of whom 50 (50%) were first-years and 50 (50%) were veterans. The two groups presented a statistically significant difference in relation to personal income ($p=0.016$) and gender ($p=0.046$). In relation to personal income, the majority of the group of veterans had an income between one and three minimum wages, while the first-years, in the majority, had an income of one minimum salary. Regarding gender, the group of first-years (84%) and veterans (96%) were composed mostly of women, however in the veteran group the percentage of men was lower (4%) than in the group of first-years (16%) (Table 1).

There was no statistically significant difference ($p \leq 0.05$) in relation to age, skin color/ethnicity, marital status, schooling, religion and initiative to participate in the U3A, which indicates that both groups are comparable (Table 1).

Regarding skin color/ethnicity, 56% (veterans) and 58% (first-years) declared themselves to be white, 36% (veteran) and 32% (first-years) mixed race/brown, and 8% (veterans) and 10% (first-years) black. In this sample, it was observed that 74% of the veterans and 72% of the first-years said they were catholic; 14% of the veterans and 10% of the first-years described themselves as evangelical protestant; and 2% of the veterans and 8% of the first-years said they were spiritists. The majority in the veteran group declared themselves to be widowed (40%), whereas in the first-year group the majority said they were married (32%). Regarding schooling, most veterans (44%) and first-years reported having a high school education (34%) (Table 1).

In terms of the initiative to participate in U3A, both the veteran group (46%) and first-year group (52%) said that they decided to participate based on their own initiative. In the next category in both groups, 40% of veterans and 24% of first-years reported being brought by friends and 8% of veterans and 22% of first-years described having been brought by their relatives (Table 1).

The general analysis of the quality of life of the elderly group from this U3A, performed using the data collected with the WHOQOL-OLD, revealed a total quality of life of 3.68±0.50 (first-year students) and 3.87±0.55 (veterans) in comparative analysis (Table 2).

When evaluating the domains of the WHOQOL-OLD, it was observed that the mean *Sensory Function* domain scores of the veteran students (4.28±0.65) were higher than those of the first-years (3.95±0.80)

and that this difference was statistically significant (p=0.025). This difference was also identified in the Past, Present and Future domain, in which the veterans had a mean score of 4.0±0.72 and the first-years had a mean score of 3.59±0.79, with p=0.008 (Table 2).

Table 1. Socio demographic variable of students at U3A PUC Goiás, by veteran (case) and first-year (control) groups. Goiânia, Goiás, 2016.

Variables	First-year	Veteran	p-value
Age (years)			0.587
60 to 69	30 (60%)	32 (64%)	
70 to 79	17 (34%)	17 (34%)	
80 to 90	3 (6%)	1 (2%)	
Gender			0.046
Male	8 (16%)	2 (4%)	
Female	42 (84%)	48 (96%)	
Skin color/ethnicity			0.884
White	29 (58%)	28 (56%)	
Black	5 (10%)	4 (8%)	
Brown/mixed-race	16 (32%)	18 (36%)	
Marital status			0.471
Single	13 (26%)	9 (18%)	
Married	16 (32%)	13 (26%)	
Widowed	13 (26%)	20 (40%)	
Divorced	8 (16%)	8 (16%)	
Monthly personal income (minimum salary)			0.016
Up to 1	21 (42%)	7 (14%)	
From 1 to 3	13 (26%)	23 (46%)	
From 4 to 6	10 (20%)	8 (16%)	
Over 6	5 (10%)	9 (18%)	
None	1 (2%)	3 (6%)	
Schooling			0.466
Illiterate	6 (12%)	2 (4%)	
Can read and write	4 (8%)	4 (8%)	
Elementary school	7 (14%)	4 (8%)	
High school	17 (34%)	22 (44%)	
Higher education	16 (32%)	18 (36%)	
Religion			0.398
No	2 (4%)	2 (4%)	
Catholic	36 (72%)	37 (74%)	
Evangelical protestant	5 (10%)	7 (14%)	
Spiritist	4 (8%)	1 (2%)	
Umbanda	0 (0%)	2 (4%)	
Christian	3 (6%)	1 (2%)	
Initiative to participate in U3A			0.148
Own initiative	26 (52%)	23 (46%)	
Brought by friends	12 (24%)	20 (40%)	
Brought by family members	11 (22%)	4 (8%)	
Heard about	1 (2%)	2 (4%)	
Informed by third parties	0 (0%)	1 (2%)	

Frequency and percentage (N±%); Chi-squared statistical significance test (p≤0,05)

Table 2. Comparative analysis of quality of life in first-year and veteran groups by WHOQOL-OLD in a sample of 100 students from U3A PUC Goiás. Goiânia, Goiás, 2016.

WHOQOL-OLD Domains	First-year	Veteran	F	*p*-value
Sensory functioning	3.95 (±0.797)	4.28 (±0.648)	5.16	0.025
Autonomy	3.68 (±0.734)	3.79 (±0.983)	0.402	0.528
Present, past and future activity	3.59 (±0.79)	4.0 (±0.72)	7.353	0.008
Social participation	3.72 (±0.815)	3.95 (±0.722)	2.134	0.147
Death and dying	3.81 (±0.976)	3.87 (±0.948)	0.114	0.736
Intimacy	3.36 (±1.149)	3.35 (±1.057)	0.005	0.946
Overall Quality of Life	3.68 (±0.5)	3.87 (±0.551)	3.174	0.078

Mean and standard deviation M (±sd); ANOVA (F) statistical tests; Significance (p≤0.05)

Multivariate analysis of variance (MANOVA) revealed that the mean total quality of life scores of veteran U3A students were higher for both the male (first-years =3.15 and veterans =4.21) and the female gender (first-years =3.78 and veterans =3.86), and that the difference was statistically significant (*p*=0.007) (Table 3).

It was observed that the veteran group (*p*=0.006) presented better results for both men (M=4.63±0.530) and women (M=4.27±0.653) in the *Sensory Function* domain. It was also found that the veteran group (*p*=0.031) had better results for both men (M=4.00±0.00) and women (M=3.99±0.736), in relation to *Past, Present and Future Activities*. It can be seen that that veterans also scored higher in total quality of life than first-years (*p*=0.007), both for men (M=4.21±0.059) and women (M=3.83±0.558) (Table 3).

Table 3. Comparative analysis of quality of life with WHOQOL-OLD between groups of 50 first-year students and 50 veteran students of U3A PUC Goiás distributed by gender (first-years – N^{female} = 42, N^{male} 8; veterans – N^{female} = 48; N^{male} 2). Goiânia, Goiás, 2016.

WHOQOL-OLD (Domains)	M±sd	F	*p*-value
Sensory Functioning		7.744	0.006
First-year			
Male	3.22±1.114		
Female	4.09±0.651		
Veteran			
Male	4.63±0.53		
Female	4.27±0.653		
Autonomy		2.152	0.146
First-year			
Male	3.22±0.281		
Female	3.76±0.763		
Veteran			
Male	4.25±0.354		
Female	3.77±0.998		

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continued from Table 3

WHOQOL-OLD (Domains)	M±sd	F	*p*-value
Past, Present and Future Activities		4.794	0.031
First-year			
Male	2.97±0.795		
Female	3.7±0.741		
Veteran			
Male	4±0		
Female	3.99±0.736		
Social Participation		2.833	0.096
First-year			
Male	2.94±0.753		
Female	3.87±0.745		
Veteran			
Male	3.88±0.177		
Female	3.95±0.737		
Death and Dying		1.419	0.236
First-year			
Male	3.41±1.093		
Female	3.88±0.947		
Veteran			
Male	4.38±0.53		
Female	3.85±0.959		
Intimacy		0.948	0.333
First-year			
Male	3.16±1.457		
Female	3.4±1.097		
Veteran			
Male	4.13±0.177		
Female	3.31±1.066		
Total Quality of Life		7.555	0.007
First-year			
Male	3.15±0.345		
Female	3.78±0.462		
Veteran			
Male	4.21±0.059		
Female	3.86±0.558		

* Statistical tests: MANOVA (F), Significance (*p*), Frequency (n)

DISCUSSION

The results of the statistical analysis firstly revealed that the initiative to participate in the U3A came from the elderly person themselves in the majority of cases (49% of the participants). A study carried out at an U3A in the city of Rio de Janeiro showed that the initial information about the existence of this university program came from family members, friends and acquaintances who recommended that the elderly person enroll in the course. It was also found that a large portion of the elderly displayed resistance to participating in the program, which reveals their fears and uncertainties regarding a new and unknown objective[7]. Another study pointed out that the initiative to participate in the U3A was based on intrinsic reasons or dependent on the wishes of the elderly. Thus, the adherence of the elderly to these university programs is usually voluntary, considering their interests and needs[16].

Other sociodemographic data worthy of attention is that most of the participants in the present study were widowed, single or divorced. It is observed that the phases of life are being reconstructed in the face of constant changes, among them technological advances, access to information, demand for a continuous education and family changes, with the increase of divorces, remarriages and homosexual relationships[17]. This perspective corroborates the idea that the U3A can act as a tool to minimize the effects of this process, since it aims to promote social contact and the development of new capacities that can help with the understanding and active coping with the repercussions that occur in this phase of life[7,18].

In this context, attention is drawn to the fact that there was a predominantly female participation in the present study. This is similar to the findings of other studies, in which women comprised about 80% of those enrolled in the U3A. According to these studies, this predominance in the number of women is related to the fact that their life expectancy is five to eight times greater than that of men. The chance that they become widows and feel lonely is therefore greater. In this scenario, this feeling of loneliness represents a stressful emotional experience in their daily lives and mobilizes these women to seek new social contacts[1,3,7,8].

The data regarding the feminization of old age identified in the present study corroborates with the perspective that the population is getting older and more feminine, with a larger contingent of women in urban areas, and who live alone. These are women who have studied more and entered the labor market[19]. Moreover, another study, which also identified a greater participation of the female sex in the U3A, found that the concepts considered important in the search for this form of education by the female public were the search for identity and the valorization of memory[16].

Also in relation to the greater female participation in the U3A, it was found that in spite of the greater life expectancy of women, their health is more compromised than that of men, as they are victims of chronic diseases such as osteoporosis, diabetes, hypertension and arthritis. Studies have shown that over time and with continuous participation in these universities, these health problems begin to diminish and even disappear. These results indicate that seeking the U3A is a form of adjuvant treatment of the morbidities that affect women more[1,3,7,20].

In relation to the comparative data between the first-year and the veteran elderly persons, the WHOQOL-OLD identified a significant improvement in *sensory functioning* and *past, present and future activities*. This fact showed that the veteran students of the U3A researched presented a perception of a significant improvement in these aspects when compared to those who were starting their participation in the activities.

The *sensory functioning* domain evaluates the sensory part of quality of life and the impact of the loss of sensory abilities on the same. Thus, it can be seen that participation in the U3A improved the perception that elderly persons have about their sensorial abilities, which contributes directly to the improvement of their quality of life[3].

The quality of life of the elderly population especially involves the maintenance of functional capacity and autonomy. As sensory functioning is represented by the maintenance of the senses (hearing, smell, taste and touch), the loss of these capacities can compromise the participation of the elderly in activities and their ability to interact with

other people, making them dependent on care, with the consequent impairment of their quality of life. However, as U3A provides greater social interaction for the elderly and stimulates biopsychosocial development, it can also stimulate the maintenance of the sensorial functioning of this population, making them feel that an improvement of their senses is occurring that is proportional to the duration of their participation in these programs[20,21].

Moreover, the more active the elderly, the better their state of health, their satisfaction with life and, consequently, the better their quality of life[2]. In addition, active aging makes elderly persons increasingly long-lived, maintaining the expectation of a safe life, with possibilities for social participation accompanied by improvements in health and care conditions, resulting in the preservation of their quality of life[22].

Another area that showed a significant difference in the present research was *past, present and future activities*. This assesses the degree of satisfaction of the elderly in relation to the previous and current activities they perform or have performed. In addition, it estimates the expectations of participants that they will continue to register achievements in their lives and is an important condition for increasing quality of life in the elderly[20,23].

These future expectations and projects are considered to be a way of giving meaning to the existence of individuals as beings who maintain their active mental faculties and are capable of projecting and realizing their desires. Thus, the significant improvement observed in veterans in this domain reflects a greater perception of well-being in projects and experiences already achieved and, consequently, leads to an increase in quality of life[20,23,24].

In addition to the two domains cited, the present study identified a significant improvement in the overall quality of life of veterans of this U3A compared to those who were beginning the activities, which corroborates with other studies, demonstrating that the social participation made possible by these schools, together with the knowledge acquired in them, has a positive impact on the quality of life of the elderly[7-9].

All these factors, by providing social participation and the development of personal skills, guarantee an active aging and contribute to the increased quality of life of the elderly, besides serving as a tool for the development of health policies aimed at improving the conditions of aging in Brazil[20,25].

Therefore, it is important to emphasize that enabling active aging also means ensuring, in addition to health, the safety, social participation and autonomy of the elderly. In the third age, whose main characteristics in relation to social behavior are the reduction of sensory capacities and a reduced promptness in response, other abilities can be especially important, such as those that allow social contact to be established and maintained. Several studies have already shown that the positive self-perception of the health of the elderly and the increase in their quality of life are directly related to their participation in the community, such as in the case of those who practice ballroom dancing, physical activity and/or who attend U3As[3,7,8,20].

CONCLUSION

Based on the results of the present study, it can be seen that the students in the veterans group of the U3A PUC Goiás presented a better general quality of life than first-year students. Based on these findings, it can be inferred that the U3A causes significant changes in aspects related to *sensory functioning* and *past, present and future activities*, as well as quality of life in general, for both men and women.

Therefore, it is inferred from these results that participation in the classes offered by this program tends to improve the perception of the elderly in relation to sensory functioning and diminish the impact of the loss of sensorial abilities on quality of life. In addition, the veteran students had a better perception of *past, present and future activities*, which reflected a greater satisfaction with their achievements in life and with their desired objectives.

All these parameters can improve the perception of the elderly regarding their quality of life, reflecting a positive perception of themselves and of their position in life in a cultural context, within the set

of values in which they are inserted, and in relation to their goals, expectations, standards and concerns.

As a U3A is a space that aims to promote the education, socialization, health and well-being of the elderly, it is expected that the longer that individuals participate in this type of program, the more sociable and healthy they will feel. These facts contribute to the promotion of active aging, resulting in a better quality of life.

In conclusion, it can be stated that the U3A PUC Goiás works as an important tool to improve the quality of life of the elderly. Thus, identifying that an active aging corresponds to biopsychosocial balance and the integrality of the insertion of the elderly in their environment, we can see both the importance that this program has for society, and the need to carry out more studies like this, as population aging is a global reality and there is a growing need for public policies and programs that promote dignified aging.

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Timed Up and Go test as a sarcopenia screening tool in home-dwelling elderly persons

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Abstract

Objective: to evaluate the performance of the Timed Up and Go test (TUG) as a screening tool for sarcopenia in elderly persons living in a city in the south of Brazil. *Method:* A cross-sectional, home-based study was conducted with 322 elderly persons. The diagnosis of sarcopenia was based on the criteria proposed by the European Working Group on Sarcopenia in Older People (EGWSOP). A Receiver Operating Characteristic (ROC) curve was constructed to assess the discriminatory power of the TUG on sarcopenia screening. *Results:* With a cutoff point of 7.5 seconds, the test had an area under the curve (AUC) of 0.66 (CI 0.56-0.76; p=0.002) and adequate sensitivity and negative predictive values (88.9% and 93.2%, respectively). *Conclusion:* Due to its ease of use and rapid execution, in addition to its low cost, this test is useful for the screening of sarcopenia, especially among elderly persons with good physical and cognitive abilities. The early identification of individuals with probable sarcopenia may allow for preventive or directive interventions for the management of this geriatric syndrome.

Keywords: Sarcopenia. Aging. Primary Health Care.

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INTRODUCTION

Aging causes physiological changes in body composition, with sarcopenia and increased fat mass common in this process. With advancing age, there is a loss of muscle mass of around 1 to 2% per year and a loss of muscle strength of 1.5 to 5% per year[1]. Decreased muscle strength and potency may influence the autonomy, well-being, and quality of life of the elderly. In a longitudinal five-year study, it was found that the reduction of muscle strength (dynapenia) was considered an independent risk factor for death among the elderly (HR=2.04; CI95%: 1.24–3.37)[2]. Physical performance parameters (strength and muscle mass) have been associated with significant health outcomes, such as a worsening of quality of life, falls, hospitalizations, frailty and sarcopenia[3]. Sarcopenia is a multifactorial syndrome with impairment of mobility, cognitive decline and early mortality[2]. In the last two decades, several diagnostic criteria have been proposed for the diagnosis of sarcopenia, involving muscle mass and strength, as well as gait speed[3-5].

In this scenario, the Timed Up and Go test (TUG) represents a possible screening tool for sarcopenia, as by allowing the evaluation of muscle strength and gait speed in a signal test it is inexpensive and easy to apply. TUG is used to assess the risk of falls in the elderly and is considered a good predictor of the frailty syndrome[6]. However, to our knowledge only one study has evaluated the use of TUG in isolation to screen for sarcopenia in a sample of hospitalized patients[7]. To identify a clinically accessible and low-cost test, the present study evaluated the performance of the TUG test as a screening tool for sarcopenia in community-dwelling elderly persons.

METHOD

A cross-sectional home-based study was conducted in a municipal region in the south of Brazil. The participants were selected as follows: a) 20% of the 51 census tracts were randomly selected; b) to ensure self-weighted sampling, a convenience sample of 40% of the target population was drawn from the selected sectors; c) an evaluation (questionnaires and physical examination) was conducted at the residences of the participants by researchers trained in standardized individual interview techniques. A total of 322 elderly persons (≥60 years) of both genders, living in the urban area of the municipality were included in the study. Of these, 111 individuals with uncontrolled hypertension (blood pressure>140/90 mmHg) and/or physical and cognitive impairment (a history of strokes and/or neurological diseases such as Parkinson's and Alzheimer's) were excluded, as such conditions made it impossible to perform the test proposed in the study. The sample was characterized by sociodemographic information (age, gender, skin color/ethnicity, education, marital status and family income), and health status was evaluated through the self-reporting of chronic diseases (number of morbidities).

The diagnosis of sarcopenia was performed according to the criteria of the European Working Group on Sarcopenia in Older People (EWGSOP)[3]: a) functional capacity measured by gait speed; b) muscle strength measured by manual grip strength measured by the Jamar hydraulic dynamometer (Sammons Preston Rolyan, 4, Sammons Court, Bolingbrook, IL, 60440); c) Lean muscle mass was assessed by the anthropometric equation proposed by Lee et al[8]. The reference points adopted were: gait speed was considered reduced when below 0.8m/s; a decrease in manual grip strength was considered to be <20kg for women and <30kg for men; total lean muscle mass was considered low when below ≤6.37kg/m^2 for women and ≤8.90kg/m^2 for men. In this study, individuals who presented a reduction in muscle mass plus a reduction in manual grip strength and /or gait speed were considered sarcopenic[2].

The TUG test was evaluated as a screening tool for sarcopenia. This test quantifies functional mobility in seconds through the task of getting up from a standardized chair, walking a three-meter linear course, turning around, and returning to sit in the chair again. The period taken to execute the test is timed.

Statistical analysis was presented as means, standard deviation and absolute frequencies for the sociodemographic and state of health characteristics.

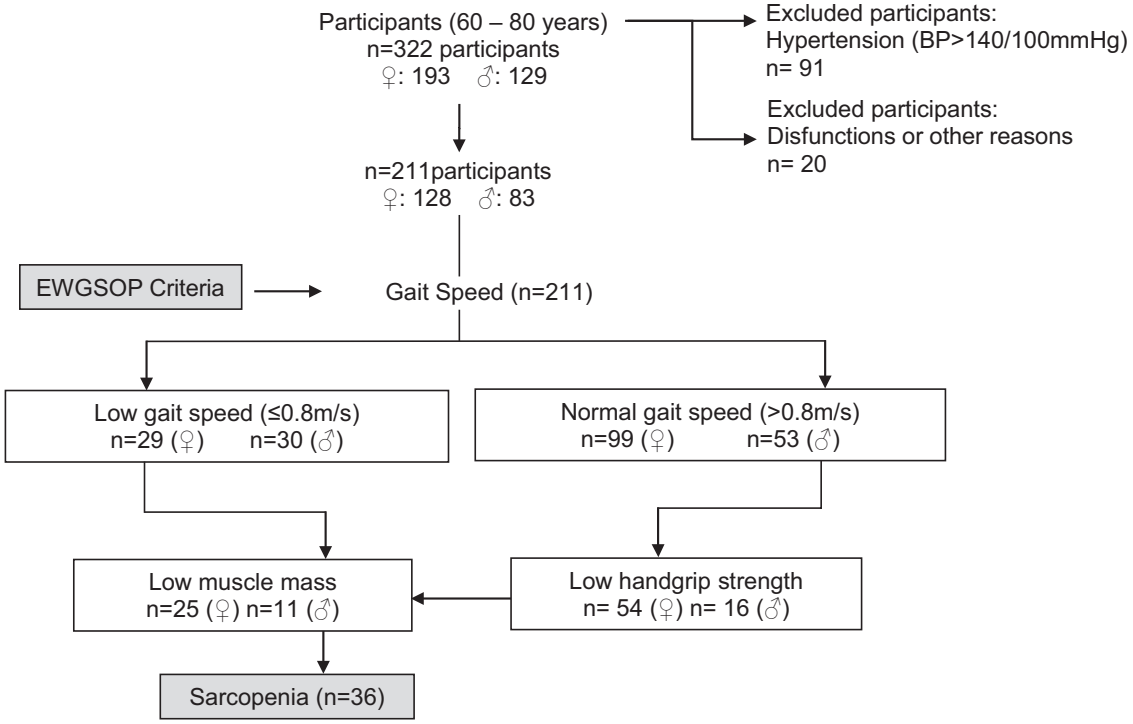
The statistical differences between the groups were analyzed with the Student's t-test for independent samples. A Receiver Operating Characteristic (ROC) curve was constructed to evaluate the discriminatory power of the TUG test for the determination of sarcopenia. The cut-off point was determined based on the requirement for high sensitivity in screening tests. In all analyzes the level of significance adopted was 5% (α=0.05).

The study was approved by the Ethics Research Committee of Unilasalle (protocol nº: 30236314.0.0000.5307). All the participants signed a Free and Informed Consent Form in compliance with Resolution 466/2012.

RESULTS

A total of 211 subjects took part in the study (flowchart 1). The sociodemographic variables are presented in Table 1. The diagnosis of sarcopenia was established in 17.1% (n=36) of such individuals using the EWGSOP criteria (table 1).

The area under the ROC curve for the TUG test when discriminating between individuals with and without sarcopenia was 0.66 (CI 0.56-0.76, p=0.002) (Figure 1). For a cut-off point of 7.5 seconds, sensitivity (88.9%), specificity (31.4%), and positive (20.9%) and negative (93.2%) predictive values were found.



Flowchart 1. Selection and exclusion criteria of sample and prevalence of sarcopenia using the EWGSOP proposed criteria among elderly residents of the community (n=211). Rio Grande do Sul, 2015.

Table 1. Sociodemographic and anthropometric characteristics of elderly population diagnosed with sarcopenia based on EWGSOP criteria (n=211). Rio Grande do Sul, 2015.

Variables	Without sarcopenia (n=175; 82.9%)	With sarcopenia (n=36; 17.1%)	All n (%)	*p*-value
Age (years)**	67.05±5.18	71.05±5.78*	67.73±5.59	<0.0001
Gender (female). n (%)	105 (49.8)	23 (63.9)	128 (60.7)	
Skin color/ethnicity (white) n (%)	150 (71.1)	34 (94.4)	184 (87.2)	
Schooling (years)**	5.51±3.55	5.23±2.58	5.46±3.40	0.603
Marital status (married). n (%)	103 (48.8)	16 (44.4)	119 (56.4)	
Family income (<3 minimum salaries). n (%)	151 (71.6)	33 (91.7)	184 (87.2)	
Number of comorbidities**	3.91±2.10	4.72±2.03*	4.05±2.11	0.036
Total muscle mass (kg)**				
Men	29.25±4.63	24.86±2.39*	28.57±4.63	<0.001
Women	19.91±3.70	15.08±1.88*	19.05±3.91	<0.0001
Total muscle mass index** (kg/m²)				
Men	10.35±1.15	8.87±0.49*	10.11±1.20	<0.0001
Women	8.14±1.27	6.42±0.73*	7.83±1.36	<0.0001
Manual grip strength ** (kgf)				
Men	38.52±7.35	24.72±4.37*	36.36±8.59	<0.0001
Women	22.23±5.86	14.97±3.69*	20.92±6.19	<0.0001
Timed Up and Go (seconds)	9.09±4.42	10.69±3.32*	9.36±3.45	0.011

*t-test for independent samples; **data presented in mean ± standard deviation; skin color/ethnicity: (determined by evaluator as white or non-white); Marital status (married or single); Family income (stratified in minimum salaries: <3 or >3); Number of comorbidities: determined by self-reported chronic diseases [diabetes, hypertension (140/90mmHg), minor psychiatric disorders, chronic bronchitis, anxiety or depression, osteoporosis, osteoarthritis, tumors]; Kg/m²: kilogram per square meter; Kgf: kilogram-force

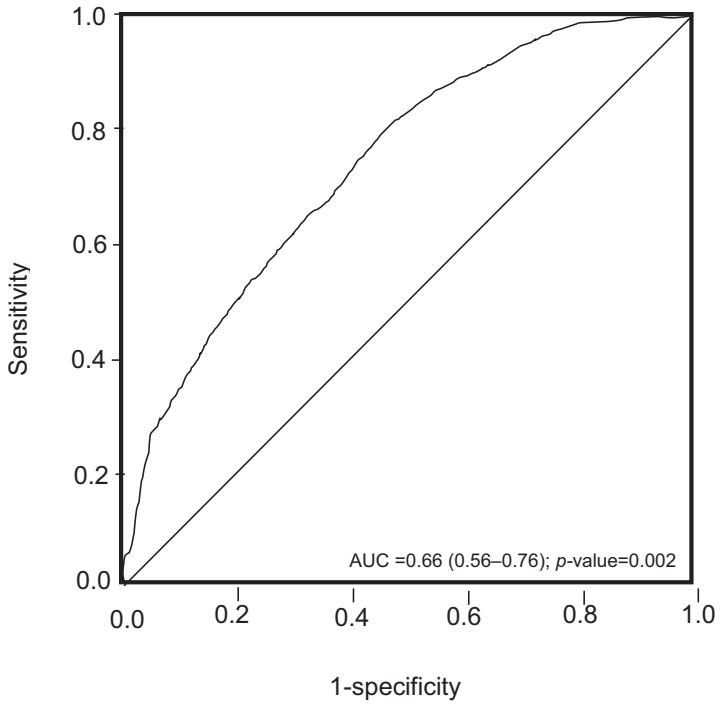


Figure 1. Accuracy of Timed Up and Go test for prediction of sarcopenia in a sample of 211 individuals living in the community. Rio Grande do Sul, 2015.

DISCUSSION

The present study demonstrated that the TUG test has adequate sensitivity for the prediction of sarcopenia in the elderly and can be used to screen for the condition. While some criteria for identifying sarcopenia have been described in literature, one of the main obstacles for early identification is the scarcity of easily applicable methods with suitable standards of validity for screening for this condition.

There is major interest in this syndrome in the aging process due to its high prevalence, as it affects a third of the elderly population[2,3]. The prevalence found in this study was similar to other studies, including research in Brazil[2,10]. Using sensitive tests for the early diagnosis of a clinical disease or syndrome is of fundamental importance, as it allows patients who could benefit from a confirmatory diagnostic evaluation and specific early intervention to be identified. The present study demonstrated the performance of TUG as a screening test for sarcopenia. The TUG is an easy-to-apply, fast and inexpensive test. These characteristics, combined with the high sensitivity demonstrated, make the test an attractive clinical tool for the screening of sarcopenia, especially in primary health care. In a smaller study of hospitalized patients, Martinez et al.[7] identified the discriminatory power of the TUG to predict sarcopenia with a cutoff point above 10.85s, (AUC: 0.80, CI=0.66-0.94, p= 0.002). However, specificity and sensitivity were 88.7% and 67.0%, respectively. It is believed that the main value of the TUG in sarcopenia is as a screening test and not as a substitute for definitive diagnosis. The test is therefore required to have high sensitivity, even with a reasonable loss of specificity.

In the present study, the cutoff point for screening for sarcopenia was lower (7.5s) than that of the study by Martinez et al.[7], which was expected, as the subjects surveyed were not hospitalized. In addition, the TUG test presented a lower false negative (11.1%) and a higher false-positive (68.8%) rate than the Martinez et al.[7] study, which identified values of 33.3% and 11.3%, respectively. A screening test is expected to have a higher sensitivity and, consequently, higher false-positive results, so that the patient is then referred for specific evaluation. A likely explanation for the discrepancies found in this study is the profile of the subjects involved in the research: the study by Martinez et al.[7] consisted predominantly of male patients admitted to hospital with clinical conditions, with a high Charlson comorbidity index (5.35±1.97), who remained hospitalized for an average of 2.76 days. In the present study, the participants lived in the community, were mostly female, had a lower number of morbidities (4.05±2.11) and, on average, were 2.7 years younger.

One of the possible reasons for the strong performance of the TUG test in sarcopenia screening is its evaluation of muscle capacity. Recently, studies have shown that a decrease in muscle strength is more easily identified than a reduction in muscle mass in the elderly and is considered a good indicator of physical disability[2]. In contrast, age-related muscle mass loss begins around the age of 30, with a decrease of 1 to 2% per year after 50 and more than 50% after 80. Thus, TUG seems to be an adequate tool for screening for sarcopenia, considering the variables of strength and gait speed[6].

The present study provides original and relevant data for public health, since the evaluations were performed in individuals living in a community, where the TUG test has not yet been tested as a screening tool for sarcopenia. The study has some limitations, however: (1) the TUG test is also used to evaluate balance and mobility in the elderly population, which may result in bias in the result, since it is not possible to dissociate the variable of balance from the variable being evaluated, sarcopenia; (2) the evaluation of elderly individuals was carried out in a single municipality in a metropolitan area in the south of Brazil, making it difficult to generalize the results; (3) the study excludes the possibility of evaluating sarcopenia in elderly persons with low physical and cognitive capacity, due to the necessity of conducting and understanding the TUG test.

CONCLUSION

The TUG test can be used for the screening of sarcopenia in elderly persons with good physical and cognitive capacity. Adequate screening has the potential to enable intervention planning, minimizing unfavorable outcomes, health care costs, functional decline and, above all, promoting successful aging.

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Nutritional therapy in the treatment of pressure injuries: a systematic review

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Abstract

Objective: to review literature on the use of nutritional therapy in the treatment of pressure injuries. *Methods:* a systematic review of the PubMed, Lilacs and Scielo databases was performed, with studies in the English and Portuguese languages published in the last five years selected. *Result:* three articles that investigated the use of different doses of arginine, a mixture of amino acids and nutritional supplements enriched with arginine, zinc and antioxidants were analyzed. The studies found that there was a reduction in the area of wounds in the intervention groups, although the difference in size was not significant in all the articles. *Conclusion:* nutritional intervention should be considered an integral part of the treatment of pressure injuries. The use of certain nutrients may positively affect the healing process of such injuries. Due to the heterogeneity of the methodologies used, the small sample size and the range of intervention times and nutrients used, more scientifically rigorous studies are recommended to create an evidence based nutritional intervention model for the treatment of pressure injuries.

Keywords: Pressure Ulcer. Wound Healing. Nutrition Therapy. Diet Therapy.

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INTRODUCTION

Pressure ulcers (PU) are described as localized damage to the underlying skin and/or tissue, usually over a bony prominence. They may be related to medical equipment or other types of devices and are considered a global problem. They can be caused by prolonged and/or intense pressure or shear forces[1]. In addition to worsening the quality of life of hospitalized patients, PU increase the length of hospital stays and the cost of treatment.

In recent years, the prevalence of pressure ulcers has increased due to the increased life expectancy of the population. One of the indicators of risk for the development of PU is the age factor, especially in patients aged 65 years or older. The non-healing of ulcers affects three to six million people from this age group, representing 85% of sufferers of such events[3,4]. The occurrence of PU has been observed in 36% of elderly patients with hip fractures and in 10 to 35% of individuals at the time of admission to long-term care facilities (LTCF)[4]. In Brazil, a study performed in a LTCF for the elderly in Fortaleza found a mean prevalence of pressure ulcers of 18.8%[5]. In Ribeirão Preto in the state of São Paulo, a study of adults and elderly persons receiving home care identified a prevalence of 21.7%[6]. In a study of patients living in an area covered by the Family Health Strategy (FHS) in Teresina, Piaui, where the majority (79.4%) of the sample were elderly, the prevalence of PU was 23.5%[7].

Turning to the relationship between PU and nutrition, studies have indicated a low association between malnutrition and the development of PU and delayed healing. Low Body Mass Index values are associated with reduced body fat and, consequently, less protection against pressure in bony prominence areas[8]. A study of high risk and hospitalized individuals found that 29% of such patients were malnourished, and of these 17% developed PU over a four-week period, while only 9% of non-malnourished patients suffered such lesions in the same period[3]. A multi-center study conducted in several hospitals in Brazil from 2009 to 2011 indicated a prevalence of 16.9% of PU, and found that 52.4% of patients were malnourished. Fifteen years earlier, the Inquérito Brasileiro de Avaliação Nutricional Hospitalar (the Brazilian Hospital Nutritional Evaluation Enquiry) (IBANUTRI) found that malnutrition was present in 48% of hospitalized patients[9].

Nutritional therapy (NT) is recommended in cases of pressure ulcers where patients are unable to meet their nutritional needs by the conventional oral route[10]. The nutritionist is responsible for creating a dietary prescription based on nutritional diagnosis guidelines[11].

The healing process consumes energy, mainly through the use of carbohydrates in the form of glucose. In order for the body to avoid using proteins in this process, an adequate calorie supply is required.[3]. From 30 to 35 kcal/kg/day of energy and 1.2 to 1.5g/kg/day of proteins are recommended, in addition to 1 mL/kcal of fluid intake. In patients with more than one PU and/or very large lesions or major catabolic situations, as well as those who do not have other comorbidities, the supply of at least 1.5 g/kg/day can be considered. The use of formulas with a higher protein content and immunomodulatory nutrients has been recommended in the treatment of patients with PI[10].

Several supplements for enteral nutritional therapy (ENR) and oral, nasogastric, nasoenteral or percutaneous (gastrostomy) nutritional supplementation have been commercially developed to prevent and treat PU. These formulas are mainly composed of protein, zinc, vitamin C, arginine and glutamine[3].

The objective of the present study was to perform a literature review of the use of NT in the treatment of pressure ulcers.

METHODS

A systematic review of literature was conducted in August and September 2016 in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology[12]. To develop the research question the PICO acronym was used[13]: P - population and problem (adults and elderly persons with PU); I - intervention (use of nutrition therapy); C - comparison (no special formula, or different formulas, or use of specific nutrients and immunonutrients, or differences in composition and/or dosage); O - outcomes (partial or total healing, stability of total area, reduction of

exudate, reduction of devitalized tissues and others). The research question was: What NT was used to improve the healing of PU in adults and the elderly?

A search was carried out of bibliographic data on the PubMed, Lilacs and Scielo databases, selecting publications performed in the last five years in the English and Portuguese languages. The following descriptors from the Medical Subject Headings (MeSH) system were used: pressure ulcer, bed sores, bedsore, decubitus ulcer, pressure sore, wound healing, nutrition therapy, diet therapy together with the following from the Descritores em Ciências da Saúde (Health Science Descriptors) (DeCS): pressure ulcer, decubitus eschar, healing, nutritional therapy, diet therapy, combined with Boolean operators (AND and OR).

The inclusion criteria were: randomized clinical trial design, studies involving humans, subject age over 18 years, oral or enteral diet administration route, and pressure ulcers only. Publications such as literature reviews, dissertations, theses, editorials and clinical guidelines and studies of injuries of other etiologies were excluded.

The studies were initially selected from their titles and abstracts after consulting the databases. They were then read in full in order to apply the predefined inclusion and exclusion criteria. For the extraction of data from the articles, an instrument was prepared containing the following information: authors, year of publication, study location, sample size, intervention, duration, results and outcome evaluation.

RESULTS

Following searches in the databases using the previously mentioned descriptors, 117 articles were found, with 98 in PubMed, 16 in Lilacs and 3 in Scielo. Eighteen studies were selected for a complete reading. The most common reasons for exclusion at this stage were: type of wound with etiology other than PU (3), non-randomized studies (2) and systematic reviews (7), parenteral route of administration (2), and TN used for objectives other than the healing of PU (1). In the end, three articles were included in this systematic review (Figure 1).

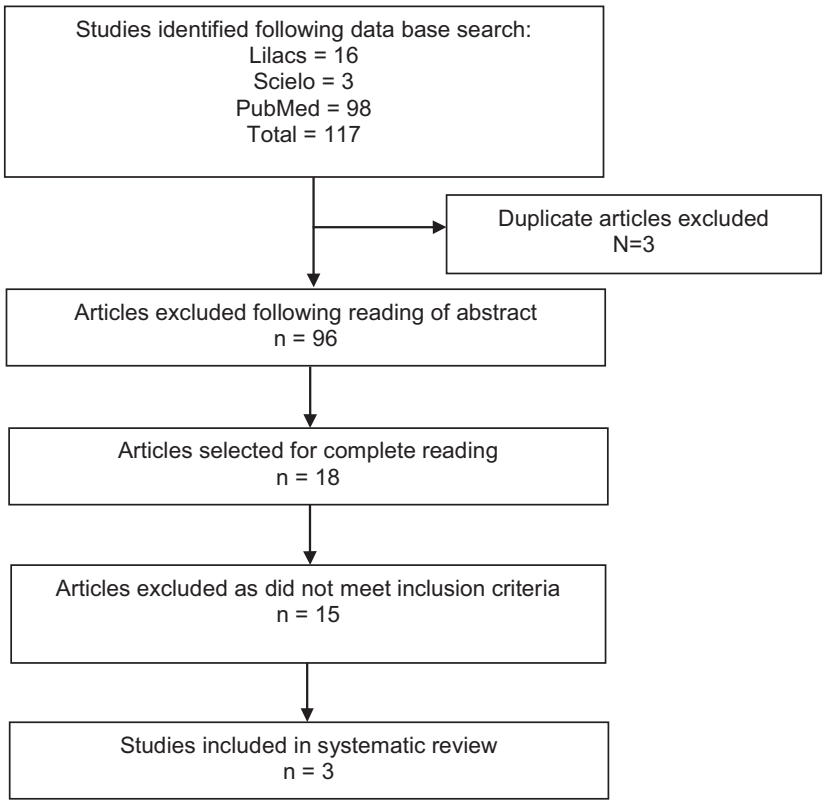

Figure 1. Flowchart of identification, selection and inclusion of studies. Distrito Federal, 2016.

The nutrients studied were: arginine, amino acid mixture [arginine, glutamine and beta-hydroxy-beta-methylbutyrate (HMB)] and a formula enriched with zinc, arginine and antioxidants (Cubitan®). The mean age varied from 67.5±4.9 to 81.7±10.7 years and 246 patients participated in the study, 86 (35%) of whom were men and 160 (65%) of whom were women. Of the studies analyzed, one was performed in Australia[14], one in Singapore[15] and one in Italy[16]. The study by Leigh et al.[14] did not receive any type of funding, while the study by Wong et al.[15] was supported by Abbot Laboratories Pte Ltd and the authors declared there were no conflicts of interest. Cereda et al.[16] received financing from the Azienda Ospedaliera Universitaria Maggiore della Carità and declared that the source of the financial support had no role in the project or the undertaking of the study. All the studies described how randomization was performed.

In terms of sample losses, Leigh et al.[14] described reasons such as death and collateral effects. The losses in the study by Wong et al.[15] included pneumonia related death and aversion to the supplement. Cereda et al.[16] described death, hospitalization, transference and the resistance of the participants to the treatment as reasons for losses.

All the studies performed nutritional and anthropometric evaluations. Two of the works[14,15] used the Subjective Global Assessment (SGA) and the Body Mass Index (BMI). Leigh et al.[14] classified 52% of the patients evaluated as malnourished. Wong et al.[15] declared that 65% were malnourished or at risk of malnutrition. No significant alterations in weight were observed following the intervention in these two studies. The study by Cereda et al.[16] evaluated only malnourished patients and used the BMI. The eight-week treatment resulted in an increase in body weight in both groups (p<0.001).

Daily energy requirements were calculated in the study by Leigh et al.[14] using the Schofield equation. Protein requirements were based on the recommended daily dose for subjects with PU, according to the National Pressure Ulcer Advisory Panel (1.2-2g/kg of body weight)[17]. Wong et al.[15] used from 30-35 kcal/kg of body weight and 1.2-2 g/kg of body weight of protein, according to the stage of the pressure ulcer. Cereda et al.[16] multiplied the result of the Harris-Benedict formula by a correction factor of 1.2 for physical activity and a PU stress factor of 1.1. Daily protein requirements were set at an intake of 1.5 g/kg of body weight.

To evaluate the ulcer, one study[16] used the Visitrak tool[18] while the other two[14,15] employed the Pressure Ulcer Scale for Healing (PUSH)[19]. The primary outcome in the study by Leigh et al.[14] was the healing rate of the PU. Wong et al.[15] did not describe the outcome of the methodology, but also evaluated the healing of the ulcers using the PUSH tool. Cereda et al.[16] describes a primary outcome of the reduction of the ulcer area at eight weeks, and secondary outcomes that included a reduction in area of 40% or more; full healing at eight weeks, and percentage change in area within four weeks.

Regarding the pressure ulcers themselves, Leigh et al.[14] found that 74.2% were classified as grade II (n=23) and 32.3% were located in the sacral region (n=10). Of the 34 ulcers found by Wong et al.[15], 47.1% (n=16) were classified as grade IV and half were found in the sacral region. Cereda et al.[16] obtained similar results: 40% of the PU were grade IV (n=80) and 64% were located in the sacral region (n=128). Following the intervention, Leigh et al.[14], who evaluated different doses of arginine, found a reduction in PUSH scores in the two groups (p<0.001), although there were no significant differences in the healing rates between the groups (p=0.991). Wong et al.[15] used a mixture of amino acids and found similar results, but observed that the improvement in viable tissues was significantly higher in the experimental group (p=0.02). Cereda et al.[16] found that the use of a formula enriched with zinc, arginine and antioxidants resulted in a greater reduction in the area of the PU (60.9%) than the standard formula (45.2%).

One bias associated with the study by Leigh et al.[14] was that it did not feature an active control group (for ethical reasons), and the authors questioned whether the healing rates would be different from the normal healing rates of PU. The sample size was small. In the study by Wong et al.[15] the determination of viable tissue was based on examination of the site and the

retrospective analysis of photographs of sores, which may have led to bias in data interpretation. Both the time period and the survey size were small. When hospital discharge occurred, control of the use of the mixture (intervention) was via the verbal reports of the relatives. The study by Cereda et al.[16] featured only malnourished patients.

Chart 1 shows the characteristics of the studies found.

Chart 1. Randomized clinical trials selected, describing authors, location, number of patients, intervention and results found. Distrito Federal, 2016.

Author/ year of publication	Study location	Sample (intervention/ control)	Intervention	Duration	Results/evaluation of outcome
Leigh et al. 2012	acute care and rehabilitation hospital/ Australia	23 patients (12/11)	Standard hospital diet (SHD) + 9g de arginine - two sachets vs SHD + 4.5 g de arginine - one sachet. Each sachet contained 4.5g of arginine, 4g of carbohydrate, 155mg of vitamin C and 40.5mg of vitamin E.	3 weeks	There was a reduction in the initial PUSH scores of the two groups (8.9±0.7 vs 8.1±1.0 for 4.5 g and 9.0 g of arginine groups, respectively, p=0.507). Although this reduction was significant (p<0.001) there was no difference in the healing rates of the two treatment groups (p=0.991). There was no significant difference in healing rates based on arginine dosage (p=0.393).
Wong et al. 2014	Acute care hospital / Singapore	23 patients (11/12)	Recommended diet for PU + 2 sachets of placebo (carbohydrate, calcium, flavoring) vs Recommended diet for PU + 2 sachets of a mixture of amino acids [7g of L-arginine, 7g of L-glutamine, 7.9g of carbohydrate, 1.5g of beta-hydroxy-beta-methylbutyrate (HMB), 200mg of calcium and orange flavoring].	2 weeks	The PUSH scores were significantly reduced in the two groups: the experimental 9.63±1.09 (CI 95%, 7.31 to 11.94, p<0.001) and the placebo 10.63±1.06 (CI 95%, 8.37 to 12.88, p=0.009). However, there was no overall difference in the PUSH scores of the two groups. The improvement in the viable tissue of the experimental group was significantly greater (p=0.02), 43.1% (from 42.8±6.6 to 85.8±4.5) compared to 25.93% (from 57.2±7.4 to 83.1±5.0) in the placebo group.

to be continued

continued from Chart 1

Author/ year of publication	Study location	Sample (intervention/ control)	Intervention	Duration	Results/evaluation of outcome
Cereda et al. 2015	Long term care facilities and home care services / Italy	200 malnourished patients (101/99)	Standard oral diet (SOD) + 400ml/day of oral nutritional supplement (ONS) vs SOD + 400ml/ day of ONS with similar values of calories and proteins, enriched with zinc, arginine and antioxidants (vitamin C, E).	8 weeks	Primary outcome: the use of the formula enriched with zinc, arginine and antioxidants resulted in a greater reduction in the area of the PU, 60.9% (CI 54.3% to 67.5) than in the control formula, 45.2% (38.4% to 5.0%). Secondary outcome: 69.9% (CI 59.5% to 79.9%) of patients in the intervention group exhibited a reduction of 40% or more in the size of the PU in eight weeks, compared to 54.1% (CI 42.7% to 65.5%) in the control group (odds ratio [OR], 1.98 [CI 1.12 to 3.48]; *p*=0.018). A complete cure at 8 weeks was more common in the experimental group (16.9% [CI 8.2% to 25.6%]) than in the control formula group (9.7% [CI 2.1% to 17.3%]), but the difference was not significant (OR 2.16 [CI 0.88 to 5.39]; *p*=0.097). No significant differences were found in the reduction of the lesion area at 4 weeks (10.2% [CI 6.5% to 27.0%]; *p*=0.149).

DISCUSSION

The objectives of nutritional therapy in patients with pressure ulcers include the promotion of tissue regeneration and the facilitating of the healing process[20]. The main nutrients used in the studies were arginine, beta-hydroxy-beta-methylbutyrate, zinc and antioxidants. Other substances were also included in the supplements used, such as glutamine, selenium, copper and vitamin C[14-16].

Carbohydrates participate in phagocytic activity, cell proliferation and fibroblastic function, with recommended levels around 50% to 60% of the energy substrate. Proteins participate in neovascularization, fibroblast proliferation, collagen synthesis, and leukocyte production and migration[20].

The main immunonutrients used in enteral formulations for the treatment of pressure lesions are arginine, glutamine and amino acids, which exercise a substrate function in the biochemical pathways responsible for mediating collagen synthesis and immune response. Arginine is a substrate for ornithine, nitric oxide and proline, which results in vasodilation, synthesis and collagen deposition, as well as being a conditionally essential amino acid, necessary during the active growth phases and in the healing process, diabetes and stress situations. Glutamine is the most abundant free amino acid in

the body. Classified as a non-essential amino acid, its synthesis, in critical situations of metabolic stress, does not meet the demand required by the organism. Glutamine has been shown to be important in healing as it is related to collagen synthesis and the proliferation of inflammatory cells[3,21,22].

Beta-hydroxy-beta-methylbutyrate supplementation is associated with an increase in muscle mass and may inhibit muscle proteolysis and modulate protein turnover. A quantity of 3g/day can increase the formation of collagen, stimulating wound healing[15].

Zinc, copper and selenium also appear to be beneficial to the healing process. Zinc is a cofactor for the formation of collagen, granulation and epithelial tissue, has an antioxidant function and is important for protein synthesis. Copper participates in the cross-linking reactions of collagen, elastin and the elimination of free radicals[3,23]. Selenium is required for the functioning of the glutathione system, responsible for the management of inflammation induced by oxidative stress[24]. Vitamin C acts on the formation of collagen and the functioning of neutrophils and macrophages in the inflammatory phase. It also acts as a reducing agent, protecting copper and iron from oxidative damage, as well as participating in all the healing stages[23,24].

The majority of participants in the studies were elderly, as illustrated by the advanced average age. Elevated age is considered a risk factor for the development of PU, probably due to changes in the skin and subcutaneous tissue of the elderly during the aging process, making it more fragile and susceptible to pressure, friction and shear forces. There was a predominance of females, characterizing what literature describes as "the feminization of old age", a phenomenon that also occurs in Brazil[26].

A systematic review by Pedroni et al.[27] evaluated the impact of malnutrition on the development and severity of PU and revealed, through eight studies, that the risk of developing pressure ulcers is higher in malnourished patients. Four studies showed that the severity of malnutrition increases the likelihood of having more severe PU or a greater number of lesions. Another study observed that pressure ulcers and their severity were directly associated with malnutrition, finding that 98% of those with PU of severity greater than or equal to grade II were malnourished[28]. Nutritional status interferes directly with tissue repair. Malnutrition is related to inadequate wound healing, decreased fibroblast production, neoangiogenesis and collagen synthesis, as well as reduced tissue remodeling capacity[10].

Leigh et al.[14] observed that well-nourished patients displayed greater improvement in healing rates than malnourished patients, although the difference was not significant ($p = 0.057$). Wong et al.[15] and Cereda et al.[16] did not evaluate the relationship between healing rate and nutritional status.

A recent systematic review on the use of arginine-containing supplements found that such substances resulted in a significant improvement in PU healing in malnourished patients and those with normal nutritional status[29]. Another study observed that the PU of patients who received the arginine-enriched supplement were significantly smaller than those of the control group ($p < 0.016$). The PUSH score in the intervention group was significantly lower than control ($p < 0.033$) in the eighth week[30]. The study which evaluated different doses of arginine in this systematic review found a significant reduction in PU severity over time ($p < 0.001$), with no evidence of differences in healing rate between the two doses of arginine ($p = 0.991$). The authors suggest that a 4.5g dose of arginine per day may promote a similar benefit in healing to a 9g dose[14]. Wong et al.[15] concluded that the use of specialized amino acids does not appear to reduce wound size and PUSH scores, but may improve tissue viability after two weeks. In both studies the follow-up time was short, with three and two weeks respectively.

In a previous study performed by Cereda et al.[31] which featured the application of a formula enriched with arginine, zinc and antioxidants for 12 weeks, the differences between the interventions were statistically significant in terms of the area of the PU in week 8 ($p < 0.05$) and in the PUSH score at week 12 ($p < 0.05$). In a more recent study, NT effectively improved the healing of PU ($p < 0.001$) in both groups, with a larger area in the intervention group at the eighth week[16].

This systematic review presented some limitations, as the sample sizes of the studies included were small, ranging from 23 to 200 subjects. The

studies employed different outcomes, nutritional assessment, proportion of areas and tissue evaluation tools (Visitrak, PUSH), and follow-up times, ranging from two to twelve weeks.

CONCLUSION

The therapeutic benefits of nutrition should be encouraged by multi-professional teams. Nutritional intervention should be considered an integral part of the treatment of pressure ulcers. The evaluation of the nutritional status of patients is recommended, as is ensuring adequate energy and protein intake as recommended by current guidelines.

Several studies have pointed to the presence of certain nutrients that can positively affect the healing process of pressure ulcers. The evidence of supplementation with arginine and other amino acids is generally favorable, but is confused by the addition of other nutrients in available commercial preparations and by the fact that the study periods involved have been relatively short.

The use of nutritional supplements enriched with arginine, zinc and antioxidants effectively aided the healing of PU in malnourished patients, although they may have a different effect on patients with adequate nutritional status.

More scientifically rigorous studies with standardized interventions and more participants are needed to create an evidence-based nutritional intervention model for the treatment of PU.

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Effect of traditional resistance training on blood pressure in normotensive elderly persons: a systematic review of randomized controlled trials and meta-analyses

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Abstract

The objective of the present study was to determine the effectiveness of the regular practice of traditional resistance training (RT) on systolic (SBP) and diastolic blood pressure (DBP) in normotensive elderly persons. A systematic review of randomized clinical trials and meta-analyses was performed. Searches were performed without language restrictions in different databases. Randomized clinical trials published from 1966 to 2010 that assessed the effects of traditional RT on resting blood pressure (BP) and/or for the treatment of high BP were included. Only studies that assessed the effects of traditional RT on elderly adults, regardless of the number of exercises, with the presence of a control group and comparisons between groups, were included. Twenty-nine studies were found, but only six met the inclusion criteria. The mean difference was used for meta-analysis, using a 95% confidence interval and a random effect model. Traditional RT induced a significant decrease in SBP (-6.63 mmHg; p=0.02) but not in DBP (-3.34 mmHg; p=0.11). These results suggest that traditional RT may be a non-pharmacological strategy for the control of BP in the elderly.

Keywords: Resistance Training. Blood Pressure. Elderly.

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INTRODUCTION

Arterial hypertension (AH) is an important cardiovascular risk factor as it is the most common condition observed in primary care and can lead to myocardial infarction, strokes, renal failure and, consequently, death, if not detected early and treated properly[1,2].

Age is one of the main non-controllable risk factors associated with the chronic elevation of blood pressure (BP), as aging leads to structural and functional alterations in the cardiovascular system, such as stiffening of the arteries and the decline of BP control mechanisms, among others, contributing to the increased prevalence of AH, especially from the fifth decade of life onwards[4].

The regular practice of physical exercise among the elderly has been recommended as a way of mitigating or reversing numerous deleterious effects on morphological, neuromuscular, metabolic, physiological and psychological variables associated with aging[5]. Thus, physical exercise can play an important role in the prevention or treatment of hypertension, and is a non-pharmacological strategy that can also contribute to the improvement of functional capacity and consequently the quality of life of the elderly.

Although the efficacy of physical exercises with predominantly aerobic characteristics in improving BP has been proven[6-8], this type of physical exercise is somewhat limited in relation to gains in strength and muscle power, muscle mass and bone mineral density, which are fundamental adaptations for static and dynamic stability, balance, coordination and gait, especially in the elderly. Resistance exercises and, in particular, resistance training (RT), however, are recognized as the most appropriate physical exercise model to induce such adaptations[9,10], which can have a positive effect in terms of reducing the number of falls and fractures, the prevention of the development of chronic-degenerative diseases, improved autonomy and functional independence, factors that contribute greatly to improving the quality of life of the elderly population[11].

However, the effectiveness of the adoption of RT for the control of BP is still controversial, since the responses produced appear to be largely protocol-dependent[12,13]. Thus, the choice of the exercises and the training system and the appropriate manipulation of the variables that compose RT programs, such as the order of execution, the number of series and repetitions, the load used, the speed of execution, the intervals between series and exercises and weekly frequency are fundamental aspects in terms of reaching the desired benefits[14,15].

Therefore, despite the American College of Sports Medicine (ACSM)[16] recommending the regular practice of RT for the prevention and control of AH, and the evidence produced so far on the possible positive impact of adopting this behavior having been confirmed in important systematic reviews with meta-analyzes[17-21], the results provided in literature regarding this theme deserve to be analyzed in a more consistent manner, considering the diversity of systems of RT available in literature (traditional, pyramidal, circuit, super-set, pre-exhaustion, drop set, etc.) and the characteristics of the training protocols used (volume vs. intensity).

It is worth mentioning that RT systems allow the manipulation of the volume and intensity of training in different ways, providing different degrees of mechanical and metabolic stimuli. The traditional RT system is most often used in medium- and long-term studies aimed at investigating changes in the manifestation of force. This system has as its principle the use of fixed loads in each exercise, with the number of sets and repetitions being defined according to the objectives established for the training (strength, muscular endurance, hypertrophy, power, weight loss, among others)[22].

Considering the popularity of the traditional RT system and its effectiveness in terms of improvement, especially of muscle strength and mass, fundamental variables for healthy aging, it is important to investigate the effectiveness or otherwise of this training system for the improvement of BP in the elderly. The objective of the study was therefore to analyze the effect of the regular practice of traditional RT for the control or reduction of BP in normotensive elderly individuals.

METHOD

A systematic review of randomized clinical trials with meta-analyzes was performed according to the recommendations of the Cochrane Collaboration Hypertension Group[23] and the PRISMA Statement[24]. The search strategy of the studies was elaborated by the authors of this study, without restriction by language. The databases investigated were: CENTRAL (The Cochrane Central Register of Controlled Trials Database); MEDLINE (Medlars Online); EMBASE (Excerpta Medica Database); LILACS (Latin American and Caribbean Health Sciences Literature); SCIELO (Scientific Electronic Library Online), Web of Science, Scopus and DARE (Database of Abstracts of Reviews of Effects). The descriptors used were: weight training, resistance training, strength training, blood pressure, hypertension, resistive exercise, randomized controlled trial, systematic review, elderly, older adults and meta-analysis. Manual searches were also performed based on the analysis of the bibliographic references of previously selected articles.

Randomized clinical trials on the effects of traditional RT on resting BP or on the treatment and/or maintenance of high BP published from January 1966 to June 2016 were selected for this investigation. The inclusion criteria of the studies selected for analyzes were: (1) samples composed of clinically healthy elderly individuals who did not report using hypertensive medication, and who were sedentary or moderately active; (2) the presence of a control group; (3) comparative data between the groups reported; (4) a minimum of four weeks of intervention; (5) adoption of the traditional RT system, regardless of the number of exercises. The period of the study search and data collection by the authors of this study was from January to July 2016.

To evaluate the quality of the studies included in this investigation, a risk of bias analysis was undertaken. The criteria of the Cochrane Back Review Group[25] were used in the evaluations, in accordance with the experimental design used. The scale indicated for analysis is composed of 12 questions that must be answered with yes, no or not clear (Table 1). To be considered to have a low risk of bias the study must reach a minimum score of six points[25]. The risk of bias for each of the studies was assessed by two independent authors, each of whom assigned a score according to the established criteria. When there was disagreement between the two, a third reviewer with experience in this type of analysis was invited to decide upon the evaluation.

Chart 1. Evaluation of risk of bias. Paraná, 2016.

Questions for evaluation of risk of bias
Was an adequate randomization method employed?
Was the allocation of randomization adequate?
Was there masking of the patients?
Was there masking of the trainers?
Was there masking of the evaluators?
Were losses acceptable and were they described?
Were the participants assessed in the group to which they were allocated?
Were the results described free of outcome selection?
Were the groups similar at baseline?
Were other interventions avoided or similar?
Was adherence acceptable in all the groups?

The analyzes were grouped according to the duration of the training (up to 12 weeks and over 12 weeks). For continuous variables, the mean difference (MD) was used, with a 95% confidence interval and a random effect model. To examine the sensitivity effect of each study on the overall results, analyzes were also performed with the one-to-one studies of the model removed. In order to evaluate the percentage of agreement of the risk of bias results of the studies analyzed between the two evaluators, the Kappa coefficient was used.

RESULTS

Initially, 562 articles were found and had their abstracts consulted. Of these, 533 studies were excluded as they were not related to the subject (other types of training or population) or were not randomized clinical trials. Of the 29 remaining studies, 23 were excluded because they presented inadequate or non-existent information on randomization or because they presented outcomes that did not meet the specific objectives of this study (Figure 1). Thus, six studies were included in this review[26-31].

The main information from the included studies regarding the analysis of the effects of traditional RT on BP in the elderly is presented in chart 2. The total number of participants investigated was 187 elderly persons. The sample size in each study ranged from 17 to 40 participants. In three studies the participants were of both genders[26,27,29] while the others used only female subjects[28,30,31]. The duration of the intervention ranged from eight to 24 weeks, with a frequency of three sessions per week. All studies used the auscultatory method to assess resting BP.

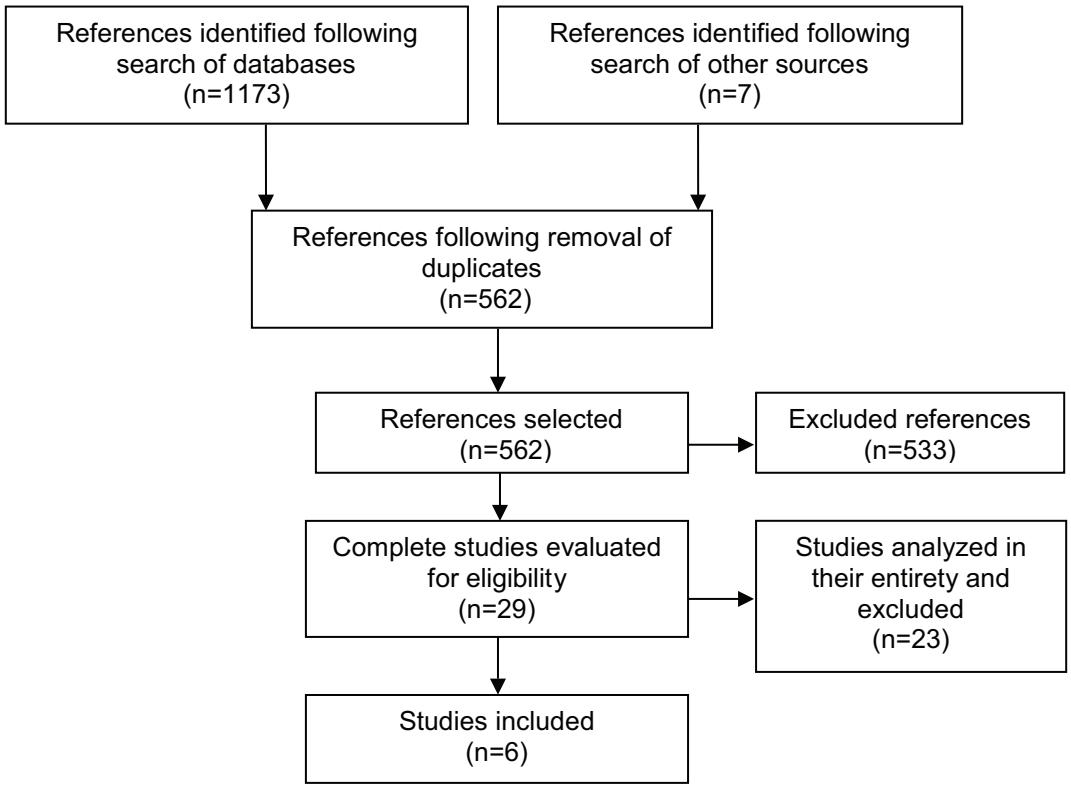


Figure 1. Algorithm of study selection. Paraná, 2016.

Chart 2. Characteristics of studies selected for assessment of impact of traditional resistance training on blood pressure of elderly persons. Paraná, 2016.

Studies	Participants	Characteristics and training time	Protocol of BP evaluation
Cononie et al. (1991)[26]	N=21 Men/Women (70 to 79 years) RTG=14 CG=7	RTG = Traditional (Nautilus), 72-79% 1RM, 1 series, 8-12 rep, 60'-120' rep, 10 ex. 24 weeks, 3 x por week.	Auscultatory (9 measures), Seated Rst (15 min). Morning.
Tsutsumi et al. (1997)[27]	N = 19 Men, Women (61 to 86 years) $RTG_{high\ int}$= 14 (67.8 ± 4.9) $RTG_{low\ int}$= 13 (68.9 ± 7.5) CG= 14 (69.8 ± 4.6)	RTG= Traditional (Weight Machine) 2 series, 12 ex, 60- 120'rep. $RTG_{high\ int}$= 75- 85% 1RM, 12 - 16 rep. $RTG_{low\ int}$= 55-65% of 1RM, 8 - 12 rep. 12 weeks, 3 x por week	Auscultatory Seated Rst
Wood et al. (2001)[28]	N = 17 Women (60 to 84 years) RTG= 11 (69.8 ± 6) CG= 6 (68 ± 5.4)	RTG= Traditional 75% 5RM, 2 series, 8-12 rep., 8ex. 12 weeks, 3x por week.	Auscultatory Seated Rst
Vicent et al. (2003)[29]	N = 62 Men, Women (60 to 85 years) $RTG_{high\ int}$= 24 (66.6 ± 7) $RTG_{low\ int}$= 22(67.6± 6) CG= 16 (71 ± 5)	RTG= Traditional 1 series, 13 ex. $RTG_{high\ int}$= 8 rep, 80% 1RM $RTG_{low\ int}$= 13 rep, 50% 1RM 24 weeks, 3x por week.	Auscultatory (6 measures) Seated Rst (15 min)
Gerage et. al (2013)[30]	N = 29 Women, (over 60 years) RTG= 15 (65.5 ± 5) CG= 14 (66.2 ± 4,1)	RTG= Traditional 2 series, 8 ex. 10-15 rep. 12 weeks, 3x por week.	Auscultatory (Mean of 9 measures) Seated Rst
Gurjão et. Al (2013)[31]	N = 17 Women, (66 ± 5.8 years) RTG= 10 CG= 7	RTG= Traditional 3 series, 7 ex. 10-12 rep. 8 weeks, 3x por week.	Auscultatory Seated Rst

Ex = Exercises; CG = Control Group; RTG = Resistance Training Group; N = Number of participants; Rep = repetitions; Rst = resting; Week. = weeks; int = intensity.

In the evaluation of risk of bias of the Furlan et al.[25] score table (Table 1), only the studies by Cononie et al.[26] and Wood et al.[28] were considered to have a high risk of bias as they scored only five points in the evaluation criteria. One study achieved the minimum required score (six points for low risk of bias)[27], while the other studies scored seven points. However, only the study by Vicent et al.[29] met the rules of the Cochrane Collaboration for the randomization of participants. No study concealed the allocation of included subjects and/or masked the evaluators. The agreement between the reviewers on the assessment of the risk of study bias was considered high (Kappa=0.81).

The analysis of the SBP and DBP outcomes of the six selected studies is shown in Tables 1 and 2, respectively. Four studies presented a training time of up to 12 weeks[27,28,30,31] and two studies had a training time greater than 12 weeks[26,29]. Two studies were separated according to the intensity used (low and high intensity)[27,29], although this strategy generated a doubling of the total number of Control Group participants (n=94) in these studies (Tables 1 and 2). Considering that the studies were divided into two subgroups by duration, the total real participation was 123 individuals in the training group and 64 in the control group.

Table 1. Result of studies that evaluated Systolic Blood Pressure in elderly persons of both genders, undergoing traditional resistance training programs (up to 12 weeks and over 12 weeks). Random effect. Paraná. 2016.

Study	Training N	Training Mean	Control N	Control Mean	Weight (%)	MD Random Effect. CI (95%)
Traditional training up to 12 weeks						
Gerage (2013)	15	120 ± 7	14	126 ± 7	18.2	-6.00 (-11.10;-0.90)
Gurjão (2013)	10	117.4 ± 9.2	7	126 ± 13.3	11.5	-8.60 (-19.98; 2.78)
Tsutsumi High int (1997)	14	103.7 ± 17.4	14	125.4 ± 14.1	11.1	-21.70 (-33.43; -9.97)
Tsutsumi Low int (1997)	13	110.15 ± 15	14	125.4 ± 14.1	11.8	-15.25 (-26.23; -4.27)
Wood (2001)	11	124.1 ± 16.3	6	127.7 ± 16.56	7.7	-5.60 (-17.01; -4.72)
Subtotal	63		55		60.3	-10.87 (-17.01; -4.72)
Heterogeneity = χ^2=7.24; GL=4 (p=0.12); I^2=45%						
Overall Effect Test Z=3.47 (p=0.0005)						
Traditional training over 12 weeks						
Cononie (1991)	14	122 ± 11	7	129 ± 7	15.3	-7.00 (-14.75; 0.75)
Vicent High int (1997)	24	129.7 ± 9	16	129.3 ± 19	12.8	0.40 (-9.58; 10.38)
Vicent Low int (1997)	22	138.9 ± 15	16	129.3 ± 19	11.6	9.60 (-1.62; 20.82)
Subtotal	60		39		39.7	0.32 (-9.10; 9.74)
Heterogeneity = χ^2=5.80; GL=2 (p=0.05); I^2=66%						
Overall Effect Test Z=0.07 (p=0.95)						
Total	123		94		100	-6.63 (-12.29; -0.97)
Heterogeneity = χ^2=18.82; GL=7 (p=0.0009); I^2 =63%						
Overall Effect Test Z=2.30 (p=0.02)						

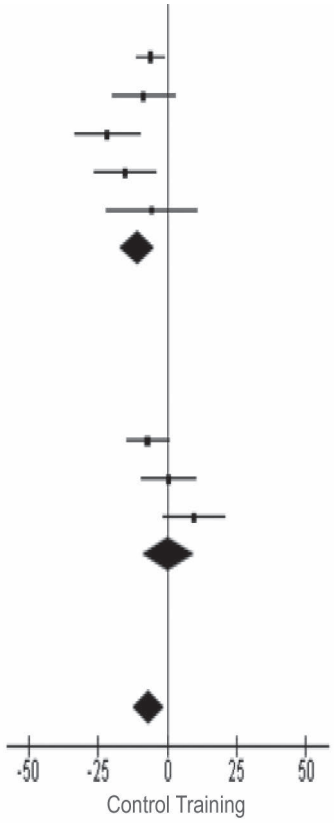
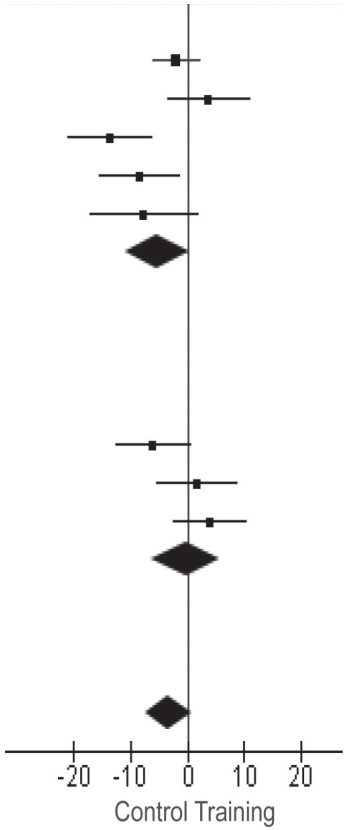


Table 2. Result of studies that evaluated Diastolic Blood Pressure in elderly persons of both genders, undergoing traditional resistance training programs (up to 12 weeks and over 12 weeks). Random effect. Paraná. 2016.

Study	Training		Control		Weight	MD Random effect.
	N	Mean	N	Mean	(%)	CI (95%)
Traditional training up to 12 weeks						
Gerage (2013)	15	80 ± 6	14	82 ± 5	16.1	-2.00 (-6.01; 2.01)
Gurjão (2013)	10	75.2 ± 8.5	7	71.4 ± 6.6	12.1	3.80 (-3.39; 10.99)
Tsutsumi High int (1997)	14	62.3 ± 9.9	14	76 ± 9.8	11.9	-13.70 (-21.00; -6.4)
Tsutsumi Low int (1997)	14	75.5 ± 9.1	14	76 ± 9.81	12.1	-8.50 (-15.63; -1.37)
Wood (2001)	11	72.6 ± 10.6	6	80.3 ± 8.8	9.6	-7.70 (-17.12; 1.72)
Subtotal	63		55		61.8	-5.33 (-11.01; 0.34)
Heterogeneity = χ^2=14.35; GL=4 (p=0.006); I^2=72%						
Overall Effect Test Z=1.84 (p=0.07)						
Traditional training over 12 weeks						
Cononie (1991)	14	75 ± 10	7	81 ± 5	13.0	-6.00 (-12.42; 0.42)
Vicent High int (1997)	24	81.1 ± 10.1	16	79.5 ± 12	12.1	1.60 (-5.53; 8.73)
Vicent Low int (1997)	22	83.4 ± 6	16	79.5 ± 12	13.1	3.90 (-2.49; 10.29)
Subtotal	60		39		38.2	-0.21 (-6.26; 5.83)
Heterogeneity = χ^2=5.80; GL=2 (p=0.05); I^2=66%						
Overall Effect Test Z=0.07 (p=0.95)						
Total	123		94		100	-3.34 (-7.49; 0.80)
Heterogeneity = χ^2=22.62; GL=7 (p=0.002); I^2=68%						
Overall Effect Test Z=1.58 (p=0.11)						



A statistically significant reduction (p=0.02) in SBP of -6.63 mmHg (95% CI= -12.29; -0.97) was associated with the practice of RT (Table 1), with the greatest reductions being identified in studies that employed an intervention time of up to 12 weeks (-10.87 mmHg; CI: -17.01; -4.72). For DBP, the meta-analysis presented a reduction of -3.34 mmHg (95% CI= -7.49; 0.80) (p=0.11) (Table 2).

DISCUSSION

The main finding of the present study is that the traditional RT system can significantly reduce SBP in the elderly even over relatively short intervention periods (<12 weeks). This is the first study that analyzed the impact of RT on BP behavior in the elderly population, based on a specific RT system. The information produced is relevant, since the effectiveness of the traditional RT system in terms of the possible hemodynamic adaptations produced over time has not yet been carefully analyzed in literature, despite being one of the most used systems by practitioners of resistance exercises in different age groups, with proven efficacy for the improvement of several components of physical fitness.

It is worth noting that the traditional RT system is considered one of the most well-known internationally, being much used by beginners, the elderly or those who are returning to practice after a period of absence[22]. In addition, the traditional RT system allows training of the entire body in a single training session, in which exercises are performed in sequence, in single or multiple series, with fixed loads. In addition, the order of execution of the exercises can be structured by means of a system that alternates by segment or located by joint, according to the time available for the training or the level of physical conditioning of the practitioner.

The regular practice of RT has been widely recommended, especially for the elderly population, as it is easy to apply and allows the individual structuring of exercise programs according to the needs and objectives of each practitioner[5]. It can also be safely performed, due to the absence of rapid movements and decelerations, presenting a low risk for the development of lesions[32]. RT has also been adopted for the prevention or control of cardiovascular diseases, such as AH[33]. In this context, the reductions in BP in the elderly persons identified in this study, when analyzed in total numbers, are greater than those found in studies that described the same outcomes in normotensive[34-37] and hypertensive adults[38].

A number of recent randomized trials that investigated the effect of resistance exercise on BP in the elderly adopted the isometric training model using handgrip dynamometry, with results varying from no change[39] to reductions between -5mmHg[40] and -19mmHg[41]. Despite some researchers[19,21,42] defending this model of exercise for the reduction of BP in different populations, such a model presents restricted and somewhat limited application[43], since in contrast to RT, it does not result in additional adaptations for the different body segments, such as gains in muscle mass, resistance and muscle power, increased density and bone mineral content, among other benefits considered fundamental for the health of the elderly.

Regarding the duration of the RT protocols, the results of the meta-analyzes identified greater reductions in BP in protocols of up to 12 weeks. It is believed that differences in the magnitude of chronic hypotensive responses related to the time of the RT may also be related to the training adjustments influenced by the condition of the individual, as well as to the manipulation of the variables that compose the RT programs and which guarantee the volume and the intensity necessary to induce adaptive responses.

Four of the studies analyzed involved an intervention for 12 weeks[27,28,30,31], with a longer intervention in only two studies[26,28]. The works of Tsutsumi et al.[27] and Vicent et al.[29], which obtained contradictory results despite featuring high and low intensity groups of equal design, are worthy of note. Therefore, it seems that the manipulation of the training characteristics of the studies of this meta-analysis alone was not sufficient to explain the greater reductions found in studies with a lower training time. One possible explanation could be the training pattern found in untrained individuals, where greater alterations, both neuromotor and cardiovascular, occur in the first weeks of intervention[14].

Regarding the possible mechanisms involved in the alteration of BP through RT, randomized clinical trials in different populations attributed this

reduction to mechanisms such as the reduction of cardiac output and peripheral vascular resistance[36], alterations in sympathetic nervous activity and vasodilatory substances[33,36], and the sensitization of baroreceptor and parasympathetic mechanisms[44,45]. However, in the elderly population, alterations in BP may involve all or a large number of these factors[21]. In our review, Tsutsumi et al.[27] reported a reduction of SBP and DBP, while the study conducted by Gerage et al.[30] found a reduction only in SBP. However, the authors did not attribute their findings to a mechanism of BP control, but instead inferred that RT is associated with the physiological benefits that come with the reduction of BP. It is important to note that most of the studies reviewed did not evaluate the possible mechanisms of BP control.

Cononie et al.[26] reported a non-significant reduction in BP values with RT, when investigating possible mechanisms of BP control. However, there were no changes in the plasma norepinephrine and epinephrine and angiotensin I and II mechanisms in the control and training groups, which may suggest the possible adaptation or failure of BP control mechanisms in the elderly population who did or did not exercise.

One aspect that deserves to be highlighted in this review is that all the studies included underwent quality assessments. However, the small number of investigations that met the established criteria indicates the need for new, well-controlled research that confirms or refutes the results found so far in the elderly population. On the other hand, the main limitations of this study are directly related to the information found in the clinical trials evaluated, principally the small number of studies and the size of the samples. Another limitation was the impossibility of verifying the effect of RT on hypertensive elderly persons, as literature presents only three randomized clinical trials for this population[26,38,39], all of which have different types of training, which makes it difficult to compare the findings.

The need for new studies to investigate the effectiveness of RT on resting BP, using different training systems, in normotensive and hypertensive elderly individuals, is therefore evident. It is suggested that randomized clinical trials are conducted in accordance with the CONSORT guidelines[46], have responses free of bias, and contribute to professional decision-making.

Despite the limitations described in terms of the biases found in this review, the results presented are especially important for clinical and/or professional practice since the reductions in BP highlighted in the present investigation indicate a possible non-pharmacological alternative to the treatment or maintenance of elevated BP in the elderly. Literature has shown that a reduction of 2 mmHg in BP can reduce the risk of death due to strokes by up to 6% and those due to coronary diseases by up to 4%, while a reduction of 5 mmHg in BP can represent a 14% reduction in the risk of death from strokes and 9% from coronary diseases[47].

CONCLUSIONS

The present study provides information about the effectiveness of traditional system RT to reduce resting SBP values for normotensive elderly individuals in comparison with the non-performance of systematized exercises.

This information may assist professionals in clinical practice with the development of non-pharmacological strategies targeted at the prevention and control of BP in elderly individuals.

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Instruments for evaluating financial management capacity among the elderly: an integrative literature review

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Abstract

Objective: To identify tools available in literature for assessing the financial management capacity of elderly persons with and without cognitive deficit or impairment. *Methods:* An integrative literature review was performed. Scientific publications indexed in the PubMed, LILACS (Latin American and Caribbean Health Sciences Literature), Psychology Index and Cochrane Library databases by November 2015 were evaluated. *Results:* Of the 609 articles obtained from the databases, 29 were considered eligible for this review, and involved 11 instruments for the evaluation of financial management capacity, the most cited of which was the Financial Capacity Instrument (FCI). *Conclusion:* There are several scales and instruments available which are used to investigate both daily and instrumental activities of daily living, which allow the independence and effective functioning of the elderly on a day to day basis to be verified. Non-Brazilian literature also describes specific instruments for the assessment of financial management capacity. However, no references to a specific scale that evaluates this construct and which has been validated and adapted for the Brazilian population were identified.

Keywords: Elderly. Financial Management Capacity. Integrative Review.

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INTRODUCTION

The medical advances of recent decades have resulted in an increase in the life expectancy of the population. According to the World Health Organization (WHO), the number of people over 60 will double by the year 2050[1]. Often, however, living longer does not mean living with better quality of life or an adequate health situation. Due to cognitive decline and subsequent losses in financial management capacity, the increase of the elderly population represents a number of challenges for society[2].

In the process of normal aging, some basic cognitive functions may be affected, such as memory and attention[3]. At the same time, decreases in sensory and perceptual capacities and, later, diminished executive functions can occur. Problems related to the loss of financial skills can occur in the normal aging process and may be aggravated in cases of associated diseases[4]. In people with acquired cognitive impairment, sudden changes in cognitive functioning can have a significant negative impact on financial management and judgment [5-7].

Financial management capacity is a multidimensional construct that involves a broad spectrum of pragmatic, conceptual and judgmental activities ranging from basic banknote and coin identification skills to more complex activities such as paying bills and managing checkbooks and bank accounts[4,8]. In addition, financial management capacity is the instrumental activity of daily life which is considered the main predictor of the ability or otherwise of the elderly to live alone[2,5,9]. Determining when an individual is no longer able to manage their own finances can be a complex task. Despite the importance of the subject and a number of proposed models, an adequate manner of measuring financial management capacity in elderly patients has not yet been established in literature.

The objective of the present study was to identify and describe the instruments available in literature for the evaluation of the financial management capacity of elderly individuals with or without cognitive impairment. In addition, the review focused on identifying instruments that included performance based measures and the direct examination of tasks or activities in a natural or clinical environment. These measures included standardized scoring procedures assessed on the basis of task completion or responses to survey questions (such as vignette or problem-based questions).

METHOD

A review was carried out to identify and describe the instruments used to assess the financial management capacity of elderly people with or without cognitive impairment, based on the integrative literature review method[10]. Five methodological steps were used: a) problem identification; b) literature search; c) evaluation of the data; d) integration of data and; e) presentation of the results.

Once the topic was defined, the question of the research was elaborated as follows: "Which instruments assess the financial management capacity or ability of elderly persons with or without cognitive impairment and what are the characteristics of scope of these instruments?".

The following were used as eligibility criteria: a) type of study: studies of any research design that assessed the financial management capacity or ability of elderly persons with or without cognitive impairment and that used some type of specific instrument to evaluate such capacity; b) types of participants: elderly persons with or without cognitive impairment; c) date or language restrictions were not applied.

Scientific publications indexed in the PubMed, LILACS (Latin American and Caribbean Health Sciences Literature), Psychology Index and Cochrane Library databases by November 2015 were evaluated.

To search for the articles in the databases, the following MeSH terms were used: (1) Terms related to Financial Management Capacity: "Financial Management", "Financial Assessment", "Financial Abilities", "Financial capacity", "Financial Skills"; (2) Terms related to the participants: "Aged" OR "Elderly" OR "Mild Cognitive Impairment" OR "Alzheimer Disease" OR "Dementia", among others; and (3) Terms related to the evaluation instruments: "Psychiatric Status Rating Scales" OR "Weights and Measures" OR "Measures and Weights" OR "Weights" OR "Measures" OR "Measure" OR "Scales" OR "Subscale" OR "Assessment"

First, two researchers working in duplicate independently assessed the titles and abstracts of the citations from the databases for the selection of potentially eligible studies. The full texts of these citations were then sought out for a detailed evaluation, which included the studies that met the previously established eligibility criteria.

An instrument constructed for the purposes of this study was used for the extraction of data from the included articles. This tool specified the following items: title, type of research, place of research, number of patients, characteristics of participants, year of publication, objective, methodology, instrument used for assessing financial management capacity, conclusion.

The material was analyzed and selected by similarity of content and an analysis category was constructed, which was specific instruments for the assessment of financial management capacity.

RESULTS

The initial literature search identified 609 citations. After the analysis of titles and abstracts, 502 citations were excluded as they did not meet the previously defined eligibility criteria. The complete texts of the remaining 64 articles were reviewed, of which 29 were selected and included. This total included eleven specific instruments for the evaluation of financial management capacity. The process of the selection of the works is shown in Figure 1.

Chart 1 identifies the instruments included in the research studies, their author(s), year and country of origin, as well as the references found in the study regarding the use of the instrument. Eleven specific instruments for evaluating financial management capacity in the elderly were categorized. Among these, the most frequently found in the studies in literature was the Financial Capacity Instrument (FCI)[5,6,11-22]. Correlated instruments, which presented objectives that complemented the research, such as the semi-structured clinical interview (SCIFC)[23], the reduced version of the FCI (FCI-SF)[24], the prior/premorbid financial capacity form (PFCF)[12,21] and the current financial capacity information form (CFCF)[19,21], were also identified. These other instruments were developed on the basis of the conceptual framework of the FCI. Most instruments were developed in the USA (8) (72.7%)[5,15,21,23-27], (Chart 1).

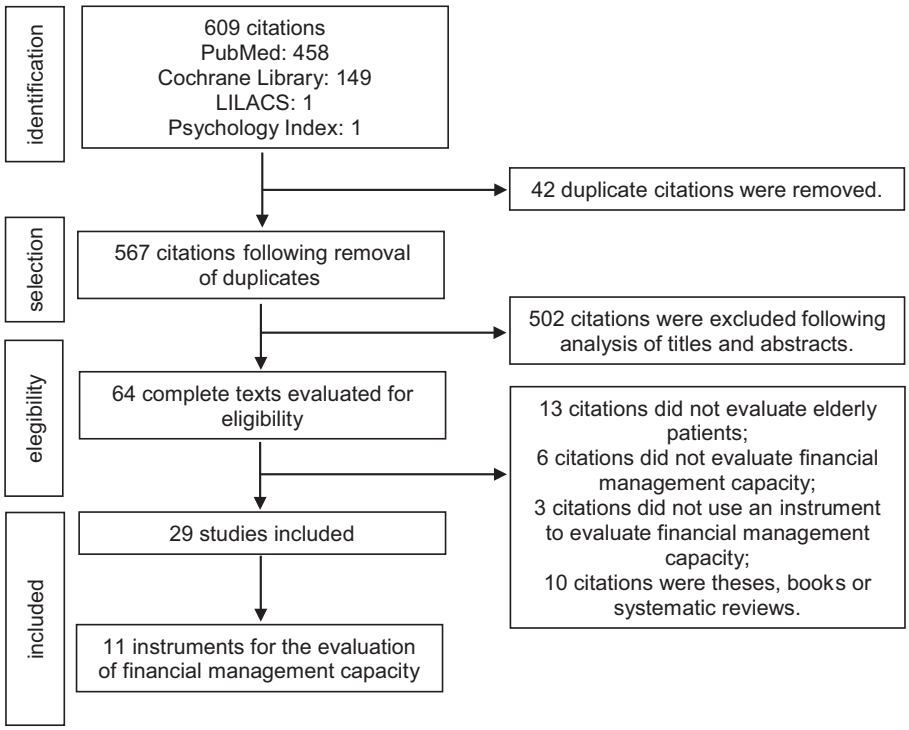

Figure 1. Flowchart of selection of studies and instruments. Porto Alegre, Rio Grande do Sul, 2015.

Chart 1. Identification of instruments included in the study. Porto Alegre, Rio Grande do Sul, 2015.

Specific Instruments	Validation Author, Year, Country	Studies found in research that used the instrument
Managing Money Scale (ILS MM)	Loeb, 1996[27], USA	Mackin and Areán[28]; Wood et al.[29]
Financial Capacity Instrument (FCI)	Marson et al., 2000[5]; Griffith et al., 2003[15], USA	Martin et al.[6]; Stoeckel et al[11]; Triebel et al.[13]; Griffith et al.[16]; Triebel et al.[12]; Sherod et al.[17]; Martin et al.[18]; Okonkwo et al.[19]; Griffith et al.[14]; Okonkwo et al.[20]; Griffith et al.[15]; Wadley et al.[21]; Earnst et al.[22]; Marson et al.[5]
Prior/Premorbid Financial Capacity Form (PFCF)	Wadley et al., 2003[21], USA	Triebel et al.[12]; Wadley et al.[21]
Current Financial Capacity Form (CFCF)	Wadley et al., 2003[21], USA	Okonkwo et al.[19]
Financial Competence Assessment Tool (FCAT)	Sakuraba et al., 2004[30], Japan	Sakuraba et al.[30]
Measure of Awareness of Financial Skills (MAFS)	Cramer et al., 2004[31], Canada	Van Wielingen et al.[32]; Cramer et al.[31]
Financial Competence Assessment Inventory (FCAI)	Kershaw and Webber, 2008[33], Australia	Pachana et al.[34]; Kershaw and Webber[33]
Financial decision-making questionnaire (FDMQ)	Cole and Denburg, 2008[25], USA	Shivapour et al.[35]
Semi-Structured Clinical Interview for Financial Capacity (SCIFC)	Marson et al., 2009[23], USA	Marson et al.[23]
Financial Capacity Instrument Short Form (FCI-SF)	Gerstenecker et al., 2015[24], USA	Gerstenecker et al.[24]
Lichtenberg Financial Decision Rating Scale (LFDRS)	Lichtenberg et al., 2015[26], USA	Lichtenberg et al.[26]

Chart 2 displays the instruments in terms of the form of assessment of the participants, as well as the design of the validation study, the objectives and the characteristics of scope. All studies of this sample had a cross-sectional design. The population studied varied from cognitively normal elderly persons (controls) and comparisons with patients with mild cognitive impairment (MCI) and Alzheimer's disease (AD) in the mild and moderate phases. In addition, in order to perform the analysis and complement information on functionality, many studies used information reported by informants.

Chart 2. Description of instruments for the assessment of financial management capacity among the elderly: forms of assessment, study design, objectives and characteristics of scope. Porto Alegre, Rio Grande do Sul, 2015.

Specific instruments	Forms of evaluation	Design of study, validation and sample	Objectives of instrument	Characteristics / scope
Managing Money Scale (ILS MM)[27]	PB	Cross-sectional MCI, dementia and psychiatric disease	4 tasks	Count money; complete financial calculations; pay bills; take precautions with money
Financial Capacity Instrument (FCI)[5,15]	PB	Controlled cross-sectional 73 individuals 23 C; 30 mild AD; 20 moderate AD	9 domains	Basic monetary skills; financial concepts; cash transactions; check management; banking management; financial discernment; bill payment; knowledge about actions and organization of assets (corroborated with a relative/ informant); investment decisions
Prior/Premorbid Financial Capacity Form (PFCF)[21]	P, I	Cross-sectional 20 AD and 20 family members 23 C and 23 family member informants	8 FCI domains	Self-reported instrument for patients and informants, identifies previous experiences and skills on financial experiences regarding the variables of the FCI, previously described
Current Financial Capacity Form (CFCF)[21]	P, I	Cross-sectional 20 AD and 20 family members 23 C and 23 family member informants	8 FCI domains	Self-reported instrument for patients and informants. Investigates current financial functioning. It uses the same conceptual model as the FCI and provides an overall evaluation as well as judgments about the current functioning
Financial Competence Assessment Tool (FCAT)[30]	PB	No information Publication of original article in Japanese.	6 domains of financial competence	Basic monetary skills; conceptual financial knowledge; use of banking institution; cash transactions; financial discernment; understanding of receipts and expenses
Measure of Awareness of Financial Skills (MAFS)[31]	PB, P, I	Cross-sectional controlled 70 individuals 10 elderly persons with dementia and 10 informants; 25 normal individuals and 25 informants	6 tasks related to finances, as well as a questionnaire applied to the participant and the informant	Identification of money; count money; cash/change transactions; interpret an account/invoice; filling in the check; checkbook management
Financial Competence Assessment Inventory (FCAI)[33]	PB	Controlled cross-sectional 178 individuals 59 with no cognitive impairment and 4 groups with cognitive impairment: 36 with acquired brain injury; 29 with schizophrenia; 22 with dementia; 32 with intellectual impairment	6 subscales	Daily financial skills; financial discernment; wealth management; financial skills related to cognitive functioning; debt management; support sources

to be continued

continued from Chart 2

Specific instruments	Forms of evaluation	Design of study, validation and sample	Objectives of instrument	Characteristics / scope
Financial decision-making questionnaire (FDMQ)[25]	PB	Cross-sectional 218 subjects 116 residents of the community and 102 young adults from a university course	5 domains of financial knowledge and the ability to make decisions	personal finances; purchase impulse; low-precision investment; financial management; financial behavior
Semi-Structured Clinical Interview for Financial Capacity (SCIFC)[23]	PB, P	Cross-sectional; controlled 261 individuals 75 C; 58 MCI; 97 mild AD; 31 moderate AD	8 domains, seven main and one experimental (based on assessment and clinical judgement)	Basic monetary skills; knowledge of financial concepts; cash transactions; checkbook management; bank account management; financial judgment; payment of invoices /bills; knowledge about assets and equity (information corroborated with family member/ informant)
Financial Capacity Instrument Short Form (FCI-SF)[24]	PB	Cross-sectional; non-controlled 1344 cognitively normal elderly persons Paired for age and educational level	5 constructs and a total. Evaluate the time of response to items	knowledge about currency; knowledge of financial concepts; troubleshooting; knowledge/use of checks; knowledge/use of bank statements
Lichtenberg Financial Decision Rating Scale (LFDRS)[26]	P	Cross-sectional study with a qualitative focus Validation of content and inter-evaluator concordance 5 patients (1 THB, 1 dementia and 3 normal individuals	Multiple choice questions, separated into sessions	Conscience of AD sufferers of financial situation; psychological vulnerability; current financial transactions; undue influence; financial exploitation

PB: performance based assessment; P: information reported by patient; I: information reported by family member/informant/caregiver; C: controls; DA: Alzheimer's disease; MCI: mild cognitive impairment.

In terms of the objectives and the characteristics of scope of the instruments found in the validation studies, variations from four to nine questions, constructs, items, domains, scales/subscales and/or tasks were identified. Among the most cited were investigation of basic monetary ability, knowledge about financial concepts, cash transactions, check management and payment of bills.

DISCUSSION

The present integrative review allowed the findings in literature to be visualized and, in addition, the description of the main instruments available for the evaluation of financial management capacity in the elderly. These results will provide health professionals and researchers in the field of gerontology with information regarding the choice of instruments for the evaluation of this construct, as well as knowledge of the studies that support the instruments in populations of elderly people with or without cognitive impairment. It should be noted that deficits in the ability to manage one's own finances may be a sign of cognitive impairment and should be considered in the clinical evaluation of the elderly[7,36-39].

In the present study, 11 instruments were classified as specific (Chart 1) for the assessment of financial management capacity and categorized in terms of their form and the scope of their evaluation of the issues, and whether based on performance, patient or caregiver information, as previously reported by other researchers[36,40,41].

Financial management capacity is mediated by higher cognitive functions and includes a broad set of basic skills (identifying and counting money, accounting) as well as complex skills (such as checkbook and bank statement management and investment decisions, among other tasks)[5,15,21,24,39]. Specific instruments that include the greatest possible amount of relevant information are necessary for an effective understanding of this function in the elderly. Financial management is considered an important ability for the elderly to live independently[2,5 8,9,42]. However, this task should consider the context in which the elderly person is inserted, together with their current and previous experiences.

There are various instruments that investigate financial management capacity. Engel et al. in 2016[41] carried out a systematic review in order to identify instruments available in the English language that contained items that evaluated the financial management capacity of adults with acquired cognitive impairment. A total of 88 instruments were found, 44 of which identified this condition based on performance evaluation, while the remainder were based on self-reporting or the reports of companions. Of these, 24 were developed for the elderly population with dementia. The authors concluded that most of the instruments were developed for the elderly and few were comprehensive in scope, that is, they did not encompass all the aspects related to financial management ability. In addition, it was important to evaluate the criteria of the authors regarding the key domains used to evaluate financial management skills (in this case, nine domains). They considered the domains of basic monetary skills, conceptual financial knowledge (or knowledge of their own finances), calculations and cash transactions, checkbook handling, bank and extract management, bill payment, budget management, monitoring and regulation of spending and others (such as understanding of investments, insurance, fraud detection, fees and loan negotiation), all of which were important for the understanding of the construct[41].

Analyzing this context, one criticism that can be made of the instruments identified in this research is that they are not available in Brazilian Portuguese nor validated for the Brazilian population. The Pfeffer Scale (Functional Assessment Questionnaire-FAQ) can be used to investigate functional capacity of instrumental tasks of daily living among the elderly, but includes few items for assessing financial management skills[43].

No specific instruments developed in Brazil and based on performance tasks were found. Instead, there are scales of measures obtained from the reports of relatives/caregivers and from the patients themselves that assess basic and instrumental functional activities, as well as investigating how the individual performs day-to-day shopping and money management tasks, with only one or two questions related to financial management.

A study of the translation and cultural adaptation of the DAFS-R (Direct Assessment of Functional Status) for Brazilian Portuguese (DAFS-BR) was carried out in a group of 89 elderly people previously classified as normal controls, those with MCI and AD. The results identified good sensitivity and specificity for the identification of MCI and AD and good internal consistency (Cronbach's Alpha=0.78) in the total sample. They concluded that the DAFS-BR can document the degree of severity in functional impairment in Brazilian elderly persons. However, the DAFS is not a specific instrument for evaluating financial management, but a subscale; it should not therefore be used uniquely to determine financial capacity. Although it is a performance-based assessment and contains tasks of identifying currency, counting money, making change, filling in a check and calculating a bill, it does not include other important components such as financial judgment and knowledge of financial concepts[44-46].

Most of the studies identified in this study had cross-sectional designs and populations comprising elderly persons with MCI and/or AD, controlled by healthy elderly community members and/or informants. Few of the identified instruments were constructed and validated for the financial management assessment of cognitively normal elderly

persons, and thus did not detect subtle differences in this group. Financial management capacity is an important instrumental activity of daily living for the independent and autonomous life of the elderly[5,15,47]. According to some authors, there is a great risk of patients with MCI progressing to AD, and the evaluation of financial management can help in the early identification of changes in their health profiles[7,8,38].

Instruments with a comprehensive scope of items, which provide classification based on multiple domains of financial management ability, assist in the identification of elderly individuals with specific limitations in this area, who may require supervision or intervention. This category of instruments may be useful in clinical, research and forensic settings[8,42,48].

The studies by Daniel Marson et al. are especially notable in this context (Chart 2).

The *Financial Capacity Instrument (FCI*) is a standardized psychometric instrument[5,15,47] that evaluates domains of financial skills when correlating cognitively normal elderly groups with dementia (mild or moderate, especially AD) and MCI patients. It is based on performance and aims to comprehensively assess nine domains of financial activity[5,6,12].

Other instruments that complement this investigation and take the FCI as a starting point have been designed. The *Prior/Premorbid Financial Capacity Form* (PFCF)[5,15,21,23] is a self-reported instrument for patients and informants that identifies experiences and skills regarding the variables of the FCI. Since current financial capacity may vary from individual to individual, the evaluation of the prior knowledge of subjects about financial experiences can aid in the control of the analyzes. The instrument is administered to the study participant and their informant and classified as: could do without help, could do but needed help, could not do even with help[15,21].

The *Current Financial Capacity Form* (CFCF)[19,21] is another self-reported instrument developed to report the information of patients and their informants, identifying the current level of functioning of subjects in relation to financial skills. It provides an overall judgment as well as judgments on current functioning in eight financial domains and in 20 associated tasks.

The *Semi-Structured Clinical Interview for Financial Capacity* (SCIFC) is a relatively brief, semi-structured clinical interview that assesses seven core financial domains and overall financial capacity. The clinician evaluates individuals according to their judgment of capacity (able, marginally capable, incapable)[23].

The FCI has limited clinical utility as it contains a great many items and is long for the purposes of administration in a single clinical appointment[24]. For this reason, the authors developed a reduced instrument with five domains which is applicable in fifteen minutes, and is capable of detecting functional impairment in the initial phase of AD, the FCI- SF (*Short Form*)[24]. It was based on the items most strongly associated with the progression of AD in a sample of MCI patients.

The complementary assessments based on previous and current abilities to deal with finances and also described by informants are important for a thorough clinical analysis and the investigation of particular questions of this context. Often there is some discrepancy between the information reported by caregivers and that reported by the patient[49]. Under conditions of independent functioning, this may not have a direct impact on the life of the elderly. However, under conditions of cognitive deficits, as in the case of MCI, the perception of functioning reported by both parties can be quite different, due to the reduction of the awareness of deficits presented by the elderly, who often perceive themselves as capable of performing certain tasks without realizing the difficulties involved. Or, on the contrary, in situations where the family takes precautions on behalf of the elderly person, the right to carry out tasks related to finances is withdrawn, and the elderly individual then loses their autonomy and independence.

Studies using the FCI have sought to determine the cognitive mechanisms that underly changes in instrumental activities of daily living (IADL) in patients with MCI and to improve our understanding of the relationship between cognitive dysfunction and functional restriction, as there is no consensus on which IADL are affected in MCI[20,40]. Griffith et al.[15] identified four of the nine domains evaluated by the FCI that differed between participants with MCI and controls (conceptual financial knowledge, cash transactions, bank statement management, and bill payment). Neuropsychological assessment can

objectively identify and monitor the presence of cognitive deficits and the possibilities of evolution to AD, helping families and the patient to plan the future and make decisions on financial management issues. Niccolai et al., conducted a two-year follow-up study using FCI and neuropsychological assessment in MCI patients. The work identified reduced performance in functions of visual memory, attention and knowledge of arithmetic concepts as predictors of decline in these patients. They emphasized that clinical assessments should consider the neurocognitive skills of arithmetic, visual memory and processing speed in patients with MCI[38].

Elderly persons with mild AD performed worse than controls in the nine domains and in the general financial capacity of the initial FCI. In the one year review, there was a considerable deterioration in overall financial management capacity[18]. The one-year decline in simple and complex financial skills underscores the importance of the financial supervision and planning of families to support patients diagnosed with AD. This assistance, to compensate for the decline in the basic judgment and the ability to count, seeks to protect such individuals from fraud and exploitation schemes[50,51]. Some abilities can remain stable in this period, such as naming coins/banknotes, and understanding and prioritizing bills[18]. Professionals who work with the elderly must understand and identify the reduction of the financial decision-making capacity of such individuals and assist them in order to reduce potential financial abuse and improper exploitation[8,37,52].

Marson et al.[23] and Gardiner et al.[53] state that there is no accepted standard for evaluating clinical judgments of financial capacity[23,53]. Kershaw and Webber[33] developed an instrument suitable for use in Australia, where there is no universally accepted definition of financial competence and few uniform guidelines for assessing financial competence. The FCAI, with 38 items, presents six subscales to be evaluated: daily financial skills, financial judgments, real estate management, cognitive functioning related to financial tasks, account management and support resources. There are also four subscales to evaluate the processes involved in the financial competence, such as understanding, appreciation, reasoning and expression of choices.

Due to the different social and economic contexts, as well as the laws in force in Brazil and the characteristics of the population being evaluated, the choice of evaluation instruments is an important factor. Many Brazilian elderly people live on pensions, retirement funds or government benefits, with their income restricted to maintaining basic expenses. For this reason, it is difficult to use instruments to assess the ability to manage finances that have not been developed for this reality and its context. It is understood that the lack of experience and disadvantages in this area occurs because of the low financial resources available to such individuals, as well as their low educational attainment and a lack of opportunity to invest, acquire or conserve resources.

Assessing the progressive loss of functional capacity to perform activities of daily living (functional disability) is an essential characteristic for the diagnosis of dementia, the adequate orientation of the patient and his/her caregivers, and to identify the effect of pharmacological and non-pharmacological interventions.

Issues involving financial management capacity in the elderly often arise due to the concerns of family members, health professionals or, in some cases, the elderly themselves[34]. Several studies and instruments can be found in non-Brazilian literature, such as those identified in this research. However, in Brazilian literature, there is no single instrument based on the performance of specific tasks that includes questions for informants and the elderly, and contains performance tasks related to this advanced instrumental activity.

In Brazil, the clinical evaluation for such issues is carried out through questionnaires and scales based on information provided by family members/caregivers or the elderly themselves, about how they "use money and makes purchases" in the context of financial abuse and misappropriation. This information, along with psychometric/neuropsychological assessment (which will investigate cognitive functions such as memory, language, attention, spatial visibility, logical reasoning, ability to perform calculations, etc.) will provide an understanding of the ability of elderly persons to perform such tasks.

There are some limitations in the identification and selection of articles in this study and possibly in relation to the selection of search terms. For our population, no specific instruments were identified that address the multidimensional issues and adequacy of the assessment of financial management skills in the elderly.

It is therefore important to consider, in clinical evaluation, the investigation of financial management capacity in the elderly, and that these assessments can, as well as collecting information from the elderly and their relatives/caregivers, include tasks based on performance, as the early and accurate identification of individuals with compromised financial skills will help to safely protect and control the economic resources and emotional well-being of the elderly and their families. In addition, it will also ensure greater security, autonomy and independence for this age group.

CONCLUSION

In this integrative review we identified and selected the instruments available in literature for the evaluation of the financial management capacity of the elderly. Eleven specific instruments were selected, which included in their validations the evaluation of elderly individuals with or without cognitive impairment and eight instruments that included measures based on performance. The FCI instrument featured in the largest number of studies and researches.

In relation to the Brazilian elderly population, no specific instruments based on performance tasks were identified that considered differences in schooling and life experience.

Based on non-Brazilian studies on the subject under study, it is necessary to develop an instrument adapted to the reality of Brazilian elderly persons, contemplating the socioeconomic and cultural characteristics that this construct involves. Such an instrument should contain basic and advanced tasks. It should be noted that instruments that include many items of comprehension may not be appropriate for the Brazilian context, as they may not elucidate clearly the reality of the elderly and their experiences. In addition, it is also important to develop instruments with a greater number of samples that contemplate both cognitively normal elderly persons and those with cognitive impairment, especially in cases of MCI. Performance-based tasks cannot be neglected, as these have good clinical applicability and can be combined with patient and informant/family member questionnaires, always considering the current and prior functional ability of the elderly. The use of environmentally friendly tasks, designed to bring the situation under assessment closer to the problems faced on a day-to-day basis and to reality, as well as tasks involving technology (such as machines used for cash withdrawals or for the payment of bills, mobile devices/applications and sites) are also important tasks to be considered in research, especially taking into account the constant changes that are taking place in the current socioeconomic context of Brazil and the world.

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