

Sociodemographic and Clinical Profile of Older Adults with Cardiovascular Diseases According to the Conditions of Frailty

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ABSTRACT

Objectives: To verify the occurrence of frailty among community-dwelling older adults with CVD; describe the socio-demographic and clinical characteristics, according to the frailty conditions and identify the factors associated with the frailty syndrome.

Methods: Cross-sectional, quantitative study with 481 elderly with CVD. The analyses performed were: descriptive, bivariate and multiple logistic regressions ($p < 0.05$).

Results: There was pre-frail predominance (55.9%). In the three frailty conditions, it was verified higher female percentages. Considering non-frail and pre-frail, age ranging from 60 | 70 years and absence of polypharmacy prevailed; for the frail, 70 | 80 years. Pre-frailty and frailty associated with the age group of ≥ 80 years ($p = 0.032$; $p = 0.001$); presence of polypharmacy ($p = 0.018$; $p = 0.001$) and partial dependence for IADL ($p = 0.001$; $p < 0.001$).

Discussion: High percentage of pre-frail older adults and variables with possible interventions showed the importance of identifying the risk groups for improvement of the elderly health prognosis.

Abbreviations

(AC) Abdominal Circumference; (BMI) Body Mass Index; (CVD) Cardiovascular Disease; (IADL) Instrumental Activities of Daily Living; (ICD) International Classification of Diseases; (MMSE) Mini Mental State Examination; (UFTM) Federal University of Triângulo Mineiro

INTRODUCTION

With the population aging, some adverse outcomes to health such as Cardiovascular Disease (CVD) [1] and the frailty syndrome [2] have become more frequent, being considered public health issues [2], therefore, requiring further investigations. CVD are among the most frequent causes of death in the world [3], being the first among Brazilian aged 60 years or older [3]. In older adults with CVD, the frailty syndrome is approximately three times more prevalent [4]. The association between these two conditions can be considered indicative of mortality and hospitalization [5]. Thus, evaluation of frailty in older adults with CVD becomes essential due to its prognostic value and the possibility of proposing early interventions that could modify adverse outcomes caused by the presence of these two conditions [5].

The frailty syndrome is defined as "biological syndrome with multiple causes, characterized by decreased strength, muscle strength and physiological function,

which results in increasing the individual's vulnerability to the development of functional dependence and/or death" [6]. There is a breakthrough in research into this syndrome, but there is no consensus on the causes, pathophysiology, possible components that characterize the frail elderly or those at higher risk and factors that influence its development [6,7]. The most widely used operational definition is one proposed by Fried et al. (2001) [7] who developed the Frailty Phenotype based on five components: unintentional weight loss, self-reported fatigue and/or exhaustion, low level of physical activity, decreased muscle strength and slow gait speed [7]. A national study among older adults with at least one CVD found that 39.8% were frail, 51.5% pre-frail and 8.7% robust [8]. An investigation carried out with community-dwelling elderly in Italy, found that among the pre-frail with impairment in one (OR: 1,25; $p=0,003$) and two (OR: 1,79; $p=0,001$) components of the frailty phenotype proposed by Fried et al. (2001) [7] showed increased risk of developing CVD [9]. It is important to highlight that the frailty syndrome becomes more frequent with increasing age [4], as well as the presence of CVD [9]. This way, researches with emphasis on these conditions are necessary to assisting health professionals in developing early interventions through care guidance with health promotion, disease prevention and control of risk factors [10]. The early recognition of the factors associated with the frailty condition among the older adults with CVD contributes to the prevention of disability and loss of independence, besides reducing health care costs and decreasing mortality rates in the older population [10]. However, researches into this subject, developed with the community-dwelling elderly with CVD are still scarce in the scientific literature [8]. The studies found evaluated the risk of the elderly to the development of CVD and frailty syndrome [2,10], besides the association between hemodynamic variables related to CVD, with frailty, in laboratory level [8]. In contrast, this research aims to identify factors associated with frailty syndrome among the older adults with CVD, considering that this condition is preventable and its early detection is essential to prevent the increase of comorbidities and disabilities in this age group [10]. This way, this study may contribute with health actions specific to this population, in primary health care. Given the above, this study aimed to evaluate the occurrence of frailty among community-

dwelling older adults with CVD; describe the socio-demographic and clinical characteristics according to the condition of frailty and identify factors associated with frailty syndrome.

METHODS

It is a cross-sectional study with a quantitative approach. Data from the population sample were obtained from the research database "Dependence in activities of daily living, frailty and use of healthcare services among the older adults of Triângulo Mineiro". This study was developed in the urban area of a municipality in the interior of Minas Gerais state and used the multi stage cluster sampling. Among the 767 elderly subjects interviewed, 155 presented cognitive decline, 37 did not perform the complete evaluation of the components of the frailty phenotype and 94 did not self-report the following CVD, based on the International Classification of Diseases (ICD 10): Systemic Arterial Hypertension, peripheral vascular disease, heart diseases and cerebrovascular accident. Thus, the final sample of the present study was 481 elderly. Inclusion criteria were: 60 years or older, living in the urban area of the Municipality of Uberaba (MG) and self-report CVD. The older adults with cognitive decline were excluded, assessed by the Mini Mental State Examination (MMSE); the ones presenting serious sequelae of stroke with localized loss of strength and aphasia; Parkinson's disease in severe or unstable stage severely affecting motricity, speech or affectivity, as it would make it impossible to carry out evaluations. For the MMSE the cutoff points considered were: ≤ 13 for illiterate ≤ 18 for average education (one to 11 years) and ≤ 26 for high level of schooling (over 11 years) [11].

Data collection was performed in the elderly home, from March to June 2016, through direct interview. Socio-demographic data were collected through the instrument developed by the Research Group on Public Health, of the Federal University of Triângulo Mineiro (UFTM). The presence of CVD associated with frailty syndrome results in a greater need for medication use [2,7]. It was considered as polypharmacy the simultaneous use of five or more medications [12]. The presence of CVD and frailty syndrome negatively influences the functional capacity of the elderly [13]. The Lawton and Brody scale, adapted in Brazil [14] was used to evaluate the Instrumental Activities of Daily Living (IADL). Among elderly people with CVD,

anthropometric assessment is required [9], thus, Abdominal Circumference (AC) was measured by means of a flexible, inelastic tape, with a length of 1.5 meters, divided in centimeters and subdivided into millimeters; during normal exhalation, with the aged standing in upright position, wearing clothing as little as possible. The AC was measured at the level of the umbilicus, without pressing the soft tissues, being considered appropriate in elderly men with measure lower than 94 cm and elderly women, lower than 80 cm [15]. To measure weight, it was used portable digital electronic scale, platform type, with a capacity of 150 kg and 100g precision, with the elderly barefooted and wearing light clothes. The height (h) was measured by the same tape described in the measurement of AC, attached to the wall in a flat and regular place, without skirting, with the elderly bare footed, placed in orthostatic position with feet closer together, with the back to the marker, eyes to the horizon. The Body Mass Index (BMI) was calculated in kg/m^2 [15] and for its classification the cut-off points used were: low weight ($\text{BMI} \leq 22 \text{ kg}/\text{m}^2$), eutrophic ($\text{BMI} > 22$ and $< 27 \text{ kg}/\text{m}^2$) and overweight ($\text{BMI} \geq 27 \text{ kg}/\text{m}^2$) [16]. The frailty syndrome was identified by means of the five items described as components of frailty phenotype proposed by Fried et al. (2001) [7], as follows: (1) loss of unintentional weight, assessed by the following question: "In the last year, have you lost more than 4.5 kg or 5% of body weight unintentionally (i.e., no diet or exercise)? "; (2) self-report of exhaustion and/or fatigue, measured by two questions (items 7 and 20) of the depression scale of the Brazilian version of the Center for Epidemiological Studies. Older adults who obtain a score of 2 or 3 in any of the questions met the criterion of frailty for this item [17]; (3) decreased muscle strength, determined on the basis of the grip strength using the JAMAR hand dynamometer, SAEHAN® SH5001 model - 973, following the recommendations of the American Society of Hand Therapists. Three measurements were obtained, presented in kg/force (kgf) with a one minute interval between them, being considered the average value of those adopting the cutoff points proposed by Fried et al. (2001) [7]; (4) slow gait speed, when it was considered the gait time (in seconds) it takes to cover a distance of 4.6 meters. The older adult covered a total distance of 8.6 meters, with the first two meters and the final two meters disregarded in calculating the time spent on the

gait. Three measurements were made, presented in seconds, considering their average value. It was used as standard a professional stopwatch Vollo®, VL-1809 model and the cutoff points proposed by Fried et al. (2001) [7] and (5) low level of physical activity, verified by the long version of the International Physical Activity Questionnaire, adapted for the aged [18]. The classification used for this component considered active those who spent 150 minutes or more of physical activity per week; and inactive those who spent 0-149 minutes of physical activity per week [19]. Elderly with three or more of these items were classified as frail and those with one or two items, as pre-frail and those with all the tests negative, robust or non-frail [7]. Among the variables of the study, there are the socio-demographic: gender (male and female) and age group in years (60-70; 70-80; 80 years or older); clinics: polypharmacy (yes, no), BMI (eutrophic, underweight, and overweight), AC (adequate, inadequate), IADL (total dependent, partially dependent and independent) and frailty condition (frail, pre-frail and non-frail). An electronic database, in Excel® program was done, with double entry. After verifying the inconsistencies between the two databases, the database was imported into the software "Statistical Package for the Social Sciences" version 22.0, for analysis. Data were submitted to descriptive analysis, absolute frequencies and percentages, and to check the associated factors under the conditions of frailty, a preliminary bivariate analysis was performed using the chi-square test. The variables that met the established criteria ($p \leq 0.10$), such as gender; age; polypharmacy and IADL were dichotomized and introduced in multiple logistic regression models. Multiple logistic regressions were the analysis used in this study because the outcome (frail, pre-frail and non-frail condition) had more than one category. This study considered the confidence interval of 95% and significance level of $p < 0.05$. The project was approved by the Ethics Committee in Research with Human Beings of UFTM, Opinion no. 493.211; CAAE n° 26148813.0.0000.5154. After the consent of the aged and the signing of the Free and Informed Consent, the interview was conducted.

RESULTS

Among the elderly with CVD (481), it was found that 23.7% were non-frail, 55.9% pre-frail and 20.4% frail. In the three conditions of frailty, the highest percentages were for female

elderly; overweight, partial dependence for IADL and inadequate AC. In terms of age group, the predominance was non-frail and pre-frail older adults, with 60 |70 years and frail with 70 |80 years. The absence of polypharmacy prevailed between non-frail and pre-frail elderly, while half of the frail reports polypharmacy (Table 1).

In preliminary bivariate analysis, the variables that met the criteria adopted ($p \leq 0.10$) and were included in the multivariate model were gender ($p = 0.069$); age group ($p < 0.001$); polypharmacy ($p = 0.001$) and IADL ($p < 0.001$) (Table 1). (Table 1) shows the distribution of socio-demographic and clinical variables according to the conditions of frailty of the older adults with CVD living in Uberaba community (MG).

Table 1: Distribution of socio demographic and clinical variables according to the frailty conditions of the older adults with CVD living in Uberaba community, Minas Gerais, 2016.

Variables	Non-frail n (%)	Pre-frail n (%)	Frail n (%)	p*
Gender				
Female	84 (73.7)	176 (65.4)	75 (76.5)	0.069
Male	30 (26.3)	93 (34.6)	23 (23.5)	
Age group (in years)				
60 70 years	61 (53.5)	105 (39.0)	33 (33.7)	<0.001
70 80 years	45 (39.5)	119 (44.2)	37 (37.8)	
80 or more	8 (7.0)	45 (16.7)	28 (28.6)	
Polypharmacy				
Yes	29 (25.4)	103 (38.3)	49 (50.0)	0.001
Not	85 (74.6)	166 (61.7)	49 (50.0)	
Body mass index				
Lowweight	17 (14.9)	44 (16.4)	18 (18.4)	0.380
Eutrophic	42 (36.8)	101 (37.5)	26 (26.5)	
Overweight	55 (48.2)	124 (46.1)	54 (55.1)	
Instrumental activities of daily living				
Total dependent	0 (0.0)	0 (0.0)	0 (0.0)	<0.001
Partial dependent	60 (52.6)	194 (72.1)	87 (88.8)	
Independent	54 (47.4)	75 (27.9)	11 (11.2)	
Abdominal circumference				
Adequate	19 (16.7)	59 (21.9)	19 (19.4)	0.490
Inadequate	95 (83.3)	201 (78.1)	79 (80.6)	

Note: * $p \leq 0.10$. Chi-square test.

The condition of pre-frailty and frailty was associated with age group of 80 years and older ($p = 0.032$; $p = 0.001$); presence of polypharmacy ($p = 0.018$; $p = 0.001$) and partial dependence for IADL ($p = 0.001$; $p < 0.001$) (Table 2). (Table 2) shows the final model of multiple logistic regression for the socio-demographic and clinical variables associated with the conditions of pre-frailty and frailty of the elderly with CVD residents in Uberaba community (MG).

Table 2: Final model of multiple logistic regressions for the variables associated with the conditions of frailty among older adults with CVD residents in Uberaba community, Minas Gerais, 2016.

Variables	Pre-Frail			Frail		
	OR *	95% **	p***	OR *	95% **	p***
Gender						
Male	1			1		
Female	0.60	(0.36-1.00)	0.052	0.97	(0.49-1.88)	0.930
Age Group						
60 80 years	1			1		
80 and over	2.40	(1.08-5.37)	0.032	4.49	(1.88-10.71)	0.001
Polypharmacy						
No polypharmacy	1			1		
With polypharmacy	1.82	(1.10-3.01)	0.018	2.87	(1.56-5.27)	0.001
Instrumental activities of daily living						
Independent	1			1		
Partial dependent	2.17	1.36 - 3.46	0.001	5.85	(2.78-12.31)	<0.001

Notes: *OR: Odds Ratio; **CI: Confidence interval; 1: Reference category; p*** < 0.05.

DISCUSSION

Similar to this research, national studies among community-dwelling older adults with CVD [10] and in outpatient clinic attendance [8] and international studies among elderly with CVD; institutionalized and living in the community [20] and with elderly men with CVD seen in general clinical [2] found that most were classified as pre-frail. Changes in pre-frailty conditions are influenced by diseases such as CVD, leading to hospitalization and, in turn, may complicate recovery and expose the elderly to adverse events [8]. Moreover, identification of the pre-frailty condition in elderly patients with CVD, due to its prognostic value [8], is essential in the development of early interventions that could change unfavorable outcomes caused by the presence of these two conditions [4,5]. The highest percentage of elderly women with CVD, in all conditions of frailty, corroborates national [4,8] and international investigations [21]. The increased risk of CVD in women may be associated with frailty due to multisystem decline in physiological reserves and greater vulnerability to stressors [9].

This result can also be explained by the higher percentage of muscle mass loss in women. This decrease occurs with the normal aging process, besides the increased propensity for the development of sarcopenia, which is an intrinsic risk for the

development of frailty and is aggravated by the appearance of chronic diseases such as CVD [7,22]. The fact that the frailty syndrome become more frequent with increasing age was also found in national [4,8,21,23] and international studies [7,24]. It is not worthy that the studies mentioned above were not developed specifically among older adults with CVD. However, the presence of CVD is more common in older ages, which may turn the elderly more vulnerable to frailty [21]. A national [23] and an international research [25] developed with community-dwelling elders showed that the condition of pre-frailty was associated with increased use of medications [23], diverging from the findings of this study. The prevalence of the overweight elderly with CVD, in all conditions of frailty was also identified in a national survey [26] corroborating the data of this research.

Overweight in the older adults may be related to activation of inflammatory processes that trigger systemic changes, which may influence the onset of frailty process [27]. Thus, the problems associated with the nutritional status of the elderly can accelerate the emergence of frailties and vulnerabilities. Therefore, in order to prevent such diseases associated with frailty syndrome, it is essential to invest more actively in services that provide recreational, health education, healthy eating, exercise and regular multidisciplinary monitoring from actions organized by professionals and conducted effectively to elderly population [28]. Regarding the functional capacity for the IADL, similar results were identified in a national survey, in which the highest percentages were among the elderly ranked with partial dependence [23]; however, the diagnosis of CVD was not reported. Just like the CVD, the frailty syndrome is directly related to the independence of older people, negatively influencing their functional capacity [13]. In this context, so that one can provide appropriate and resolute assistance the health professionals should check the need of the elderly for aid for maintenance and health promotion activities through the multidimensional assessment and monitoring [29]. Corroborating the results of this research, national [26] and international [9] studies found higher indicators of abdominal fat among the elderly of all the frailty conditions [9,26]. The evaluation of anthropometric measurements in the elderly [26], especially among those with CVD is necessary [9], because during the aging process there is

a loss of lean mass and fat accumulation that may hinder the reduction in BMI [26]. This can lead to misunderstanding in the diagnosis of malnutrition and the impossibility of a correct screening of frailty conditions [26]. National studies performed among older people with CVD and risk factors for these conditions found a correlation between age ($p=0.016$) [8], ($p<0.001$) [10] and pre-frailty and frailty which converges with the data from this research. The development of the frailty concomitant to aging results in physiological, immunological and inflammatory disorders [7] which may contribute to the vulnerability for the CVD or the other way round [22].

It is important to highlight that the adverse results from deterioration of multiple systems, particularly the dysfunction of the cardiovascular system, may be associated with the development of frailty syndrome [8]. In addition, the reduction of homeostatic reserve concomitant to a stressful event, such as a CVD, causes negative health effects [30] related to the use of medications [7,8] and the functional capacity in the elderly [7,30]. This context of adverse outcomes among elderly patients with CVD and frailty is corroborated by the results of this study and similar to those of other Brazilian researches conducted among elderly with CVD in São Paulo [8], Barueri and Cuiabá [10], who identified association between polypharmacy ($p=0.018$) [8], ($p=0.002$) [10] and the conditions of pre-frailty and frailty. It should be noted the role of CVD in the exacerbation of the need to use drugs in the elderly [2] and this context is confirmed by the association between frailty syndrome and increased number of drugs and morbidity [7,23]. The polypharmacy may increase the risk of interaction between the drugs, so that there is the development of adverse health effects [1]. So, it is essential to have a multidisciplinary assessment about medications, possibility of reducing the amount of medication and possible side effects, and can negatively impact on the physical condition and quality of life of the aged. The association between the partial dependence on IADL and the frailty syndrome corroborates a research among the elderly with CVD residents in São Paulo [8]. A systematic review of the literature found that frailty in the elderly may be a precursor to functional disability for IADL. However, it pointed out that one needs to consider a possible effect of reverse causality in the relationship between functional capacity and frailty [29]. This occurs in the

pathophysiological context, symptoms related to CVD in the elderly may affect the level of physical activity and, consequently, functional disability, making them more vulnerable to the development of frailty. In addition, functional limitations, which are commonly identified in elderly patients with CVD, may result in decreased homeostatic capacity to resist the presence of a stressor event and then, the occurrence of the frailty syndrome [31].

Therefore, it is emphasized that despite the recognition of the frailty syndrome as a key element in the evaluation of elderly patients with CVD, yet there are few protocols and interventions targeted at this group [32]; and national and international studies conducted among older adults with CVD to identify the factors associated with frailty conditions [8,9,21]. Thus, understanding of the factors that are associated with the conditions of frailty among elderly with CVD may assist in the prevention of hospitalizations, falls, disability, mortality [8] and improves the prognosis of the older adult health [30]. Moreover, it is imperative to know the pathophysiology of frailty syndrome and its impact in different clinical conditions such as CVD, for proper risk group identification, optimization and targeting of the practice of care and intervention strategies [30]. This research presents as limitations the design of the study that does not allow determining the causality relationships and self-reported CVD, as the elderly may not have adequate knowledge of their morbidities. In addition, the exclusion of elderly individuals with cognitive impairment may contribute to the selection of a healthier sample. However, the possibility of bias of selection was minimized, since all eligible elders were interviewed. Thus, future multicenter and cohort studies should be conducted, which would contribute to health policy planning for the elderly, especially the most vulnerable. However, understanding the factors associated with conditions of frailty in the elderly with CVD may assist in the prevention of functional incapacity, mortality and improved prognosis of the elderly health.

CONCLUSION

In this study, the majority of elderly patients with CVD were classified as pre-frail. In the three conditions of frailty, the prevalence of elderly with CVD was female, overweight, partial dependence for IADL and inadequate AC. It was found

that the highest percentage of older people with CVD categorized as pre-frail and frail, was aged 70-80 years and polypharmacy prevailed among the frail ones.

The condition of pre-frailty and frailty associated the age group of 80 years and over; occurrence of polypharmacy and partial dependence for IADL. However, the study shows the need for longitudinal design studies to examine the causality between frailty conditions and the elderly with CVD. Nevertheless, the results of this study contribute to the knowledge of the factors associated with frailty conditions among elderly people with CVD that can help in the planning and implementation of care directed to these conditions, in search of the prevention or staging of this syndrome.

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