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Frailty and associated risk factors in independent older people living in rural areas

Fragilidade e fatores de risco associados em pessoas idosas independentes residentes em meio rural

Fragilidad y factores de riesgo asociados en personas ancianas independientes residentes en el medio rural

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Abstract

Background: The diagnosis of the frailty syndrome is essential in the planning of elderly health interventions.
Objective: To assess the prevalence of frailty among older people living in rural communities and its associated factors.
Methodology: A cross-sectional study was conducted with 435 elderly subjects who were classified according to the frailty phenotype. The following instruments were also applied: Short Portable Mental Status Questionnaire (SPMSQ), Charlson Comorbidity Index (CCI), Barthel Index (BI), and Lawton And Brody Instrumental Activities Of Daily Living (IADL) Scale. Association tests, mean comparison tests, and correlation analysis ($p < 0.05$) were used.
Results: The sample (74.3 ± 7.1 years) was predominantly female (62.3%) and showed prevalence rates of 33.3% for non-frailty, 46.2% for pre-frailty, and 20.5% for frailty. Frailty was associated with self-perceived health, pain intensity, use of walking aids, and sensory problems. Frail older people were more dependent on activities of daily living.
Conclusion: Stronger correlations were found between frailty and the CCI and ELB scores, age, and number of medications per day, in this order.

Keywords: aging; frail elderly; health status; nursing; rural population

Resumo

Enquadramento: O diagnóstico da síndrome de fragilidade é essencial ao planeamento de intervenções em saúde do idoso.
Objetivo: Avaliar a prevalência e os fatores associados à fragilidade em idosos que residem em comunidades rurais.
Metodologia: Estudo transversal que avaliou 435 idosos classificados segundo o fenótipo de fragilidade. Aplicámos ainda os seguintes instrumentos: Breve Questionário Portátil sobre o Estado Mental (BQPEM), Índice de Comorbidade de Charlson (ICC), Índice de Barthel (IB) e Escala Lawton e Brody (ELB). Utilizámos testes de associação, comparação de médias e análise de correlações ($p < 0,05$).
Resultados: Amostra (74,3 ± 7,1 anos) maioritariamente feminina (62,3%). Encontrámos prevalências de 33,3% para não-fragilidade, 46,2% para pré-fragilidade e 20,5% para fragilidade. A condição de fragilidade associou-se a saúde autopercebida, intensidade da dor, uso de meios auxiliares de marcha e problemas sensoriais. Os idosos frágeis apresentavam maior dependência nas atividades de vida diária.
Conclusão: O score do ICC, as pontuações obtidas na ELB, a idade e o número de medicamentos consumidos diariamente foram, por esta ordem, as variáveis que mais se correlacionaram com fragilidade.

Palavras-chave: envelhecimento; idoso fragilizado; nível de saúde; enfermagem; população rural

Resumen

Marco contextual: El diagnóstico del síndrome de fragilidad es esencial para planificar intervenciones en torno a la salud del anciano.
Objetivo: Evaluar la prevalencia y los factores asociados a la fragilidad en ancianos que residen en comunidades rurales.
Metodología: Estudio transversal que evaluó a 435 ancianos clasificados según el fenotipo de fragilidad. Asimismo, se aplicaron los siguientes instrumentos: Breve Cuestionario Portátil sobre el Estado Mental, Índice de Comorbilidad de Charlson (ICC), Índice de Barthel (IB) y Escala de Lawton y Brody (ELB). Se utilizaron test de asociación, comparación de medias y análisis de correlaciones (p < 0,05).
Resultados: Muestra (74,3 ± 7,1 años) mayoritariamente femenina (62,3%). Se encontraron prevalencias del 33,3% para no fragilidad, del 46,2% para prefragilidad y del 20,5% para fragilidad. La fragilidad se asoció a la salud autopercibida, la intensidad del dolor, el uso de medios auxiliares de marcha y los problemas sensoriales. Los ancianos frágiles presentaban mayor dependencia en las actividades de la vida diaria.
Conclusión: La puntuación del ICC, las puntuaciones obtenidas en el ELB, la edad y el número de medicamentos consumidos diariamente fueron, por este orden, las variables que más se correlacionaron con la fragilidad.

Palabras clave: envejecimiento; anciano frágil; estado de salud; enfermería; población rural

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Introduction

In Portugal, the increase in life expectancy and the reduction in the young and active population translate into a high aging index, which calls for the creation of social and health networks aimed at promoting older people's autonomy and their stay in the community of origin for as long as possible (Rodrigues et al., 2015). Within this demographic context, it is important to understand the aging-associated conditions in which professionals can intervene after a correct diagnosis, such as functional decline and frailty.

The phenotypic theory defines frailty as a clinically recognizable state of vulnerability across multiple physiological systems that compromises the ability to successfully cope with everyday stressors (Fried et al., 2001; Xue, 2011). As a clinical syndrome, frailty can be identified based on the presence of phenotype criteria which, according to Fried et al. (2001), include weight loss in the past year, weakness, low level of physical activity, slow walking speed, and weak grip strength. However, according to this theory, the most adverse consequences of the frailty syndrome (disability, institutionalization/hospitalization, and death) can be prevented.

Several authors emphasize that disability implies loss of function, whereas frailty indicates risk of functional loss (Campbell & Buchner, 1997; Fried et al., 2001; Strandberg, Pitkälä, & Tilvis, 2011). According to these authors, disability is often a point of no return for older people, and it is always preceded by frailty, which, in turn, is preceded by a pre-frailty status.

The idea that frailty is not an inevitable aging-associated condition and that disability is preceded by other conditions opens the way to research and primary prevention.

Although frailty has been investigated in several international studies, it has not been a predominant topic on the agenda of nursing research. In fact, Linck and Crossetti (2011) conducted a systematic review of nursing studies on frailty and found only 16 articles: 14 in English and two in Portuguese. According to Duarte and Paúl (2015), the studies conducted by Portuguese researchers on this topic are very scarce.

Therefore, given the high aging index and lack of research in Portugal, as well as the importance of better identifying the frailty profile in the elderly, this study aimed to determine the prevalence of frailty among independent older people living in rural communities and characterize its associated factors.

Background

Although there is still no universally accepted gold standard to accurately identify frailty in aging older people, the theoretical framework of frailty is well described. The literature tends to define frailty as a geriatric syndrome, distinct from disability or disease, that results from a decline in energy and reserve capacity - thus increasing the risk for adverse health outcomes – and that can be mitigated or prevented (Apóstolo et al., 2017; Fried et al., 2001; Strandberg et al., 2011; Xue, 2011). The literature suggests that there are determinants that may contribute to the onset of the syndrome, such as genetic factors, subclinical disease and sequelae of an acute disease or trauma, lifestyle/environment, and aging (Strandberg et al., 2011). Chen, Mao, and Leng (2014) argue that the above-mentioned factors are enhanced (or triggered) by inflammatory and immune mechanisms that cause musculoskeletal (dynapenia, sarcopenia, osteopenia), endocrine (hormonal changes), and cardiovascular changes (fatigue, arteriosclerosis). According to these authors, the typical initial signs and symptoms of frailty (phenotype) are followed by adverse health outcomes such as falls, disability, and dependency (Chen et al., 2014). The trajectory of this syndrome may be reversible in cases of pre-frailty, but it may reach a point of no return after the onset of the disability/dependence (Strandberg et al., 2011).

The prevalence of frailty among older people has been analyzed in several studies, all of which had limitations regarding the comparison of results due to the variety of instruments used and the nature and composition of the samples (Apóstolo et al., 2017). Thus, the prevalence of frailty in community-dwelling older people varies greatly across studies (ranging from 4.0 to 59.1%; Collard, Boter, Schoevers, & Oude Voshaar, 2012). The fact

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that frailty increases with age and that it is more prevalent among women and in the presence of chronic diseases is consensually accepted (Collard et al., 2012). The prevalence of frailty tends to increase with socioeconomic poorer, comorbidities, associated deficits, disability, and institutionalization (Strandberg et al., 2011).

Pegorari and Tavares (2014) found a prevalence of frailty of 12.8% among Brazilian older people living in urban areas. Frail participants were individuals aged over 80 years, who took five or more medications on a daily basis, had a higher number of recent hospitalizations, were more dependent on activities of daily living, and had more depressive symptoms. On the other hand, Júnior, Carneiro, Coqueiro, Santos, and Fernandes (2014) found a prevalence of frailty of 23.8% among Brazilian older people living in rural areas. Frail participants were mostly women, individuals aged over 80 years, and who had a negative self-perceived health.

Another study conducted in Europe concluded that the prevalence of frailty was higher in Southern countries, probably due to socioeconomic, educational, and health factors (Santos-Eggimann, Cuénoud, Spagnoli, & Junod, 2009). Although Portugal was not included in this study, the results obtained in Spain (which was the country with the highest rates) showed a prevalence of pre-frailty and frailty of 50.9% and 27.3%, respectively, among community-dwelling older adults (Santos-Eggimann et al., 2009).

In Portugal, a study conducted with older people of the municipality of Guimarães on phenotypic frailty reported that 50.9% of individuals were pre-frail and 34.9% were frail (Duarte & Paúl, 2015).

Hypotheses

This study is based on the following research hypotheses: (i) Frailty is associated with the sociodemographic characteristics of older people living in the municipalities of Murça and Alfândega da Fé; (ii) Frailty in the elderly is associated with clinical variables (sensory problems, pain intensity, falls, previous hospitalization, and use of walking aids); (iii) The mean differences found in the quantitative sociodemographic, anthropometric, and clinical variables differ significantly according to the categories of the frailty variable; (iv) There is a correlation between frailty, the Charlson Comorbidity Index and Barthel Index scores, pain intensity, age, and number of medications per day.

Methodology

Taking into account the research purpose, a quantitative cross-sectional observational study was conducted in two municipalities of the Trás-os-Montes and Alto Douro region (Murça and Alfândega da Fé). These municipalities were selected for convenience reasons due to the research team's easier access to them. These two, mostly rural, municipalities have a total of 3,334 inhabitants aged over 65 years. The sample size was calculated for a 5% sampling error, a 95% confidence interval, and an expected 50% ratio, plus 20% for potential losses and exclusion criteria. Using a stratified sampling method in each geographical area, participants were randomly selected from lists of residents provided by the parish councils. In each municipality, the researchers selected the sample based on the percentage of individuals aged over 65 years in relation to the total population. The following exclusion criteria were applied: inability to walk and severe cognitive deficit (after application of the Short Portable Mental Status Questionnaire; Pfeiffer, 1975). Data were always obtained by the same researchers following standardized protocols and after prior training within the research team. Data were collected between January and June 2016 at parish facilities, in close collaboration with the members of all parish councils. To avoid bias, all older people were evaluated during the afternoon, at least 1 hour after their previous meal. A sociodemographic and clinical questionnaire was used. In the sensory assessment, older people reported visual, hearing, and swallowing problems. With regard to participants' health status, the following aspects were evaluated: number of medications per day, history of falls in the past 6 months, number of hospitalizations in the past year, and use of walking aids. Self-perceived health was also assessed using a

4-point likert-type scale, ranging from *excellent* to *poor* self-perception. With regard to the clinical and anthropometric data, the following variables were assessed: perceived pain in the past week, weight, height, and Body Mass Index (BMI). All these items were assessed through instruments used in similar studies, namely those developed by the Gerontology Research Group of the University of Coruña. The age-adjusted Charlson Comorbidity Index (CCI) was used to assess chronic diseases, encompassing 17 comorbidities scored 1, 2, 3, or 6 points according to their impact on the prognosis. One point for each decade of life above 50 years is added to the final score (Charlson, Szatrowski, Peterson, & Gold, 1994). The functional ability to perform basic and instrumental activities of daily living was assessed using the Barthel Index (BI) and the Lawton And Brody Instrumental Activities Of Daily Living (IADL) Scale.

The *frailty* dependent variable was operationalized according to the frailty phenotype (Fried et al., 2001). Following this methodology, the following criteria were measured: (i) Unintentional weight loss of 4.5Kg or over 5% of body weight in the past year; (ii) Self-reported exhaustion; (iii) Low level of physical activity, adjusted for gender; (iv) Slow walking speed, adjusted for gender and height and based on cutoff values for the time to walk 4.57m; and (v) Weak grip strength, adjusted for gender and BMI and measured by dynamometer. Older people were classified as frail if they met three or more criteria; pre-frail if they met one or two criteria; and non-frail if they met none of the criteria (Fried et al., 2001).

Weight was measured on a digital scale with participant barefoot and wearing light clothes. Exhaustion was assessed using two statements of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977): "I felt that everything that I did was an effort?" and "I could not get 'going' ". These questions were used to assess participants' feeling of increased effort during their usual activities, based on how often they had to do an increased effort or did not feel like doing their usual tasks during the past week. Exhaustion was considered to be present when the participant indicated frequencies greater than or equal to 3 days per week.

Physical activity (PA) was assessed using the Minnesota Leisure-time Physical Activity Questionnaire and calculating the metabolic equivalent (MET) for each activity, based on an Excel sheet made available online by Ruiz Comellas et al. (2012). After the calculation, older people were classified according to the energy expenditure and divided into Sedentary, Moderately active, Active, and Very active. The presence of a frailty criterion for PA indicated that the participant was Sedentary or Moderately Active.

Walking speed was measured by asking older people to walk 7 meters on a flat surface. Participants were timed in seconds while walking the intermediate 4.57 meters indicated by marks on the ground. Times over 6 or 7 seconds (adjusted for gender and height) indicated the presence of the frailty criterion of slow walking speed (Fried et al., 2001).

Grip strength was measured with the participant sitting in an armless chair, adduction of the shoulder and 90º flexion of the forearm. Grip strength was measured three times in the dominant hand using a Jamar® universal dynamometer, with a one-minute interval between measurements. The mean scores were recorded in kilograms-force (Kgf), adjusted for gender and BMI, according to the cutoff values provided by the literature to identify the presence of this frailty criterion (Fried et al., 2001).

Data were inserted in IBM SPSS Software, version 20.0 and analyzed using both descriptive and inferential analysis. Association tests, mean comparison tests, and correlation analysis were used. A two-tailed value of $p < 0.05$ was considered statistically significant. Microsoft Excel was also used to calculate the level of PA.

The study protocol was submitted to the Ethics Committee of the Health Sciences Research Unit: Nursing (UICISA: E) of the Nursing School of Coimbra and approved under registration no. 318/12-2015.

Results

A total of 435 older people participated in the study. Most participants were women (62.3%). The prevalence of pre-frailty, frailty, and robustness/non-frailty was 46.2%, 20.5%, and 33.3%, respectively (Figure 1).
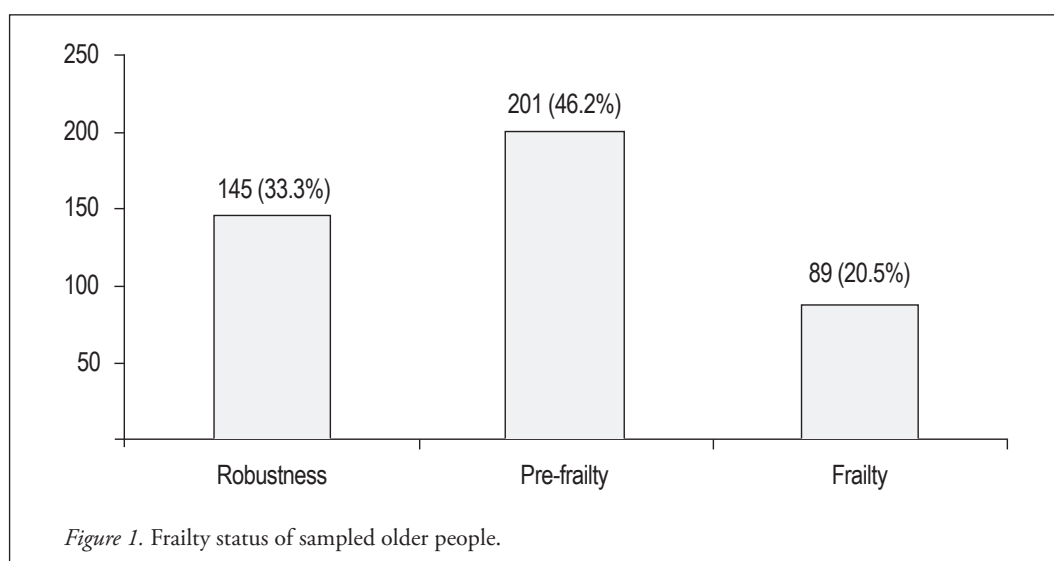
Figure 1. Frailty status of sampled older people.

Table 1 shows that 23.3% of women and 15.9% of men were frail, with a statistically significant association between variables (p = 0.001). Frailty was correlated with sociodemographic factors, namely marital status (p < 0.001) and retirement (p < 0.001).

Table 1

Distribution of sociodemographic variables and their association with the frailty status

	Frailty status*			Total† n (%)	$X^{2\dagger}$ $p^{\ddagger}$ $C^{\S}$
	Non-frail n (%)	Pre-frail n (%)	Frail n (%)		
Gender					
Female	73 (26.9)	135 (49.8)	63 (23.3)	271 (100.0)	13.577
Male	72 (43.9)	66 (40.2)	26 (15.9)	164 (100.0)	0.001 0.174
Marital status					
Single	10 (55.6)	6 (33.3)	2 (11.1)	18 (100.0)	
Married	101 (39.0)	113 (43.6)	45 (17.4)	259 (100.0)	31.848
Divorced	10 (58.8)	6 (35.3)	1 (5.9)	17 (100.0)	< 0.001 0.261
Widowed	24 (17.0)	76 (53.9)	41 (29.1)	141 (100.0)	
Retired					
Yes	102 (27.4)	184 (49.3)	87 (23.3)	373 (100.0)	44.166
No	43 (69.4)	17 (27.4)	2 (3.2)	62 (100.0)	< 0.001 0.304
Living arrangements					
Lives alone	34 (29.6)	64 (55.6)	17 (14.8)	115 (100.0)	6.147
Lives with someone	111 (34.7)	137 (42.8)	72 (22.5)	320 (100.0)	0.064 0.118

Note. *Horizontal percentages. †Result of the chi-square test. ‡ Chi-square test *p*-value. §Contingency coefficient.

The majority of the older people ($n = 336$) had visual problems associated with frailty ($p = 0.014$). Hearing and swallowing problems were reported by 194 and 159 of the elderly, respectively, with both clinical conditions being associated with the frailty profile ($p < 0.001$). In the analysis of the frequency distribution resulting from the intersection of the *self-perceived health* and *frailty* variables ($p < 0.001$), it should be highlighted that none of the participants perceived their health as excellent (Table 2).

A large number of older people ($n = 87$) reported having fallen in the past 6 months. Hospitalization in the past year ($p = 0.001$) and use of walking aids ($p < 0.001$) were also correlated with frailty (Table 2).

Table 2

Clinical variables and their association with the frailty status

	Frailty status*				$X^{2\dagger}$ $p^{\ddagger}$ $C^{\S}$
	Non-frail n (%)	Pre-frail n (%)	Frail n (%)	Total† n (%)	
Visual problems					
Yes	101 (30.1)	159 (47.3)	76 (22.6)	336 (100.0)	8.508 0.014 0.139
No	44 (44.5)	42 (42.4)	13 (13.1)	99 (100.0)	
Hearing problems					
Yes	47 (24.2)	89 (45.9)	58 (29.9)	194 (100.0)	23.962 < 0.001 0.228
No	98 (40.7)	112 (46.5)	31 (12.9)	241 (100.0)	
Swallowing problems					
Yes	37 (23.3)	72 (45.3)	50 (31.4)	159 (100.0)	22.444 < 0.001 0.222
No	108 (39.1)	129 (46.7)	39 (14.1)	276 (100.0)	
Self-perceived health					
Good	65 (65.0)	31 (31.0)	4 (4.0)	100 (100.0)	98.240 < 0.001 0.429
Regular	77 (28.8)	139 (52.1)	51 (19.1)	267 (100.0)	
Bad	3 (4.4)	31 (45.6)	34 (50.0)	68 (100.0)	
Pain intensity					
No pain	102 (51.3)	86 (43.2)	11 (5.5)	199 (100.0)	93.462 < 0.001 0.421
Mild pain	39 (23.1)	84 (49.7)	46 (27.2)	169 (100.0)	
Moderate/intense pain	4 (6.0)	31 (46.2)	32 (47.8)	67 (100.0)	

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	Non-frail	Pre-frail	Frail	Total	χ²† / ‡p	§C
Falls in the past 6 months						
Yes	14 (16.1)	45 (51.7)	28 (32.2)	87 (100.0)	17.721 < 0.001	0.198
No	131 (37.7)	156 (44.8)	61 (17.5)	348 (100.0)		
Hospitalization in the past year						
Yes	13 (18.1)	34 (47.2)	25 (34.7)	72 (100.0)	14.639 0.001	0.180
No	132 (36.4)	167 (46.0)	64 (17.6)	363 (100.0)		
Walking aids						
Yes	15 (14.8)	35 (34.7)	51 (50.5)	101 (100.0)	75.279 < 0.001	0.384
No	130 (38.9)	166 (49.7)	38 (11.4)	334 (100.0)		

Note. *Horizontal percentages. †Result of the chi-square test. ‡Chi-square test *p*-value. §Contingency coefficient.

The mean age of the participants was approximately 74 years. Table 3 shows that frail individuals (79.6 ± 6.6 years) are older than pre-frail ones (75.4 ± 6.6 years), who, in turn, are older than non-frail individuals (69.5 ± 4.9 years). Statistically significant differences were found between groups ($p < 0.001$).

The mean comparison test using the anthropometric variables across the three groups revealed significant differences in weight ($p < 0.001$) and height ($p < 0.001$), but not in BMI ($p = 0.115$). In addition, Table 3 shows that frail older people took more medications per day ($p < 0.001$), had more comorbidities ($p < 0.001$) and scored lower on the instruments assessing their functional independence to perform activities of daily living (ADL) and instrumental activities of daily living (IADL; $p < 0.001$).

Table 3
Mean comparison according to the frailty status

	Study sample M ± SD*	Frailty status			$p^\dagger$
		Non-frail M ± SD*	Pre-frail M ± SD*	Frail M ± SD*	
Age (years)	74.3 ± 7.1	69.5 ± 4.9	75.4 ± 6.6	79.6 ± 6.6	< 0.001
Weight‡ (Kg)	67.8 ± 12.3	71.9 ± 11.3	66.5 ± 11.7	64.1 ± 13.3	< 0.001
Height§ (m)	1.58 ± 0.09	1.61 ± 0.09	1.57 ± 0.09	1.54 ± 0.09	< 0.001
BMI‖ (Kg/m²)	27.3 ± 4.4	27.9 ± 4.2	27.0 ± 4.2	26.9 ± 5.0	0.115
Medications	3.9 ± 2.8	2.2 ± 1.9	4.1 ± 2.5	6.2 ± 2.9	< 0.001
CCI‡‡	3.91 ± 1.51	2.75 ± 0.93	4.12 ± 1.24	5.29 ± 1.46	< 0.001
BI§§	95.7 ± 6.8	98.8 ± 2.9	96.4 ± 4.2	89.4 ± 11.0	< 0.001
IADL‖‖‖	14.6 ± 2.8	15.8 ± 0.5	14.9 ± 2.1	11.8 ± 4.2	< 0.001

Note. *Standard deviation. †Analysis of Variance (ANOVA). ‡Weight in kilograms. §Height in meters. ‖Body Mass Index. ‡‡Charlson Comorbidity Index. §§Barthel Index. ‖‖‖Lawton and Brody Scale.

Table 4 shows Spearman's correlation coefficients between frailty and other variables. Considering the ordinal nature of the frailty variable (1 = *non-frail*, 2 = *pre-frail*, and 3 = *frail*), the analysis showed that frailty was correlated with five variables which, in turn, were significantly correlated with each other. The highest value was observed between frailty and the CCI score, followed by the correlation between frailty and the IADL, score and between frailty and age.

Table 4

Correlations between frailty, Charlson Comorbidity Index score, Barthel Index, pain intensity, age, and number of medications per day

	Frailty	CCI[†]	IADL[‡‡]	Pain	Age	Medications
Frailty	1					
CCI[†]	0.637[**]	1				
IADL[‡‡]	-0.541[**]	-0.447[**]	1			
Pain	0.450[**]	0.339[**]	-0.283[**]	1		
Age	0.528[**]	0.622[**]	-0.447[**]	0.302[**]	1	
Medications	0.523[**]	0.550[**]	-0.383[**]	0.400[**]	0.330[**]	1

Note. [†]Charlson Comorbidity Index. [‡‡]Lawton and Brody Scale. [**]Significant correlation at the 0.01 level (two-tailed) using Spearman's correlation coefficient.

Discussion

The prevalence of frailty among older people varied greatly across studies, ranging from 4.0% to 59.1%, with a weighted prevalence of 13.6% for the phenotypic frailty (Collard et al., 2012). The distribution of the frailty status is in line with international studies, but it is lower than the rate of 34.9% reported in a previous study conducted in Portugal (Duarte & Paúl, 2015). Almost half of the older people in the sample analyzed in this study were pre-frail, a condition that also affected the majority of community-dwelling older adults screened in similar studies (Duarte & Paúl, 2015; Júnior et al., 2014; Lenardt et al., 2016; Pegorari & Tavares, 2014). These results pose important challenges to health and active aging policies because the probability of becoming frail increases with age (Apóstolo et al., 2017; Xue, 2011). In Portugal, sociodemographic aging is a particularly worrying reality, especially in rural communities which are very affected by depopulation and social isolation. We believe that the increasing number of interdisciplinary and collaborative social and health responses is the best approach to preventing the frailty syndrome. In a study conducted in Spain, in a sociodemographic context very similar to that of this study, the authors found an increasing trend in the mortality rate among frail older people living in rural areas than among those who lived in urban areas (Lorenzo-López et al., 2016).

In the present study, the severity of frailty increased significantly with age. Although aging does not inevitably lead to frailty, the likelihood of developing this condition usually increases with age, as several authors have observed (Collard et al., 2012; Fried et al., 2001; Santos-Eggimann et al., 2009).

In this study, the prevalence of pre-frailty and frailty was higher among women, with statistical significance, when compared to men, which is in line with the results found in the literature (Collard et al., 2012; Xue, 2011). This difference may be explained by the fact that women have a higher life expectancy, are more affected by osteoporosis, and have less muscle mass and strength than men (Collard et al., 2012; Strandberg et al., 2011).

Sensory problems are important markers of frailty and should be screened during the multidimensional assessment of older people. This study found an association between frailty and self-reported hearing problems. A recent longitudinal audiometric study assessed 2,000 older people and concluded that

patients with impaired hearing had a 63% increased risk of developing frailty (Kamil et al., 2015). Therefore, older people's hearing problems should be corrected through proper medical surveillance and the use of hearing prostheses. This recommendation also applies to visual and swallowing problems.

The self-perceived health was associated with the frailty status, which corroborates previous studies (Júnior et al., 2014). According to the literature, frail older people have a lower health-related quality of life and a high prevalence of chronic diseases (Lenardt et al., 2016; Strandberg et al., 2011). It is therefore understandable that self-perceived health can be compromised and show a high correlation with frailty.

Other frailty-associated risk factors include the presence of comorbidities and dependence on ADL, which is in line with the study of Fried et al. (2001) that concluded that 46% of frail older people have comorbidities and 6% are dependent on ADLs.

The limitations of this study resulted from the fact that it was a cross-sectional study that was conducted in a specific geographic context and that included only elderly patients who were able to walk and had no cognitive impairment. Thus, the results should be generalized to other populations with caution. However, this study can contribute to a better understanding of frailty-associated factors among older people and lead to a discussion about health interventions within this population. A health care approach aimed at the reduction of the incidence of frailty may translate into health gains.

Conclusion

This study found a prevalence of frailty of 20.5%. The profile of frail older people was characterized by lower self-perceived health, higher self-reported pain intensity in the past week, use of walking aids, and sensory problems. In addition, they were older, weighted less, took more medications, had more comorbidities, and were more dependent on ADL and IADL.

Frailty was strongly correlated with the CCI and IADL scale scores, age, and number of medications per day, in this order. These variables are treatable or modifiable, except for age. Therefore, frailty prevention and/or management is a feasible goal, and the diagnosis of the frailty syndrome is essential in the planning of health interventions. As professionals who play a key role in early intervention, nurses' contribution to the area of frailty is associated with the prevention of disability and risk of functional changes.

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