Frailty Syndrome In Institutionalized Elderly

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***Abstract*— Frailty is characterized by the reduction of physical and cognitive reserves or that makes elderly vulnerable to adverse events, comorbidities, falls, loss of independence and death. Objectives: assess mobility, functional balance and trace frailty syndrome among institutionalized elderly people. Methodology: primary, observational, analytical and cross-sectional study, sampled for convenience, for six months. Instruments: Socio-demographic questionnaire; Mini-Mental State Examination; Self-Referred Frailty Assessment Instrument. There were 40 institutionalized elderlies interviewed; over 60 years; both sexes; with preserved mobility to perform the TUG, even with the help of orthotics and prostheses. The level of significance used as the criterion of acceptance or reference in the statistical tests was 5% (p < 0.05). Results: 40 elderlies; mean 76.5 years; 87.5% female sex; 45% single; 85% sedentary; 32.5% reported remaining in the last 12 months; no TUG 65% two elderly showed partial independence and risk of being left in the self-referred assessment 35% were not frail, 45% pre-frail and 20% frail. A schooling < 8 years had a MEEM less than schooling ≥8, p=0. 031; The elderly with remaining in the last 12 months presented a higher degree of frailty according to the assessment instrument p=0.025; The elderly with less than 8 years of schooling had a TUG greater than ≥8 years of schooling, p=0.022. Conclusions: For the most part, two institutionalized old people present partial independence and risk curfew. In the self-referred assessment for frailty, most were pre-frail and frail.**

Keywords—Elderly; Frail elderly; Sarcopenia; Immobilization; Postural Balance.

I. INTRODUCTION

The reduction in mortality rates obtained from scientific technical advances and the improvement of the population's living and health conditions, associated with the reduction of fertility rates, changed the demographic profile of populations, with an increasing proportion of the elderly [1].

For many years, the term "frailty" has been used to name the emaciated elderly with difficulty in getting around, who theoretically would be more susceptible to injuries, falls and morbid outcomes. More recently, some authors have associated the term with a state of functional decline and vulnerability characterized by weakness and decreased physiological reserve [2].

Frailty is a multidimensional syndrome characterized by the reduction of physical and cognitive reserves and that makes the elderly more vulnerable to adverse events [3], such as hospitalizations, falls, loss of independence and death.

Although there is no consensus in the literature on the criteria for identifying frailty, the model created by Fried et al is among the most used today. For the author, the presence of three or more criteria classifies the elderly as frail and the presence of one or two classifies them as pre-frail, here understood as those who have a high risk of developing the frailty syndrome [2].

The criteria established by Fried (2001) are unintentional weight loss of 4.5 kg or 5% of body weight in the last year; self-reported fatigue, assessed using questions and the Center for Epidemiological Studies depression scale; reduction in hand grip strength, measured using a manual dynamometer, in the dominant upper limb; reduced level of physical activity measured by weekly energy expenditure in kcal and decreased gait speed [2].

Fried's model is based on sarcopenia, immunological and neuroendocrine changes, focusing on the physical dimension of frailty.

Rockwood, in turn, developed a multidimensional frailty model that contemplated the presence and severity of diseases, the ability to perform activities of

daily living, in addition to physical and neurological signs and symptoms, from the clinical examination [2].

His model resulted in a scale of clinical frailty that classified the elderly into seven strata ranging from the robust elderly to the severely frail elderly and a frailty index derived from 70 different clinical deficits, where the sum of the diagnosed items is divided by the total of evaluated indices, providing a measure of proportion; a value greater than or equal to 0.25 indicates frailty and between 0.09 and 0.25 classifies the elderly as pre-frail [4].

These models are accepted definitions, but one must consider that their assessment is impractical at the bedside. Frailty defined by the Study of Osteoporotic Fractures (SOF) index was identified by the presence of two or more criteria: unintentional weight loss > or = 5%; inability to get up from a chair five times without using the arms; exhaustion assessed by self-reported fatigue (Identified by the answer “no” to the following question: “Do you feel full of energy?”, from the Geriatric Depression Scale) [5].

The Timed up and Go (TUG) test 6, 7 is a standard mobility assessment and the time taken to perform it has been a strong predictor of frailty8 and is commonly used to assess the risk of falls in the elderly [9].

For many years, the term frailty has been used to name the emaciated elderly people with difficulty in getting around, who theoretically would be more susceptible to injuries, falls and morbid outcomes. More recently, some authors have associated the term with a state of functional decline and vulnerability characterized by weakness and decreased physiological reserve. Frail elderly are less able to adapt to stressors such as acute illness or trauma. Their greater vulnerability leads to adverse outcomes, including falls, institutionalization, disability and death. Frailty is closely related to functional disability and comorbidities, and they coexist in 21.5% of the elderly. And finally, comorbidities can contribute to the development of frailty [2].

There is an association of frailty syndrome with advanced age, female sex, black skin color, presence of two or more comorbidities, polypharmacy, functional or cognitive disability, in addition to the occurrence of low BMI, obesity in the elderly, depressive symptoms and poor self - rated health [10,11].

Faced with an aging and growing population, with radical changes in the family structure, where everyone is involved with work and activities outside the home, without human resources and structure to care for these elderly people, institutionalization often becomes essential for their survival. Knowing about mobility, functional balance and self-reported assessment of the frailty syndrome or not of institutionalized elderly people can come in public health policies to avoid this compromise and prepare this population for a healthier aging process.

In view of the above, the present article aims to assess mobility, functional balance, sarcopenia, polypharmacy and to track the frailty syndrome among institutionalized elderly by self-reported assessment.

II. METHODOLOGY

This is a primary, observational, analytical and cross-sectional study. The sample was for convenience. Elderly people living in Long-Term Institutions for the Elderly were invited to participate for a period of six months, according to the eligibility criteria. Inclusion: elderly, totaling 40 participants; age over 60 years; both sexes; those who agreed to participate in the study, and the patient or guardian who signed the Free and Informed Consent Term (FICT), the study was approved by the Research Ethics Committee of UNIVÁS; with preserved mobility to perform the TUG, even with the aid of orthoses and prostheses.

Non-inclusion: Elderly patients with immobility syndrome; Elderly people with severe cognitive impairment that prevents them from understanding the guidelines for performing the Time Up Go (TUG). Exclusion: withdrawal from continuing the study after signing the Free and Informed Consent Form.

The study was carried out in two Long Stay Institutions in the city of Pouso Alegre.

For the registration of socio-demographic data and the results of the multidimensional assessment of the elderly, an appropriate questionnaire was prepared.

The instrument for screening cognition was the Mini Mental State Examination (MMSE) which is composed of several questions grouped into seven categories, each of which has the objective of evaluating specific cognitive functions, such as: orientation to time, orientation to location , record three words, draw a geometric figure. The MMSE consists of two parts, one that covers orientation, memory and attention, with a maximum score of 21 points, and another that addresses specific skills such as naming and understanding, with a maximum score of 9 points, totaling a score of 30 points. The MMSE score can vary between 0 and 30 points [12].

It is a brief cognitive screening test to identify dementia. The maximum score is 30 points, which can be influenced by the individual's education [12,13,14]. The impact of schooling in our country, verified by a study[13], showed that for illiterates the standard cutoff score is 20; for age 1 to 4 years, 25; from 5 to 8 years, 26.5; from 9 to 11 years old, 28; for individuals with more than 11 years of schooling, 29. However, the current trend is to use the following cutoff points, depending on the patient's schooling: illiterate/low schooling - 18 points; 8 years or more of schooling - 26 points [14].

The Self-Reported Frailty Assessment Instrument in the Elderly is a validated instrument for screening by self-reported assessment of frailty syndrome among the elderly. The validation process consisted of a

cross-sectional study with data from the Health, Well-being and Aging (SABE) study, carried out in São Paulo. The probability sample consisted of 433 elderly (age ≥ 75 years) and the self-reported instrument was composed of dichotomous questions directly related to each component of the frailty phenotype considered the gold standard: unintentional weight loss, fatigue, low physical activity, reduced strength and gait speed. The classification proposed in the phenotype was maintained: not frail; pre-fragile and fragile. Cronbach's α coefficient was used in the psychometric analysis to validate reliability and criterion validity, sensitivity, specificity and positive and negative predictive values [15]. The self-reported frailty assessment instrument is capable of identifying the syndrome among the elderly, and can be used as a screening instrument, with the advantages of being simple, fast, low-cost and applicable by different professionals. To assess calf circumference, the classification proposed by the World Health Organization (WHO) was adopted, which indicates reduced muscle mass when its value is less than 31 cm. The PC was measured in cm according to the technique recommended by the WHO [16].

The study was approved by the Research Ethics Committee of the Universidade do Vale do Sapucaí (UNIVAS), Pouso Alegre, MG CAAE. 65917817.0.9999. 5102. Opinion Number: 2,016,179

Data were tabulated in Microsoft Excel 2016 and subjected to statistical analysis: Spearman's correlation analysis to study the correlation between factors and responses; Mann-Whitney test (used when you have two independent groups); Kruskal-Wallis test. The significance level used as acceptance or rejection criteria in the statistical tests was 5% ($p < 0.05$).

III. Results

A total of 40 elderly people were evaluated, with a female prevalence of 87.5% (n=35), with a mean age of 79.5 years and a male gender of 12.5% (n=5), with a mean age of 76, 2 years. The number of elderly people with <8 years of schooling was 75% (n=30) and only 25% (n=10) and the percentage of falls in the last year was 32.5% (n=13). The highest percentage of number of medications used was 5 medications per day, with 32.5% (n=13).

The correlation and significance between the factors and the responses were shown in table 1, where the Rô and p value are shown.

TABLE I. CORRELATION OF SOCIODEMOGRAPHIC AND CLINICAL VARIABLES AND THE MMSE, TUG, CALF CIRCUMFERENCE AND SELF-REPORTED ASSESSMENT TESTS

	Sex	Age	School	Fall	Med	Polyph	BMI	MMSE	MMSE cut	Inst End	TUG
Age:	0.107										
	0.511										
Schooling	0.218	-0.245									
	0.176	**0.128**									
Fall	-0.101	0. 377	0.031								
	0.536	**0.016**	**0.850**								
Medicine	0.064	0.124	0.028	-0.178							
	0.695	**0.447**	**0.863**	**0.272**							
Polypharmacy	0.057	0.094	0.029	-0.088							
	0.728	**0.562**	**0.859**	**0.588**							
BM1 (Kg/cm²)	0.090	-0.122	0.066	-0.082	-0.062	-0.112					
	0.580	**0.455**	**0.685**	**0.617**	**0.704**	**0.490**					
MMSE:	0.076	0.031	0. 301	0.104	-0.137	-0.089	0.044				
	0.643	**0.848**	**0.059**	**0.522**	**0.399**	**0.584**	**0.788**				
MMSE cut	0.040	-0.049	0.182	0.050	0.256	0.278	-0.003				
	0.808	**0.762**	**0.262**	**0.758**	**0.110**	**0.082**	**0.988**				
Inst. Endors.	-0.058	0.111	-0.176	0.316	-0.075	-0.074	-0.158	-0.103	-0.129		
	0.724	**0.493**	**0.277**	**0.047**	**0.646**	**0.650**	**0.329**	**0.528**	**0.427**		
TUG	-0.133	0. 371	-0.325	-0.143	0.064	0. 010	-0.079	-0.349	0.138	0.351	
	0.415	**0.018**	**0.041**	**0.378**	**0.696**	**0.950**	**0.627**	**0.027**	**0.396**	**0.026**	
Calf circumf.	0.174	-0.031	-0.114	-0.242	-0.088	-0.175	0.075	-0.097	0.062	-0.012	-0.037
	0.283	**0.849**	**0.484**	**0.132**	**0.590**	**0.281**	**0.644**	**0.551**	**0.704**	**0.942**	**0.819**

Table 1 shows a positive correlation between increasing age versus greater risk of falling in the last 12 months (r=0.377; p=0.016) and age versus longer time to perform the TUG (r=0.371; p=0.018). A positive correlation is also seen in relation to the level of education and the result obtained in the MMSE (r=0.301; p=0.059), however the correlation is negative when comparing the MMSE and the time to perform the TUG test (r= - 0.349; p=0.027). Regarding the drop in the last year and self-reported assessment instrument, the correlation is positive (r=0.316; p=0.047), as is the relationship between the value in the self-reported assessment instrument and time to perform the TUG (r=0.351 ; p=0.026). Schooling versus the TUG test, on the other hand, obtained a negative correlation (r= -0.325; p=0.041). Through the Mann-Whitney test (used when there are two independent groups) the response between some variables and their significance was investigated, proving the hypotheses indicated at the beginning of the study to be true. Mann-Whitney test correlating: Education versus MMSE – p value: 0.031; Decline in the last 12 months versus Self-reported assessment – p value: 0.025; Level of education versus Time in the TUG – p value: 0.022.

The Kruskal-Wallis test, to investigate the correlation of variables, showed that the Fall in the last 12 months versus age - p value: 0.059; TUG time versus age - p value: 0.068; MMSE versus TUG – p

value: 0.081; TUG versus self-reported assessment – p value: 0.052.

In all these correlations, a tendency of $p<0.05$ is observed, however a larger sample is necessary to confirm this value and better correlation of the data.

IV. Discussion

It can be seen that in the present research, the majority of the elderly were female, which is compatible with the literature, with regard to the phenomenon of feminization of the aging process. According to Netto et al17, the number of men and women would be almost the same until age 45, however, at age 70, there will be approximately six women for every five men and, at age 80, it will be four for a man. In addition, an average of elderly people with less than 8 years of schooling was 75% (n=30) and only 25% (n=10) with more than 8 years of schooling, compatible with the average of the population in different Brazilian cities by studies. older adults [18,19,20] and may notice a greater difficulty of populations with low education to support themselves by family members after aging, either because of the costs of medication and interventions or even for the time needed for care.

The results of the study were consistent with the literature, demonstrating how increasing age and the risk of falling are directly linked, and that one of the biggest problems associated with aging is a greater susceptibility to falls [21]. Falls are frequent events in the elderly population and have been associated with aging and reported difficulty in walking [22], in addition to numerous studies confirming this proposition. The increase in age and longer time to perform the TUG is also seen in the literature, as in the study by Almeida et al. [23], participants in the 80-89 age group had a longer average time than those in the 60-69 and 70-79 age groups. In addition to this study, the TUG test has been used since Podsialo et al. 7 to assess the risk of falling, with the correlation between age being similar to other studies in the literature [20-22].

The level of education of the participants and their results in the MMSE are closely correlated, given previous studies. In a 2012 study, Argimon et al [24] found a significant, albeit weak, positive correlation between years of schooling and MMSE performance. Christofoletti et al. [25] analyzed the influence of the MMSE and the BBRC on the schooling of 176 elderly people, divided into cognitively preserved community residents and individuals living in long-stay homes with a diagnosis of dementia. These authors obtained data similar to other studies that demonstrated the influence of schooling on MMSE scores [26,27].

Regarding the self-reported assessment instrument, few studies have used it in the literature, although it has already been validated in a large study, with 433 elderly people [28], being compared with the classic model by Fried et al [2], showing its effectiveness as a predictor of falls in the elderly . The correlation was positive with the number of falls in the last months and showed an r=0.316. The correlation between this instrument and the TUG test was also evaluated, demonstrating a positive correlation.

It was seen that the correlation between cognition and risk of falling was demonstrated in the MMSE versus TUG test, according to studies in the literature [29,30,31,32] also showing moderate correlations between the tests. Thus, as the mental state of individuals improves, the time required to perform the gait tests is shorter. In addition, there was a negative correlation between schooling and TUG time, which was not expected at the beginning of the study, due to the simplicity of the test and its understanding, but which already occurred in the study by Gomes et al in 2015 [33].

One detail is that, as already mentioned, the sample did not allow a $p<0.05$ for the Kruskal-Wallis Tests (fall in recent months versus age; TUG versus age; TUG versus MMSE; TUG versus self-reported assessment), however, if seen in the r curve, a correlation trend is noted, which can confirm the significance of the data.

V. Conclusion

Most institutionalized elderly have partial independence and risk of falling and in the Self-Reported Assessment for frailty, most are pre-frail and frail. Age, cognition, as seen by the MMSE, a self-reported assessment tool, and TUG are important predictors of fall events in institutionalized elderly people, showing the need for intervention in long-stay institutions. These can be performed by professionals of physiotherapy, medicine, physical education, nursing, occupational therapy, considering that the frailty syndrome is a multidisciplinary problem, and can be seen as a public health problem in Brazil, since the population is increasingly the more one gets older and seeks a healthy aging, with functionality and quality of life.

The present study showed a satisfactory result compared to tests performed on institutionalized elderly people, with correlations with the literature in most of them.

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