

Relation of frailty with depression among Colombian adults with chronic obstructive pulmonary disease

Relación de fragilidad con depresión en adultos Colombianos con enfermedad pulmonar obstructiva crónica

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Conflicts of interests

The authors declare that there is no conflict of interest.

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ABSTRACT

Introduction: Frailty and depression risk are common in older adults undergoing chronic obstructive pulmonary disease (COPD) treatment. However, little is known about this association in people with COPD residing in low- and middle-income countries. **Objective:** The study aimed to establish the relationship between frailty and depression among ambulatory adults over 60 years with COPD in Santa Marta, Colombia. **Methodology:** A cross-sectional study was designed in which consecutive patients from the pulmonology outpatient clinic were invited to participate. Frailty was quantified with the FiND (Frail Non-Disabled [FiND] Screening Tool) [Cronbach's alpha 0.65] and depression with the Primary Care Screening Questionnaire for Depression (PSQD) [Cronbach's alpha 0.73]. **Results:** Three-hundred forty-nine patients with COPD between 60 and 98 years participated (M=75.6, SD=8.4), 61.9% were males, and 19.8% presented a C or D combined evaluation. Two hundred eighty-six patients (76.8%) presented frailty with and without mobility disability, and 31.2% presented depression. The relationship of frailty with depression remained significant, even after adjusting for confounding variables (OR=2.80, 95%CI 1.42-5.51). **Conclusions:** Frailty and depression are significantly associated after adjusting for confounding variables. More studies are welcome.

Keywords: Frailty; Depression; Chronic obstructive pulmonary disease; Cross-sectional studies.

RESUMEN

Introducción: El riesgo de fragilidad y depresión es común en los adultos mayores en tratamiento por enfermedad pulmonar obstructiva crónica (EPOC). Sin embargo, se sabe poco sobre esta asociación en personas con EPOC que residen en países de ingresos bajos y medianos. **Objetivo:** El estudio tuvo como objetivo establecer la relación entre fragilidad y depresión en adultos ambulatorios mayores de 60 años con EPOC en Santa Marta, Colombia. **Metodología:** Se diseñó un estudio transversal en el que se invitó a participar a pacientes consecutivos del ambulatorio de neumología. La fragilidad se cuantificó con el FiND (Frail Non-Disabled Screening Tool) [alfa de Cronbach 0,65] y la depresión con el Primary Care Screening Questionnaire for Depression (PSQD) [alfa de Cronbach de 0,73]. **Resultados:** Participaron 349 pacientes con EPOC entre 60 y 98 años (M=75,6, DE=8,4), el 61,9% eran hombres y el 19,8% presentó una evaluación combinada C o D. Doscientos ochenta y seis pacientes (76,8%) presentaron fragilidad con y sin discapacidad de movilidad, y el 31,2% presentó depresión. La relación entre la fragilidad y la depresión siguió siendo significativa, incluso después de ajustar por variables de confusión (OR=2,80; IC95%: 1,42-5,51). **Conclusiones:** La fragilidad y la depresión se asocian significativamente después de ajustar por variables de confusión. Se aceptan más estudios.

Palabras clave: Fragilidad; depresión; enfermedad pulmonar obstructiva crónica; estudios transversales.

INTRODUCTION

Frailty is a syndrome associated with progressive deterioration in multiple physiological systems that occurs in older adults and is related to vulnerability, illness, and the risk of dying (1). Approximately 10% of adults aged > 65 years who dwell in the community meet the criteria for frailty (2). However, its prevalence can increase to 80% in at-risk populations (3-7). The frequency of frailty in individuals with chronic obstructive pulmonary disease (COPD) is high (3), with variable values depending on the characteristics of the population and the measurement instrument, between 19% and 82%, quantified with FiND (8-10). Patients with COPD are twice as likely to be frail (8).

Comorbidities such as COPD and depression are frequent. The prevalence of depression is widely variable; it can be identified in 6% and 60% of people living with COPD (11-17). Patients are three–four times more likely to have depression than the general population (18). The association between frailty and depression is widespread in clinical practice (19). The identification of depression among people with frailty is approximately 40% (20). In frail patients, the risk of depression increases by seven times (3,4,20-27).

The association between frailty and depression is complex. Frailty may be a causal pathway for the adverse health outcomes associated with depression (28). Alternate hypotheses suggest that frailty can induce depressive episodes (20,21,29), depression increases the possibility of frailty (19), and the most likely relationship is bidirectional or reciprocal (20). Frailty and depression can be part of a single syndrome (30).

Frailty, depression, and COPD interact synergistically to increase the risk of falls, prolonged hospital stay, and suicidal behavior (31,32). The comorbidity of frailty, depression, and COPD further impairs the quality of life (33). In addition, it is essential to remember that frailty, depression, and COPD are independent risk factors for mortality in different population groups (34-36). A comprehensive approach to patients with comorbidities favors adherence to pharmacological and psychosocial therapeutic plans, increases social adaptation, and improves patients' quality of life (37,38). However, the association between frailty and depression in patients with COPD has not yet been studied. In primary care, the emotional aspects of patients with chronic conditions are often neglected or inadequately addressed (39,40). It is necessary to consider these entities together to better understand the complexity of the association and the specific clinical needs of this group of patients (41). It is crucial

to prioritize adapting care protocols for people living with COPD because comprehensive treatment must involve actions aimed at reducing disability/frailty and depression (37,41). The objective of this study was to determine the relationship between frailty and depression among ambulatory adults aged > 60 years with COPD from Santa Marta, Colombia.

METHODOLOGY

Design: Cross-sectional study. **Ethical considerations:** The University Research Ethics Committee (omitted from the review) reviewed and approved the study protocol. The patients provided written informed consent in accordance with the Declaration of Helsinki (42). **Participants:** Adult patients aged > 60 years with a diagnosis of COPD consulting at three institutions in Santa Marta, Colombia, were included. Patients with evident cognitive impairment and those with limitations in filling out the self-administered questionnaire for depressive symptoms due to their general condition or some visual or motor disability were excluded.

There was a non-probabilistic sample of patients who consulted between July 1, 2021, and June 30, 2022. A non-inferior sample of 323 participants was expected to have an expected prevalence of depression of 30% (margin of error of 5%), with a confidence level of 95% (43). This sample size was adequate to observe an OR of 1.5 in the association between frailty and depression. Likewise, this number of participants would allow adjustment for up to five confounding variables at a rate of 10–20 cases for each epidemiological confounding variable (44).

Measurements

Demographic information: Variables recorded were age, sex, schooling, marital status, and socioeconomic status.

Combined evaluation: The combined evaluation is a clinical classification of COPD that considers symptoms, risk of exacerbations, airflow limitation, spirometry findings, and presence of comorbidities. It considers four stages: A, B, C, and D. Classification A is the minor and severe stage, and D is the most serious (45). The present study formed two groups: less severe patients (A and B) and more severe patients (C and D).

Depression: Depression was measured using the Primary care Screening Questionnaire for Depression (PSQ4D). The PSQ4D includes four items that explore mood during the most recent two weeks. The instrument has a dichotomous response pattern, with

each affirmative response receiving one point. Scores of two or more indicate risk of depression with a specificity of 0.96, sensitivity of 0.87, positive predictive value of 0.74, negative predictive value of 0.98, positive likelihood ratio of 7.4, and negative likelihood ratio of 0.05 (46). In the present group of patients, the PSQ4D had adequate internal consistency (Cronbach's alpha = 0.73).

Frailty: Frailty was quantified using the FiND questionnaire from the English acronym ('Frail Non-Disabled' (FiND) Screening Tool). The FiND brings together five items, the first two for 'disability' and the remaining three for 'frailty.' Each item had two scoring options, zero and one, with specific criteria. If item 1 + item 2 ≥ 1 , the individual is considered 'disabled.' An individual is considered 'frail' if item 1 + item 2 = 0 and item 3 + item 4 + item 5 ≥ 1 . An individual is considered 'strong' if the sum of all items is zero (47). Frail patients with and without mobility disabilities were pooled and compared to non-frail patients. The FiND has a sensitivity of 0.95, specificity of 0.76, and Cohen's kappa of 0.69 in identifying non-disabled and disabled frail participants from participants without frailty compared with another instrument for frailty (47). In the present study, the FiND showed an acceptable internal consistency (Cronbach's alpha = 0.65).

Procedure

The patients were invited to participate in the research at the specialty outpatient services of three institutions in Santa Marta, Colombia. The research objectives were explained and no pharmacological or psychological interventions were involved. One of the authors, who specializes in pulmonology, performed the clinical evaluation and included the FiND. Patients

who agreed to participate completed the PSQ4D after brief and straightforward instructions.

Data analysis

In the descriptive analysis, the data distribution was observed in frequencies and percentages for nominal and ordinal variables, and in the mean, median, and standard deviation for quantitative data.

The relationship analysis used frailty as the independent variable, and depression as the dependent variable. Demographic and combined assessment variables were used as confounding variables. Odds ratios (OR) with 95% confidence intervals (95%CI) were calculated.

Demographic and clinical variables with significant associations or probability values of less than 20% with frailty and depression were considered confounding (48). Adjustment for the association between frailty and depression was performed using a logistic regression analysis. The model's goodness of fit was observed with the Hosmer-Lemeshow test; the fit is acceptable if the test shows a p-value greater than 0.05 (49). The analysis was performed using IBM SPSS Statistics for Windows, Version 23.0.

RESULTS

A total of 349 patients were aged between 60 and 98 years ($M=75.6$, $SD=8.4$), with the highest percentage of patients aged between 60 and 79 years, with a stable partner, low schooling (high school or less), low income, and less clinical deterioration (combined evaluation C or D) (Table 1).

TABLE 1. DEMOGRAPHICAL AND CLINICAL FEATURES OF THE SAMPLE

Variable	Frequency	%
Age between 60 and 79 years	227	65.0
Female gender	133	38.1
High school or less	272	77.9
Married or free union	309	88.5
Low income	258	73.9
Significant deterioration (C or D combined evaluation)	69	19.8

The disability scores were between 0 and 2 ($M=0.7$, $SD=0.9$), and 163 (46.7%) patients were classified as having disabilities. Frailty scores were between 0 and 3, with 105 (30.1%) presenting with frailty. Consequently, 286 patients (76.8%) were classified as frail with or without mobility disability. The depression scores ranged from 0 to 4 ($M=1.1$, $SD=1.3$), and 109 patients (31.2%) scored for depression.

The association between frailty and depression was statistically significant ($OR=3.26$, 95%CI 1.68-6.32). However, sex and combined evaluation behaved as confounding variables. The relationship between frailty and depression remained significant, even after adjusting for confounding variables ($OR=2.80$, 95%CI 1.42-5.51).

DISCUSSION

In the present study, a significant relationship was observed between frailty and depression in patients with COPD; frailty increased the probability of depression. In the present sample of patients with COPD, frailty and depression were found to be statistically associated. These findings are similar to those observed in other studies. In China, Liu et al. (22), in 470 community-dwelling adults over 65 years of age, documented that the presence of frailty increased the odds of depression almost sevenfold (OR=6.80, 95%CI 2.30-20.11). Liu et al. (23), in a sample of 936 adults over 60 years of age, observed that frailty increased the risk of depression three times (OR=2.99, 95%CI 1.86-4.81). Tian et al. (24), in 1,788 adults over 60 years of age from the general population, found a statistically significant association between frailty and depression (OR=4.67, 95%CI 3.36-6.50). Zhao et al. (26), in 4,013 adults over 60 years of age living in the community, showed that frailty increased the possibility of depression approximately three times (OR=2.98, 95%CI 1.94-4.56).

Ribeiro et al. (21) found that 91 frail centenarian patients presented almost four times more risk of depression than centenarians without frailty (OR=3.92, 95%CI 1.48-10.4). Sharma et al. (3), in a sample of 200 healthy participants over 80 years of age, found that depression was three times more frequent in frail people (OR=3.35, 95%CI 1.29-8.73). Yadav et al. (4) found, in 794 adults over 60 years of age living in rural Nepal, a statistically significant association between scores for frailty and depression (adjusted OR=1.06, 95%CI 1.02-1.10). Samper-Ternent et al. (25), among 2000 adults aged over 60 years dwelling in a community in Colombia, frailty was related to depression (OR=1.17, 95%CI 1.12-1.22). Finally, in a meta-analysis based on 24 studies, they observed that patients with frailty had almost three times the risk of depression (OR adjusted for publication bias 4.42, 95%CI 2.66-7.35, and OR adjusted for possible factors of confusion 2.64, 95%CI 1.59-4.37 (20).

The association between frailty and depression must be examined using different approaches. The situation of frailty may represent a significant stressor in a particular group of patients, leading to depression during the illness (20,21,29). Similarly, anhedonia and decreased physical activity during depression may represent risk factors for frailty in vulnerable people (19). Finally, it can be considered that frailty and depression are manifestations of a single syndrome in older adults with multiple predisposing factors (30). Further studies should control for confounding

variables (50).

The presence of frailty and depression in people living with COPD worsens the course of lung disease and further impairs quality of life (33). In addition, comorbidity predisposes to falls and their complications, extended stays in hospital, and increased mortality (31,34-36). Particular attention should be paid to depression because of its close relationship with suicidal behaviors (32).

Clinical practitioners should carefully monitor patients with COPD and investigate the presence of frailty and depression, which are highly prevalent clinical conditions in chronically ill people, especially in the presence of disability (11). Timely identification and treatment of comorbidities significantly improves the quality of life and long-term prognosis of patients with COPD (37).

The present study has the novelty of rejecting the association between frailty and depression after controlling for sex, disability, and the clinical stage of COPD. Another strength of the present research is the implementation of the study in the Colombian and Latin American contexts, where more attention is paid to infectious diseases in other age groups. However, it has some limitations: there was a non-probabilistic sample, and only depressive symptoms were quantified without a formal diagnosis of depression. Another area of improvement is the lower percentage of women's participation. However, adjusting the association using logistic regression statistically compensates for the disproportionate inclusion of patients by sex.

Furthermore, the number of high-income participants is limited. This finding should be considered in future research because it may suggest that COPD is highly related to social inequalities and, consequently, to social determinants that have been little analyzed in Colombia. In addition, questions remain about the direction of causality between frailty and depression because of the cross-sectional design (50). Frailty affected approximately one-third of the participants aged 60 years and older. Frailty increases the likelihood of depression among people with COPD. Therefore, there is a need to systematically explore frailty and depression in COPD patients. Longitudinal studies can clarify causal relationships.

AUTHORS CONTRIBUTIONS

All authors participated in the conception and design of the research. All accepted the final version for publication.

DATA AVAILABILITY

Data are available upon request to the corresponding author.

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