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Fragility Syndrome In Older Adults In A Rural Community In The Peruvian Andes

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FRAGILITY SYNDROME IN OLDER ADULTS IN A RURAL COMMUNITY IN THE PERUVIAN ANDES

SÍNDROME DE FRAGILIDAD EN ADULTOS MAYORES DE UNA COMUNIDAD RURAL DE LOS ANDES PERUANOS

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ORIGINAL PAPER

ABSTRACT

Introduction: There are few studies on Frailty Syndrome in older adults living in high-altitude communities. **Objective:** To determine the prevalence and factors associated with Frailty Syndrome in older adults residing in the district of Chaglla-Huánuco, located at 3000 meters above sea level. **Methods:** Analytical cross-sectional study carried out in adults over 60 years of age living in a rural community in the Peruvian Andes. For the evaluation of the dependent variable, a modified version of Fried's criteria was used. Associated factors were calculated using crude and adjusted prevalence ratios with 95% confidence intervals (95% CI), using a multiple Poisson regression model with robust variance. A p value <0.05 was considered significant. **Results:** Of 233 older adults studied, there was a median age of 74 years (interquartile range: 70-79 years), with 50.6% being female. The prevalence of frailty was 72.1%. The presence of depression (PRa = 1.77; 95% CI: 1.43-2.18, p <0.001) and the female sex (PRa = 1.46; 95% CI: 1.16-1.81, p = 0.001) were independently associated with an increased risk of developing this syndrome. **Conclusions:** The prevalence of Frailty Syndrome among older adults residing in a rural Andean community was high. The factors associated with this diagnosis were the presence of depression and female sex. More studies are required on this topic in rural high-altitude populations.

Key words: Rural Health; Frail Elderly; Aging; Geriatric Assessment; Comprehensive Health Care (source: MeSH NLM).

RESUMEN

Introducción: Existen pocos estudios sobre el Síndrome de Fragilidad en adultos mayores residentes en comunidades de altitud. **Objetivos:** Determinar la prevalencia y factores asociados al Síndrome de Fragilidad en adultos mayores residentes en el distrito de Chaglla-Huánuco, ubicado a 3000 metros sobre el nivel del mar. **Métodos:** Estudio transversal analítico efectuado en adultos mayores de 60 años residentes en una comunidad rural de los Andes peruanos. Para la evaluación de la variable dependiente se utilizó una versión modificada de los criterios de Fried. Los factores asociados se calcularon mediante razones de prevalencia crudas y ajustadas con intervalos de confianza al 95% (IC95%), utilizando un modelo de regresión de Poisson múltiple con varianza robusta. Se consideró un valor p<0,05 como significativo. **Resultados:** De 233 adultos mayores estudiados, se tuvo una mediana de edad de 74 años (rango intercuartílico: 70-79 años), siendo el 50,6% del sexo femenino. La prevalencia de fragilidad fue 72,1%. La presencia de depresión (RPa=1,77; IC95%: 1,43-2,18, p<0,001) y el sexo femenino (RPa=1,46; IC95%: 1,16-1,81, p=0,001) se asociaron de manera independiente con un mayor riesgo de presentar este síndrome. **Conclusiónes:** La prevalencia del Síndrome de Fragilidad entre adultos mayores residentes en una comunidad rural andina fue alta. Los factores asociados con este diagnóstico fueron la presencia de depresión y el sexo femenino. Se requieren más estudios sobre este tema en poblaciones rurales de las grandes alturas.

Palabras clave: Salud Rural; Anciano Frágil; Envejecimiento; Evaluación Geriátrica; Atención Integral de Salud (fuente: DeCS BIREME).

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INTRODUCTION

Frailty Syndrome (FS) is a more vulnerable clinical condition, characterized by an inadequate adaptive response to exposure to stress, due to the dysregulation of multiple physiological systems[1]. It predisposes to a serie of adverse events in older adults (OA) such as: delirium, falls, hospitalizations, mortality, cognitive deterioration, institutionalization and disability[2,3]. Its pathophysiology is related to the decrease in physiological reserves, typical of aging and other factors such as chronic diseases, malnutrition, sedentary lifestyle, cognitive impairment, depression and poor social condition[4,5].

In 2001, Fried[6], defined a frailty phenotype, based on the fulfillment of three of the following five criteria: unintentional weight loss, fatigue, muscle weakness, slow gait and low physical activity. Although other instruments have subsequently been used for its detection, this phenotype is still the most widely used in diagnosis.

The prevalence of FS in Latin America and the Caribbean is 19.6% (range: 7.7 - 42.6%) and in our country it ranges between 7.7% and 27.8%[7-9]. However, there are few studies in the international literature on the characteristics of FS in populations living at high altitudes; therefore, the objective of the study was to determine the prevalence and factors associated with FS in OA residents in a rural community in the Peruvian Andes.

METHODS

Design and study area

Observational, cross-sectional and analytical study, carried out in the district of Chaglla, located at 3000 meters above sea level, in the province of Pachitea, department of Huánuco, during February 2020. This research was developed in the context of the V Course -Thesis Degree Workshop of the Faculty of Human Medicine "Manuel Huamán Guerrero" of Universidad Ricardo Palma, according to the published approach and methodology[10].

Population and sample

The population consisted of all people over 60 years of age, residents of the Chaglla district, estimated at 903 people according to the 2017 national census. To calculate the sample size, the free software Open-Epi was used, where the frequency with the factor to be estimated was 40%, the frequency without the factor was 22%[11], the confidence level was 95% and the statistical power was 80%. Resulting as a calculated sample size: 228 people. However, in order to compensate for possible incomplete data, the number was increased by 10%, resulting in a final sample size of 250. The selection of the sample was done by simple random sampling.

Residents over 60 years of age, of both sexes, residing in the district during the six months prior to the study, who had the informed consent form signed by the resident or responsible family member, were included. People with cognitive impairment, hearing loss or language barrier were excluded, to the extent that they prevented the application of the questionnaires used.

From the initial sample, 12 residents were excluded (five refused to participate in the study, five were not located, and two had dementia). Another five patients were not treated due to incomplete information and / or a language barrier. In this way, the final sample consisted of 233 people.

Variables and instruments

For the evaluation of FS, the version modified by Ottenbacher[12] of the Fried phenotype was used, validated for its use in the Hispanic-American population, which has shown a sensitivity and specificity greater than 70 and 82% respectively for the diagnosis of FS. The scale comprises four criteria and defines the FS if two or more of the following are present:

- Unintentional weight loss (Shrinking), evaluated with a closed question: "Have you lost weight so that your clothes have become looser?" (Yes/No).
- Weakness, muscle strength was measured using a manual dynamometer with the dominant hand. The measure was compared with the adjusted values for the Body Mass Index (BMI), considering a value less than 20% of the baseline as positive.
- Fatigue (Exhaustion), assessed with a question: "Do you feel full of energy?" (Yes/No).
- Slowness of the gait, evaluated by means of the 4 meter timed walk test. Points adjusted for height and gender were used. A 20% slower was considered positive.

The cut-off points for muscle strength and walking time with respect to BMI, sex, and height of the study participants are shown in Annex 1[9]. It was considered fragile if the resident presented two or more of the criteria to be evaluated and pre-fragile if only one was present[12].

Information was recorded on: age (≤ 80 years,> 80 years); sex; educational level (illiterate - primary, secondary); marital status, categorized into those without a partner (single, widowed, divorced) and with a partner (married, cohabiting); occupation; drug use at the time of the interview; history of falls and hospitalizations in the last year.

The instruments used were: balance, height rod, 120286 series manual dynamometer to measure muscle strength and digital stopwatch to determine gait speed.

Procedures

Authorization was requested from the municipality of Chaglla for the execution of the study. The data collection technique was the interview of the resident or responsible family member, complemented with the review of his medical history, if it is available, at the district health center. The evaluation took an average of 20 minutes and was conducted by a general practitioner with prior training in geriatrics. Demographic and clinical data were recorded in a file.

Statistic analysis

For data analysis, the STATA version 14 program for Windows was used. Frequencies and percentages were calculated for the categorical variables and measures of central tendency and dispersion for the numerical variables. For the comparison of the obtained values, the Chi-square test or Fisher's exact test were used in the case of categorical variables and the Student's t-test or Mann Whitney U test in the case of numerical variables.

Poisson generalized linear models (GLM) and the log link function were used, taking FS as the dependent variable. For the adjusted model, those variables that had a p value <0.20 in the crude model were included. Crude Prevalence Ratios (PR) and adjusted (RPa) with 95% confidence intervals were reported, considering a p value <0.05 as significant.

Ethical aspects

The research project was approved by the Institute for Research in Biomedical Sciences (INICIB) and by the Research Ethics Committee of Universidad Ricardo Palma.

RESULTS

233 AM were evaluated. The median age of the study participants was 74 years (interquartile range: 70-79), 50.6% were women and 61.8% came from the Chaglla hamlet. Of the total, 95.3% were illiterate or with a primary education level, 60.9% had a partner and 52.4% were farmers or merchants. The group studied was characterized by a low frequency of drug use, falls and hospitalizations in the last year.

Of the total, 72.1% were considered fragile, 22.7% pre-fragile and 5.2% robust. Most of the MAs had an independent functional status (99.6%), low comorbidity (97.8%), absence of cognitive impairment (82.8%) and depression (57.5%). The general characteristics of the study participants are shown in Table 1.

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Table 1. Characteristics of the residents without and with Frailty Syndrome (FS) (N=233).

Variables	Without FS(N=65)	With FS(N=168)	Value of p*
Age			0.005
≤ 80 years	60 (92.3%)	128 (76.2%)	
> 80 years	5 (7.7%)	40 (23.8%)	
Sex			0.009
Male	41 (63.1%)	74 (44.0%)	
Female	24 (36.9%)	94 (56.0%)	
Degree of instruction			0.732
Illiterate – Primary	63 (96.9%)	159 (94.6%)	
High school	2 (3.1%)	9 (5.4%)	
Marital status			0.279
Single	29 (44.6%)	62 (36.9%)	
With couple	36 (55.4%)	106 (63.1%)	
Occupation			0.042
Housewife	24 (36.9%)	87 (51.8%)	
Farmer / trader	41 (63.1%)	81 (48.2%)	
Take bills/drugs			0.780
No	57 (87.7%)	145 (86.3%)	
Yes	8 (12.3%)	23 (13.7%)	
Falls			0.922
No	48 (73.8%)	123 (73.2%)	
Yes	17 (26.2%)	45(26.8%)	
Hospitalizations			0.224
No	61 (93.8%)	164 (97.6%)	
Yes	4 (6.2%)	4 (2.4%)	
Comorbidity			0.998
Baja	64 (98.5%)	164 (97.6%)	
Alta	1 (1.5%)	4 (2.4%)	
Nutritional condition			0.933
Malnourished	2 (3.1%)	6 (3.6%)	
Normal	33 (50.8%)	81 (48.2%)	
Overweight / Obese	30 (46.2%)	81 (48.2%)	
Cognitive impairment			0.017
No	60 (92.3%)	133 (79.2%)	
Yes	5 (7.7%)	35 (20.8%)	
Depression			<0,001
No	50 (76.9%)	49 (29.2%)	
Yes	15 (23.1%)	119 (70.8%)	
Functional status			1.000
Independent	65 (100%)	167 (99.4%)	
Partial dependent	0 (0%)	1 (0.6%)	
Social conditions			0.922
Good	11 (16.9%)	25 (14.9%)	
Risk	53 (81.5%)	140 (83.3%)	
In Trouble	1 (1.5%)	3 (1.8%)	

*= Chi Square or Fisher's Exact Test were used for the comparison of categorical variables.

Regarding the factors shown by the sample, the adjusted analysis showed depression (RPa = 1.77; 95% CI: 1.43-2.18, p <0.001) and female sex (RPa = 1.46; 95% CI: 1.16-1.81, p = 0.001), were statistically significantly associated with the presence of FS. No significant association was found with age, occupation and cognitive impairment (Table 2).

Table 2. Factors associated with Frailty Syndrome in adults older residents in the district of Chaglla (N = 233).

Variables	RP raw*	IC 95%	RP ajusted**	IC 95%	p
Age					
≤ 80 years	Ref				
> 80 years	1.31	(1.13-1.51)	1.02	(0.89-1.16)	0.807
Sex					
Male	Ref				
Female	1.24	(1.05-1.46)	1.46	(1.16-1.81)	0.001
Occupation					
Farmer / trader	Ref				
Housewife	1.18	(1.01-1.39)	0.84	(0.68-1.04)	0.103
Cognitive impairment					
No	Ref				
Yes	1.27	(1.09-1.48)	1.07	(0.92-1.24)	0.38
Depression					
No	Ref				
Yes	1.79	(1.46-2.21)	1.77	(1.43-2.18)	<0.001

* Simple Poisson regression with robust variance
** Multiple Poisson regression with robust variance, a model was generated with all the variables shown in Table 2.

ORIGINAL PAPER

DISCUSSION

The prevalence of FS in MA residents in the district of Chaglla (Huánuco) was 72.1%. In the literature there are few studies that systematically evaluate frailty in high altitude communities. In this regard, Curcio[19], found a prevalence of frailty of 12.2% among 1878 older than 60 years, residing in a community in the Colombian Andes. In another study carried out in Japan, Maştarelu[20], consecutively evaluated a group of 663 people over 65 years of age, of which 73% were frail and mostly living in rural areas. Recently, Yadav[21] published the results of an investigation carried out in a group of 794 AMs, inhabitants of rural areas of Nepal, finding a prevalence of FS of 65%, using for this purpose a new instrument: the Frail Non-disabled scale (FiND).

In Peru, studies have shown variable results. In an investigation carried out with the application of Fried's criteria, a prevalence of FS of 7.7% was found in a sample of 246 people over 60 years old residing in Metropolitan Lima[22]. A subsequent analysis of the data from this study indicated that a gait speed <0.7m / s was an independent indicator of the presence of frailty[8].

In a hospital environment, a frequency of frailty of 27.8% was found in older patients treated in a naval hospital, with a significant percentage of pre-frail patients (47.3%)[9]. Recently, Chuquipoma[11] published the results of the evaluation of a group of MA from the outpatient clinic of a State hospital. Using the Frail questionnaire for the diagnosis of FS; of a total of 180 patients, 18.9% were frail, 55.6% pre-frail, and 25.5% robust.

The differences in the results obtained could be due to the characteristics of the studied populations (rural or urban, community or hospital), a variable frequency of comorbidities, habits and lifestyles, as well as the definitions used by the FS. Some of the diagnostic instruments include self-reporting of symptoms such as weight loss and fatigue, which could be influenced by socioeconomic and cultural factors. At the moment it is unknown if the altitude

of the place of residence could be a determining factor of a higher frequency of FS.

In this study, the independent factors associated with FS were depression and female gender. The association between depression and FS has been documented by previous works, carried out both in Taiwan[23] and in Nepal[21]. It has been suggested that depression in MA could influence the performance of activities of daily living, conditioning less mobility and increasing the risk of frailty. On the other hand, one of the Fried criteria used in the diagnosis of FS, such as fatigue, is a common symptom of depression, therefore, longitudinal studies are necessary to clarify the nature of this association.

The association between the female sex and FS is well documented. Studies carried out in Brazil[24], China[25] and the United States[26] have consistently shown a higher frequency of FS among women over 60 years of age. It is probable that the differences between men and women in the social and family roles they fulfill, especially in rural communities, could partly explain this association. In rural areas, women usually play the role of housewives, dedicated to caring for their children, with less social contact, greater economic dependency and stress that could predispose them to developing FS.

The limitations of our study include the limited sample size; its transversal nature that describes associations, but does not define causalities; as well as the fact that our findings could not be extrapolated to other rural communities in our country. Furthermore, the diagnosis of depression was made using the GDS-4, which, although it has shown high reliability, cannot replace a formal psychiatric interview.

CONCLUSION

The prevalence of FS among the AM of the district of Chaglla (Huánuco), was higher than that reported in urban areas of lower altitude. The factors associated with this diagnosis were depression and female sex. Prospective research with a larger sample size is needed for a better study of FS in rural communities in our country.

ORIGINAL PAPER

Annex 1. Cut-off points for muscle strength and gait time according to the BMI and height of the participants.

Muscle strength: cut-off point according to BMI	
Men	
IMC ≤ 22 kg/m2	≤ 23 Kg
IMC 22 – 24 kg/m2	≤ 23 Kg
IMC 24 – 28 kg/m2	≤ 25 Kg
IMC > 29.5 kg/m2	≤ 25.5 Kg
Women	
IMC ≤ 21 kg/m2	≤ 24 Kg
IMC 21 – 24 kg/m2	≤ 17 Kg
IMC 24 – 28 kg/m2	≤ 23 Kg
IMC > 28 kg/m2	≤ 24 Kg
Walking time: cut-off point according to size	
Men	
Size ≤ 159 cm	≥ 4.9 seconds
Size > 159 cm	≥ 6.5 seconds
Women	
Size ≤ 153.7 cm	≥ 6.5 seconds
Size > 153.7 cm	≥ 7 seconds

Source: Runzer FM, Samper R, Al S, Ottenbacher KJ, Parodi JF, Wong R. Prevalence and factors associated with frailty among Peruvian older adults. Arch Gerontol Geriatr. 2014; 58(1):69-73. DOI: 10.1016/j.archger.2013.07.005

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