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ORIGINAL RESEARCH

Fear of Falling in Patients with Chronic Obstructive Pulmonary Disease: Clinical Associations and Functional Impact

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Background: This study aimed to determine the frequency of fear of falling (FOF) in individuals with chronic obstructive pulmonary disease (COPD) and to evaluate its relationship with demographic, clinical, and functional parameters.

Material and Methods: Eighty COPD patients followed in a university hospital between May 2021 and December 2022 were included in this cross-sectional study. Perceived fear of falling was assessed with the Falls Efficacy Scale (FES), and functional balance was evaluated using the Berg Balance Scale (BBS). Physical performance was measured using the Timed Up and Go (TUG) test and Six-Minute Walk Test (6MWT). Symptoms were assessed with the COPD Assessment Test (CAT) and modified Medical Research Council Dyspnea Scale (mMRC). Respiratory function was measured using spirometric parameters including Forced Expiratory Volume in 1 second (FEV_1), Forced Vital Capacity (FVC), and the FEV_1/FVC ratio. Data analysis was conducted using SPSS.

Results: The mean age of participants was 64.98±8.13 years, and 91.25% were male. FES scores were significantly higher in patients with fall history (45 [64–73] vs 20 [12–32], $p<0.001$). FOF was also significantly higher in those with comorbidities, especially hypertension ($p=0.024$) and heart failure ($p=0.036$). FOF differed across COPD groups, with Group E patients showing significantly higher FES scores than Groups A and B (59 [28–71.5] vs 16 [10–25] and 29 [14–45], respectively; $p<0.001$). Based on FEV_1, patients in Stages 3 and 4 had higher FOF than those in Stages 1 and 2 ($p<0.05$). FES scores positively correlated with age, COPD duration, CAT, mMRC, and TUG; and negatively with FEV_1, FVC, BBS, and 6MWT. All 10 patients with FES ≥70 had moderate fall risk by BBS. Among those with FES ≤70, 22.8% had moderate to high objective fall risk.

Conclusion: FOF in COPD is associated with age, disease duration, symptom severity, balance, and physical capacity. Balance-focused interventions should be integrated into pulmonary rehabilitation.

Keywords: chronic obstructive pulmonary disease, fear of falling, balance impairment, pulmonary rehabilitation, falls efficacy scale, physical performance

Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive respiratory condition with systemic effects that lead to airway narrowing. It is associated with multiple comorbidities, affecting not only respiratory function but also overall health and quality of life.[1] Recent studies have shown that balance disorders are common among patients with COPD and are linked to an increased risk of falling.[2–6] The prevalence of falls in this population has been reported to range between 25% and 46%.[4,7,8]

Fear of falling (FOF) represents a persistent worry about falling that causes individuals to limit activities they could otherwise safely perform. This concern involves both the emotional distress related to potential falls and the resulting changes in behavior aimed at reducing fall risk. Alongside physical issues such as muscle weakness and balance impairments, FOF has been identified as a major contributor to reduced quality of life. Studies have shown that FOF is more common in COPD patients than in healthy older adults, indicating that this population faces particular

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challenges.[2,8–10] Understanding FOF in COPD patients matters because it contributes to reduced physical activity, more frequent hospitalizations, and poorer quality of life, while also showing connections to symptom severity and how the disease progresses.

Systemic inflammation and long-term corticosteroid use in COPD also contribute to osteoporosis, which significantly increases the risk of fracture following a fall.[11–13] Such fractures are associated with longer hospital stays and increased immobilization, further worsening muscle atrophy and functional decline.[12,13] Although American Thoracic Society (ATS) and European Respiratory Society (ERS) guidelines recommend evaluating balance in COPD patients, current pulmonary rehabilitation practices often focus on symptom management and dyspnea control, while balance disorders and FOF are frequently overlooked.[14,15] More recently, the importance of addressing bone loss, fall prevention, balance, and mobility in COPD rehabilitation has gained attention.[16–20] This highlights the need for pulmonary rehabilitation programs to include interventions targeting FOF, improving balance, and enhancing physical function, in addition to conventional respiratory and muscle training.

While researchers have recognized FOF as important in COPD, we still lack key information about how it relates to measurable physical function across different disease stages. This is particularly true for GOLD Group E patients who experience frequent flare-ups. We also do not know enough about how patients' own fears compare to actual balance problems when predicting falls. Our study therefore examined relationships between FOF and various patient characteristics in COPD, paying special attention to disease severity levels and how well patients' perceived fall risk matches objective measurements. In this study, we aimed to examine the relationship between FOF and demographic, clinical, and functional parameters in patients with COPD.

Materials and Methods

Study Design and Population

This cross-sectional study included consecutive patients diagnosed with COPD who presented to the chest diseases outpatient clinic of a tertiary university hospital between May 2021 and December 2022. Patients were excluded if they were under 40 years of age, lacked respiratory function test results from the preceding six months, or had visual or hearing impairments. Additional exclusion criteria included neurological or vestibular disorders affecting balance (confirmed by clinical interview and history review), severe degenerative musculoskeletal conditions impairing ambulation, limb amputation, history of hip or knee surgery, acute coronary syndrome, malignancy, and inner ear disorders.

A total of 95 patients were initially evaluated for eligibility between May 2021 and December 2022. Fifteen patients were excluded: 8 due to recent respiratory exacerbation, 4 due to musculoskeletal limitations affecting mobility, 2 due to neurological conditions, and 1 due to incomplete data. This resulted in a final sample of 80 patients who completed all assessments and were included in the analysis (Figure 1).

Data Collection and Assessments

Demographic variables including age, sex, and body mass index (BMI) were recorded. Comorbidities and history of falls were also documented. FOF was assessed using the Falls Efficacy Scale (FES). Balance and fall risk were evaluated using the Timed Up and Go test (TUG) and the Six-Minute Walk Test (6MWT). Additional assessments included the Berg Balance Scale (BBS) for balance function, the modified Medical Research Council Dyspnea Scale (mMRC) for dyspnea severity, and the COPD Assessment Test (CAT) for symptom burden. Pulmonary function test results obtained within the last six months were included.

We selected our assessment tools based on their proven usefulness in COPD research. The FES captures how confident people feel about not falling during everyday activities, giving us insight into their personal concerns. For objective balance assessment, we chose the BBS because it thoroughly examines both standing still and moving balance skills that matter for preventing falls. The TUG test reflects real-world movements like getting up from a chair and walking, while the 6MWT shows us how well patients can sustain physical activity – both important factors that might influence fall risk.

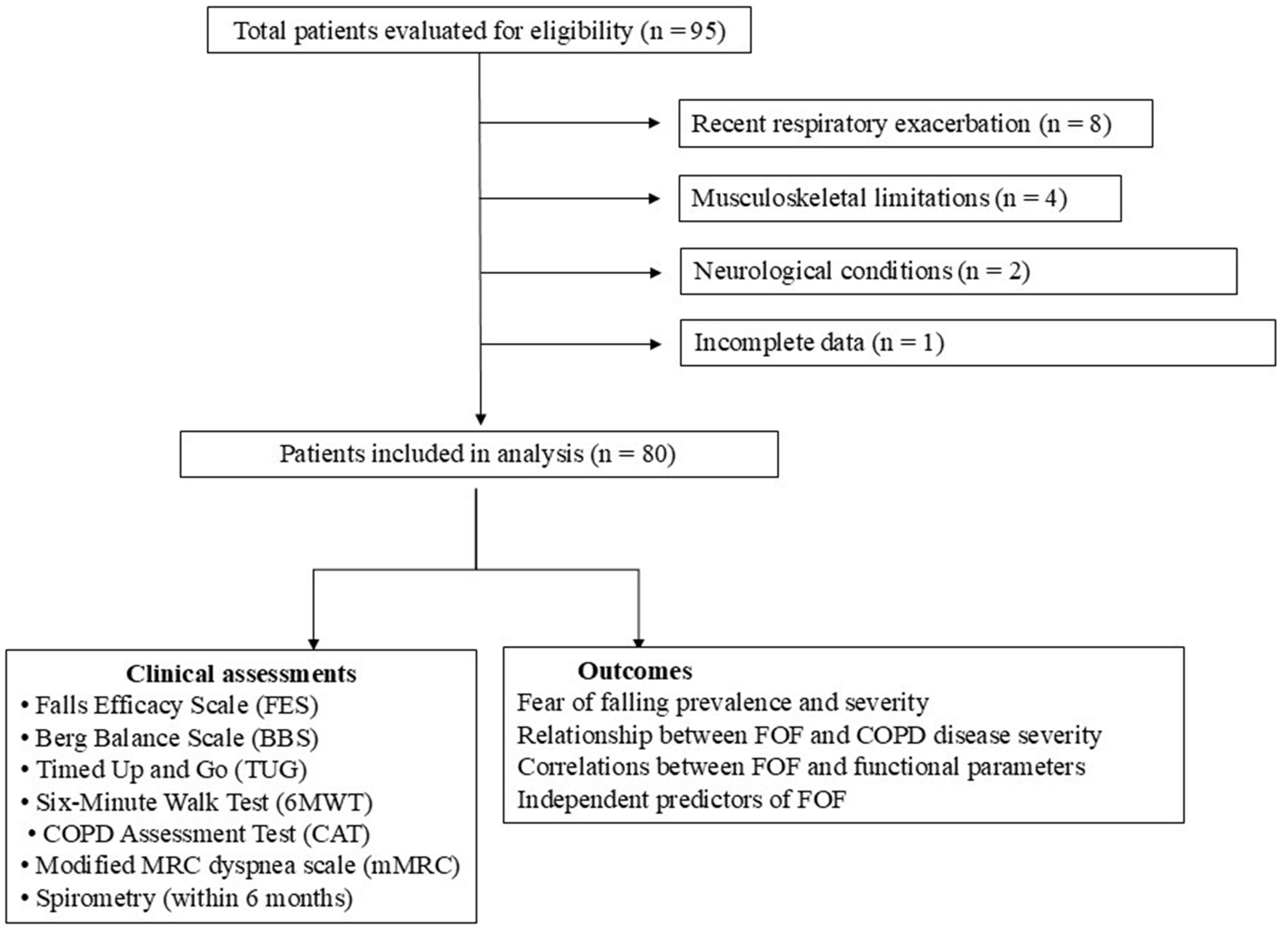

Figure 1 Patient flow diagram. Screening, exclusion, and enrollment of COPD patients for fear of falling assessment.
Abbreviations: COPD, chronic obstructive pulmonary disease; FOF, fear of falling.

All assessments were completed in a single visit lasting approximately 90 minutes, with adequate rest periods between tests. Patients were categorized into Groups A, B, and E based on the 2023 Global Initiative for Chronic Obstructive Lung Disease (GOLD) report, using symptom severity (CAT and mMRC scores) and exacerbation history.[21]

The FES is a 10-item self-report scale with scores ranging from 10 to 100; higher scores indicate greater FOF. A score ≥70 was considered to reflect high FOF. The FES has demonstrated good test-retest reliability (r=0.71) in previous studies with older adults.[22] The TUG measures the time taken to stand up from a chair, walk three meters, turn, return, and sit down; times ≥14 seconds indicate high fall risk. The TUG test has shown good reliability and validity for assessing functional mobility in older adults.[23] The 6MWT assesses the distance walked in six minutes to estimate aerobic capacity and endurance.[24] The BBS consists of 14 tasks scored from 0 to 4, with total scores ranging from 0 to 56; scores of 0–20 indicate high, 21–40 moderate, and 41–56 low fall risk.[25] The mMRC and CAT were used to quantify dyspnea and evaluate overall symptom burden, respectively.[26,27]

Pulmonary function tests were performed in the hospital's respiratory function laboratory using a Jaeger MasterScope spirometer. All measurements were conducted in the seated position in accordance with ATS and ERS guidelines.[28] A bronchodilator test was performed 15 minutes after administration of 400 µg of inhaled salbutamol (4 puffs). The most acceptable and reproducible results for forced expiratory volume in one second (FEV_1, %, L), forced vital capacity (FVC, %, L), and the FEV_1/FVC ratio (%) were recorded according to ATS/ERS standards.

All assessments were performed by trained physiotherapists with standardized protocols to minimize inter-tester variability. Assessors performing objective balance tests (BBS, TUG) were blinded to participants' FES scores to minimize measurement bias.

Ethics

The study was approved by the Aydin Adnan Menderes University, Faculty of Medicine, Non-interventional Clinical Research Ethics Committee (Approval Number: 2020/231, Date: 03.12.2020). Written informed consent was obtained from all participants. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis

According to descriptive statistics (effect size=0.718) in the study by Oliveira et al,[10] a total sample size of 64 achieve 80% power ($\beta = 0.20$) at the $\alpha = 0.05$ significance level. In addition, a total sample size of 46 can detect a Spearman's ρ of 0.40 with $\beta = 0.20$ and $\alpha = 0.05$ significance level. Sample sizes were calculated using G*Power 3.1.9.7 software.

Data were analyzed using SPSS version 22.0 (SPSS Inc., Chicago, USA). The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. Descriptive statistics were presented as mean ± standard deviation for normally distributed continuous variables, as median with interquartile range (25th - 75th percentile) for non-normally distributed continuous variables, and as frequencies and percentages for categorical variables. Since, FES score was right-skewed, non-parametric tests were applied. The Mann–Whitney *U*-test was used for the comparison of continuous variables between two independent groups. For comparisons involving more than two groups, the Kruskal–Wallis test was applied. Bonferroni correction was used to adjust pairwise comparisons. The relationships between continuous variables were examined using Spearman correlation analysis. Multivariable linear regression analysis (stepwise selection method) was used to determine significant variables independently associated with the FES score. Natural (base e) logarithmic transformation was applied to ensure normality assumption. Statistically significant variables according to univariate analysis results were included to multivariable linear regression analysis. A p-value of <0.05 was considered statistically significant.

Results

A total of 80 patients with COPD were included in the study. Of these, 7 (8.75%) were female and 73 (91.25%) were male, with a mean age of 64.98 ± 8.13 years. Based on GOLD classification, 23 patients (28.75%) were categorized as Group A, 27 (33.75%) as Group B, and 30 (37.50%) as Group E. The mean duration of COPD was 8.77 ± 5.53 years, with a median of 7.5 years (IQR: 5–11 years). Twenty-seven patients (33.75%) reported a history of falls, whereas 53 patients (66.25%) did not. Demographic and functional characteristics are presented in Table 1.

Table 1 Baseline Demographic and Clinical Characteristics of Patients With COPD

Variables	
Gender, n (%)	
Female	7 (8.75%)
Male	73 (91.25%)
Age, years	64.98 ± 8.13
BMI, kg/m²	24.85 ± 4.14
Smoking status, n (%)	
Current smoker	23 (28.75%)
Ex-smoker	53 (66.25%)
Non-smoker	4 (5.00%)
Smoking exposure, pack-years	40 (25–53.5)
Disease group n (%)	
Group A	23 (28.75%)
Group B	27 (33.75%)
Group E	30 (37.50%)

(*Continued*)

Table 1 (Continued).

Variables	
Disease stage based on FEV_1, n (%)	
Stage 1	4 (5.00%)
Stage 2	50 (62.50%)
Stage 3	19 (23.75%)
Stage 4	7 (8.75%)
Duration of COPD, years	7.5 (5–11)
Steroid use, n (%)	
Yes	72 (90.00%)
No	8 (10.00%)
Presence of comorbidity, n (%)	
None	33 (41.25%)
At least one	47 (58.75%)
Co-morbidities, n (%)	
Diabetes mellitus	15 (18.75%)
Hypertension	27 (33.75%)
Heart failure	7 (8.75%)
Coronary artery disease	14 (17.50%)
Benign prostatic hyperplasia	2 (2.50%)
Hypothyroidism	2 (2.50%)
Number of comorbidities, n (%)	
1	30 (37.50%)
2	14 (17.50%)
≥3	3 (3.75%)
History of falling, n (%)	
Yes	27 (33.75%)
No	53 (66.25%)

Notes: Continuous variables are presented as mean ± standard deviation (SD) or median (25th - 75th percentile), as appropriate. Categorical variables are expressed as number (percentage).
Abbreviations: COPD, chronic obstructive pulmonary disease; FEV_1, forced expiratory volume in 1 second.

The relationship between FOF and various clinical variables was examined. No significant difference in FOF was observed between sexes (p=0.670). However, patients with a history of falling had significantly higher FOF levels (p<0.001). FOF was also significantly higher among patients with comorbidities compared to those without (p=0.002). When comorbidities were evaluated separately, FOF was significantly higher in patients with hypertension and heart failure (p=0.024 and p=0.036, respectively).

There were statistically significant differences in FOF among COPD groups (p<0.001). Patients in Group B had higher FOF than those in Group A (p=0.021), and those in Group E had significantly higher FOF than both Group A (p<0.001) and Group B (p=0.006) (Figure 2).

Grouping by FEV_1 stages also showed significant difference in FOF (p=0.001). Patients in Stage 3 had higher FOF compared to those in Stage 2 (p=0.005) (Figure 3). No significant difference was observed between Stage 1 and Stage 2 (p=1.000), Stage 1 and Stage 3 (p=0.114), Stage 1 and Stage 4 (p=0.228), Stage 2 and Stage 4 (p=0.120) or between Stage 3 and Stage 4 (p=1.000). These findings are summarized in Table 2.

FES scores were not significantly correlated with BMI or smoking amount. However, significant positive correlations were found with age, TUG test time (Figure 4), duration of COPD, CAT score, and mMRC score. In contrast, FES scores

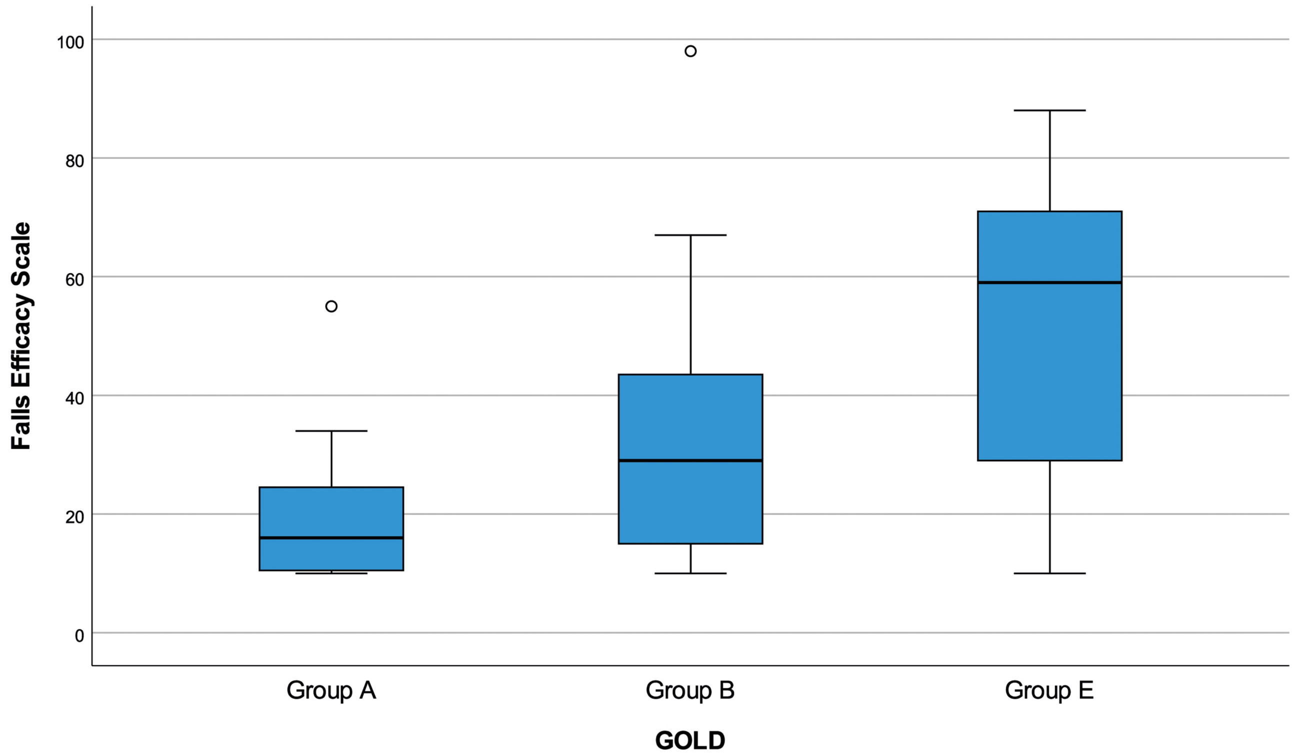

Figure 2 Box plots of FES scores by GOLD classification.

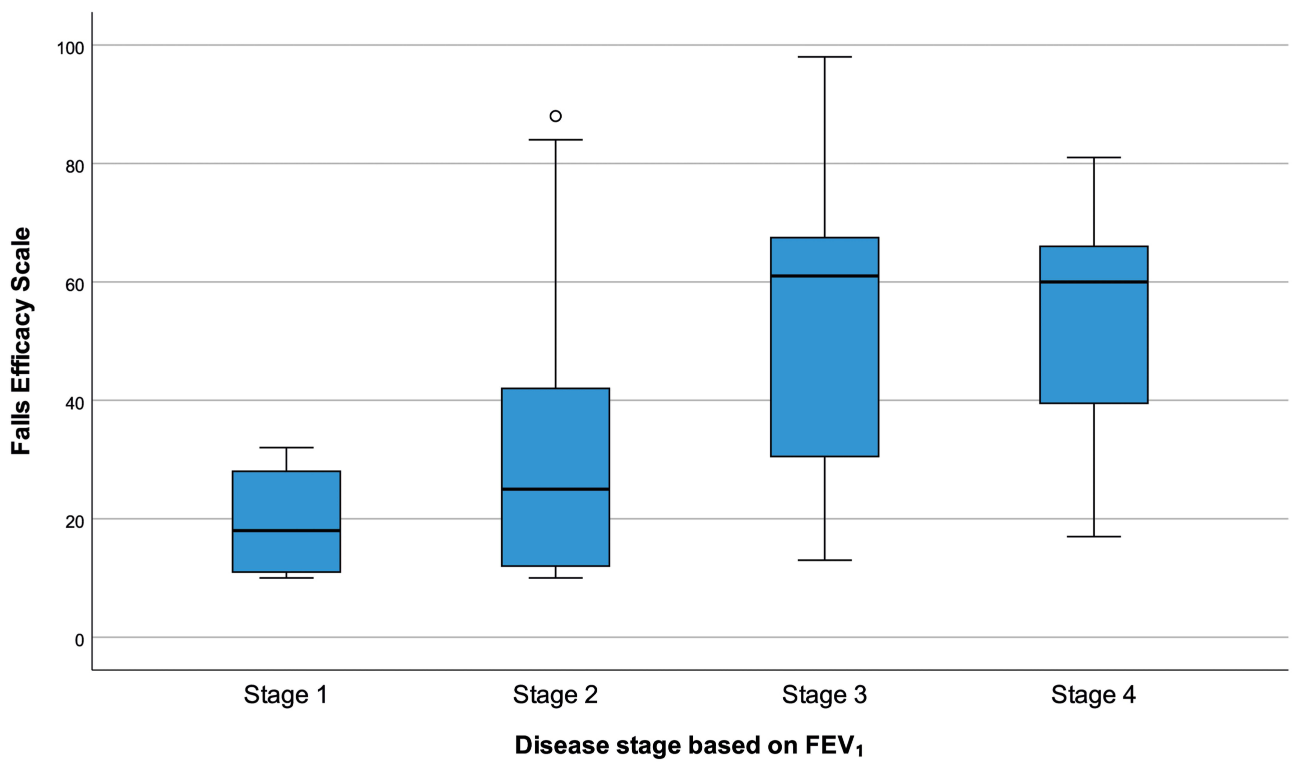

Figure 3 Box plots of FES scores by FEV_1 stages.

Table 2 FES Score Comparisons According to Clinical and Disease Severity Subgroups in COPD

Variables	**n**	**FES**	**p**
Gender			
Female	7	23.0 (16.0–45.0)	0.670
Male	73	30.0 (14.0–58.0)	
Steroid use			
Yes	72	31.0 (16.0–60.5)	0.138
No	8	22.0 (12.0–33.0)	
History of falling			
Yes	27	64.0 (45.0–73.0)	<0.001
No	53	20.0 (12.0–32.0)	
Co-morbidities			
Yes	47	36.0 (22.0–64.0)	0.002
No	33	20.0 (12.0–32.0)	
Hypertension			
Yes	27	49.0 (23.0–61.0)	0.024
No	53	25.0 (13.0–45.0)	
Diabetes mellitus			
Yes	15	36.0 (20.0–61.0)	0.294
No	65	29.0 (14.0–57.0)	
Heart failure			
Yes	7	54.0 (34.0–73.0)	0.036
No	73	27.0 (14.0–55.0)	
Coronary artery disease			
Yes	14	40.0 (22.0–65.0)	0.185
No	66	28.5 (14.0–54.0)	
Benign prostatic hyperplasia			
Yes	2	26.0 (20.0–32.0)	0.711
No	78	29.5 (14.0–58.0)	
Hypothyroidism			
Yes	2	54.5 (32.0–77.0)	0.254
No	78	29.0 (14.0–57.0)	
Between COPD Groups			<0.001
Group A and Group B	23 and 27	16.0 (10.5–24.5) and 29.0 (15.0–43.5)	0.021
Group A and Group E	23 and 30	16.0 (10.5–24.5) and 59.0 (29.0–71.0)	<0.001
Group B and Group E	27 and 30	29.0 (15.0–43.5) and 59.0 (29.0–71.0)	0.006
Between groups when grouped according to FEV_1 value			0.001
Stage 1 and 2	4 and 50	18.0 (11.0–28.0) and 25.0 (12.0–42.0)	1.000
Stage 1 and 3	4 and 19	18.0 (11.0–28.0) and 61.0 (30.5–67.5)	0.114
Stage 1 and 4	4 and 7	18.0 (11.0–28.0) and 60.0 (39.5–66.0)	0.228
Stage 2 and 3	50 and 19	25.0 (12.0–42.0) and 61.0 (30.5–67.5)	0.005
Stage 2 and 4	50 and 7	25.0 (12.0–42.0) and 60.0 (39.5–66.0)	0.120
Stage 3 and 4	19 and 7	61.0 (30.5–67.5) and 60.0 (39.5–66.0)	1.000

Notes: Data are presented as median (25th - 75th percentile). P-values were calculated using the Kruskal–Wallis test for multiple group comparisons. Pairwise comparisons (eg, A vs B, Stage 1 vs Stage 3) were performed using Mann–Whitney *U*-test.

Abbreviations: FES, Falls Efficacy Scale; COPD, chronic obstructive pulmonary disease.

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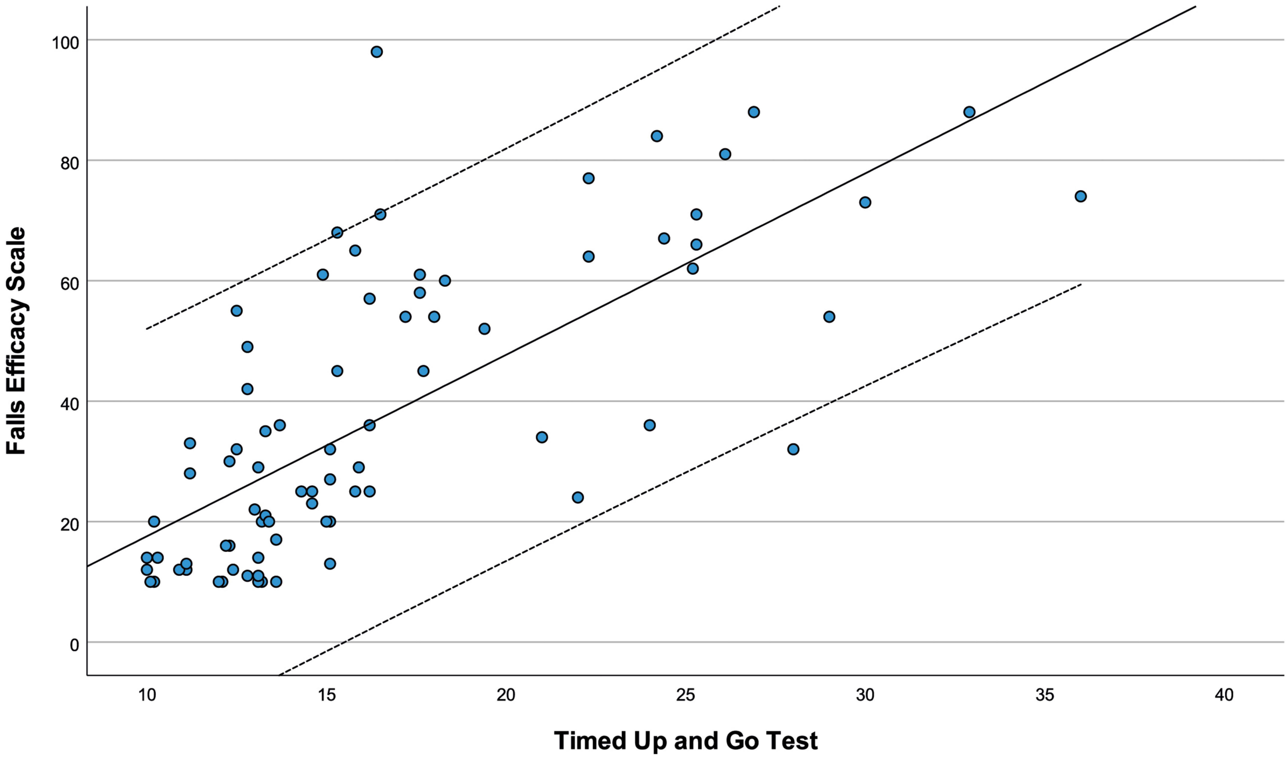

Figure 4 Scatter-plot of FES scores and TUG test.

were negatively correlated with BBS score (Figure 5), FVC (%), FEV_1 (%), FEV_1/FVC ratio and 6MWT distance (Figure 6). These correlation findings are presented in Table 3. The strongest correlations were observed between FES scores and TUG time (ρ=0.716, p<0.001) and BBS scores (ρ=−0.864, p<0.001).

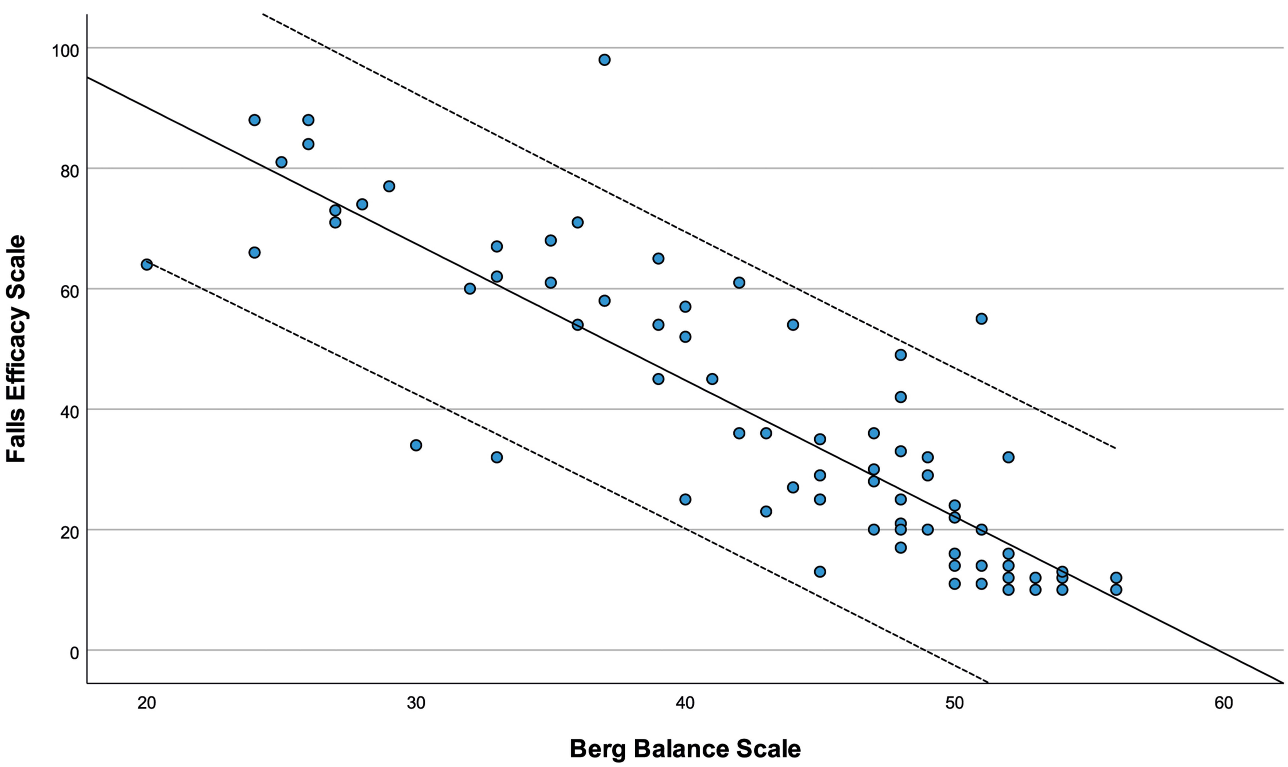

Figure 5 Scatter-plot of FES scores and BBS.

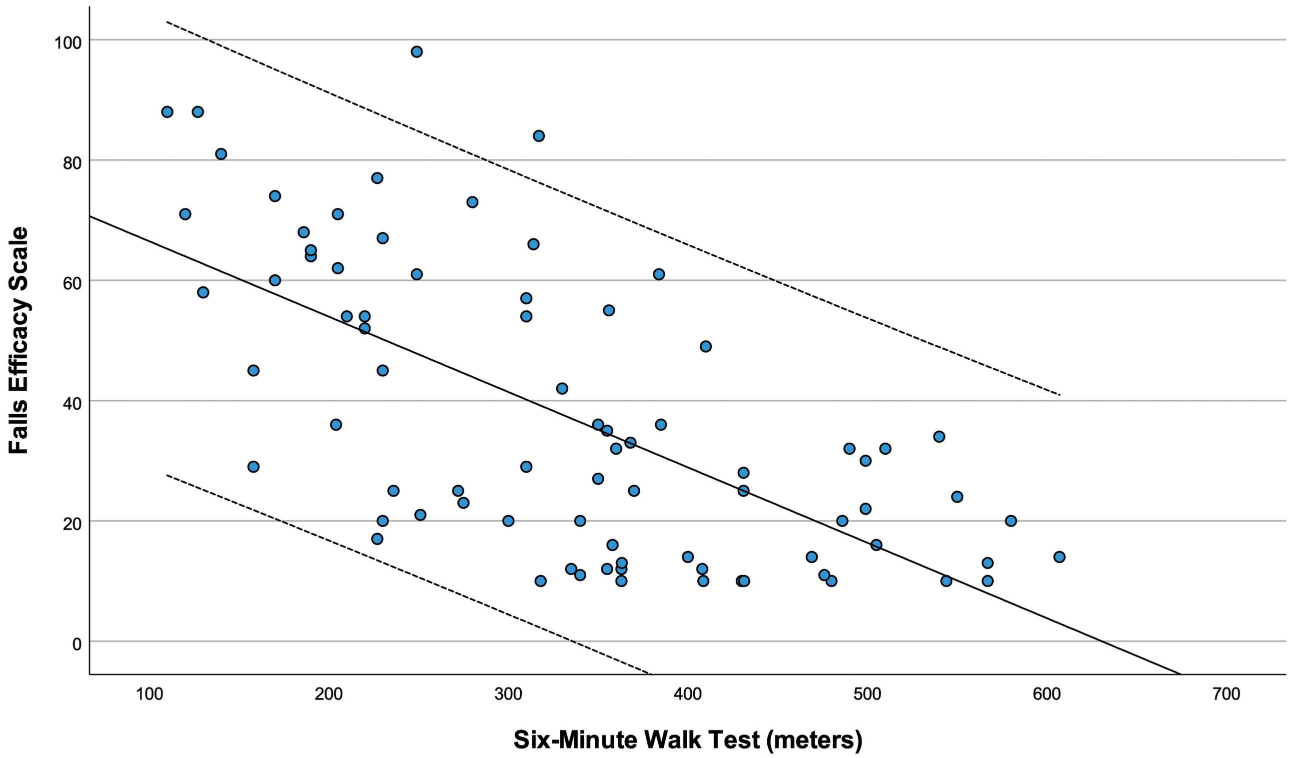

Figure 6 Scatter-plot of FES scores and 6MWT.

According to multivariable linear regression analysis results, low 6MWT distance (p=0.014) and low BBS score (p<0.001) were independently associated with high FOF (Table 4). Other variables included in the analysis, age (p=0.329), history of falling (p=0.812), co-morbidities (p=0.097), hypertension (p=0.192), heart failure (p=0.983),

Table 3 Correlations Between FES Scores and Demographic, Clinical, and Functional Parameters in Patients with COPD

	n	Spearman's ρ (95% CI)	p
Age, years	80	0.264 (0.040–0.462)	0.018
BMI, kg/m²	80	−0.062 (−0.284–0.167)	0.588
Smoking exposure, pack-years	80	−0.087 (−0.307–0.142)	0.445
Duration of COPD, years	80	0.331 (0.113–0.518)	0.003
CAT	80	0.594 (0.425–0.723)	<0.001
mMRC	80	0.590 (0.420–0.720)	<0.001
FVC (%)	80	−0.447 (−0.611 - −0.246)	<0.001
FEV_1 (%)	80	−0.417 (−0.587 - −0.211)	<0.001
FEV_1/FVC	80	−0.241 (−0.443 - −0.016)	0.031
Six-Minute Walk Test (meters)	80	−0.654 (−0.767 - −0.503)	<0.001
Six-Minute Walk Test (%)	80	−0.558 (−0.696 - −0.380)	<0.001

(*Continued*)

Table 3 (Continued).

	n	Spearman's ρ (95% CI)	p
TUG	80	0.756 (0.639–0.839)	<0.001
BBS	80	−0.888 (−0.928 - −0.828)	<0.001

Notes: Correlation coefficients were calculated using Spearman correlation analysis. A positive Spearman's ρ value indicates a direct correlation, while a negative Spearman's ρ value indicates an inverse correlation.
Abbreviations: FES, Falls Efficacy Scale; BMI, body mass index; CI: Confidence interval, CAT, COPD Assessment Test; mMRC, modified Medical Research Council dyspnea score; FVC, forced vital capacity; FEV_1, forced expiratory volume in 1 second; 6MWT, six-minute walk test; TUG, Timed Up and Go test; BBS, Berg Balance Scale.

Table 4 Significant Variables Independently Associated with FES Score, Multivariable Linear Regression Analysis

	Unstandardized β	Standard Error	Standardized β	p	95% CI for β	
(Constant)	6.148	0.203		<0.001	5.743	6.553
Six-Minute Walk Test (meters)	−0.001	0.000	−0.191	0.014	−0.002	0.000
BBS	−0.056	0.006	−0.722	<0.001	−0.067	−0.044

Notes: Dependent variable: ln(FES score), R^2=0.728, F=103.205, p<0.001.
Abbreviations: FES, Falls Efficacy Scale; CI, Confidence interval; BBS, Berg Balance Scale.

GOLD classification (p=0.403), disease stage based on FEV_1 (p=0.560), duration of COPD (p=0.804), CAT (p=0.223), mMRC (p=0.498), FVC (%) (p=0.304), FEV1 (%) (p=0.912), FEV1/FVC (p=0.446) and TUG time (p=0.650) were found to be non-significant (Table 4).

Ten patients (12.50%) had FES scores ≥70, indicating high FOF. All of these patients were classified as having moderate fall risk according to BBS. Among the 70 patients with FES ≤70, 54 (77.14%) had low fall risk, 15 (21.43%) had moderate risk, and 1 (1.43%) had high risk.

Discussion

This study examined the frequency of fear of falling (FOF) and its association with various clinical and functional parameters in patients with chronic obstructive pulmonary disease (COPD). FOF was found to correlate significantly with postural balance, physical performance, and disease severity. COPD may impair balance control through systemic inflammation, reduced muscle strength, and aging-related changes in proprioception and neuromuscular function.[29] Aging is a well-known risk factor for impaired balance and increased fall risk, with approximately 30% of individuals over 60 experiencing at least one fall per year.[2] In our study, FOF increased with age; however, it remains unclear whether this is COPD-specific or primarily age-related. Literature supports the role of aging in FOF among COPD patients, but further research is warranted to clarify this relationship.[30,31] The broader aging process common in COPD – including ongoing inflammation, cellular damage, and accelerated aging – likely makes this cycle worse by contributing to overall frailty and continued functional decline.

Women typically face higher fall risks,[32,33] but our study found no meaningful difference in FOF between men and women. This contrasts with some earlier work – Hellström et al reported more FOF in women with COPD,[8] while Oliveira's team found results similar to ours.[10] Our findings might reflect our small number of female participants (just 7 women, or 8.75%), which makes it harder to detect real differences. Alternatively, COPD might affect fall concerns so strongly that it overwhelms the usual gender patterns we see in healthy older adults.

While the total number of comorbidities was not significantly associated with FOF, patients with hypertension and heart failure exhibited significantly higher FOF scores. This may be attributed to cardiovascular-related hemodynamic instability and reduced functional capacity.[34–38]

In this study, FOF was assessed using FES, while balance and fall risk were evaluated using TUG and BBS. We found that all patients with high FES scores (≥70) were classified as having moderate fall risk according to the BBS. These findings are consistent with previous research by Oliveira et al, who reported that balance impairment in COPD patients was independently associated with FOF.[10] In line with these findings, our study demonstrated a positive correlation between FES scores and TUG test results and a negative correlation between FES scores and BBS scores. However, among patients with FES scores below 70, which indicates a low fear of falling, 21.4% were still found to have a moderate and 1.4% a high level of fall risk according to the BBS. This suggests that some patients may underestimate their actual fall risk. Consequently, fall risk assessment should not rely solely on patient-reported FOF but should be supplemented with objective balance testing to guide clinical decision-making.

In our study, fear of falling was significantly higher in patients with a history of falling. This finding supports the notion that previous falls may contribute to increased fear of falling in COPD patients. Beauchamp et al reported that individuals with a history of falls had lower confidence in their balance, which may underlie the heightened FOF observed in this group.[4] Similarly, Oliveira et al highlighted that FOF may remain elevated in COPD patients even in the absence of prior falls, suggesting that FOF is not solely a consequence of fall experiences but may also be influenced by perceived instability and functional limitations.[10]

FOF is also known to restrict physical activity, reduce participation in daily living activities, and negatively affect quality of life in COPD patients. Dyspnea, limited mobility, and concerns about falling may lead patients to avoid movement, which in turn can contribute to deconditioning and further increase fall risk. These behavioral adaptations highlight the importance of early identification and targeted intervention for FOF to preserve independence and functional status.

FOF was significantly higher in GOLD Group B and E patients compared to Group A, and in Stages 3 and 4 compared to Stages 1 and 2, indicating that FOF increases with disease progression. In addition, FOF showed a positive correlation with COPD duration, CAT and mMRC scores, and a negative correlation with 6MWT distance. These findings indicate that FOF is strongly associated with functional decline and symptom severity. Similar to previous findings by Oliveira et al, FOF in COPD is not only related to fall risk but also reflects impaired mobility and reduced self-confidence.[10] Since patients with longer-standing COPD showed more fall fears, we might help more by starting balance assessments and fall prevention education when patients are first diagnosed, rather than waiting until their disease becomes severe. Early intervention could help prevent significant FOF from developing and keep patients more active throughout their illness.

Rehabilitative strategies targeting balance impairments have shown positive results. Beauchamp et al reported that incorporating balance training into pulmonary rehabilitation programs significantly reduced FOF.[25] Our findings support the inclusion of structured balance interventions in COPD rehabilitation to mitigate fall risk and restore patient confidence.

Despite growing evidence, balance-specific exercises are not yet systematically included in all pulmonary rehabilitation programs. Balance impairments are increasingly recognized as a distinct comorbidity in patients with COPD, with significant implications for functional independence and fall risk.[39,40] Our results underscore the importance of evaluating FOF and balance performance in COPD patients and implementing individualized interventions aimed at both respiratory and neuromuscular components.

FOF is not solely influenced by physical impairments; psychological and cognitive factors also contribute to its severity.[8] Karaca et al demonstrated that the addition of Body Awareness Therapy (BAT) to standard pulmonary rehabilitation significantly reduced FOF in COPD patients.[41] Although our study did not assess psychological variables, we recognize the need for future research to integrate cognitive-behavioral and perceptual-motor strategies into rehabilitation. A comprehensive approach addressing both physical and psychological contributors to FOF may improve functional outcomes and patient safety.

Our findings suggest that doctors and rehabilitation teams should routinely ask COPD patients about fall fears, especially those with advanced disease or previous falls. Several approaches might help reduce FOF: structured balance training programs, progressive balance exercises, and cognitive-behavioral interventions to address fall-related anxiety. Beauchamp's research showed that 8 weeks of balance training meaningfully reduced FOF in COPD patients. Teaching patients about preventing falls and making their homes safer could also help reduce both actual fall risk and the tendency to avoid activities out of fear.

Our study has several important limitations. Because we examined patients at only one time point, we cannot determine whether FOF causes functional problems or results from them. Our convenience sample from a single hospital may not represent all COPD patients in the community. Also, recruiting patients from hospital clinics rather than the community may have given us a sample with more severe symptoms, possibly making FOF appear more common than it actually is among all COPD patients. We did not measure anxiety or depression, which likely influence fall fears. The small number of women in our study limited our ability to detect gender differences. We also lacked follow-up data to see how FOF changes over time or relates to actual falls.

Conclusion

Our study shows that fear of falling in COPD patients connects strongly with disease severity, physical limitations, and balance problems. Notably, all patients with high fall fears also had measurable balance issues, but some patients with low fear scores still showed concerning fall risk on objective tests. This suggests that both patient-reported fears and physical testing provide valuable but different information. These findings support including fall fear screening and balance checks in routine COPD care, particularly for patients with more advanced disease. Adding targeted balance training and fall prevention strategies to standard lung rehabilitation programs may help reduce both fear and actual fall risk, ultimately helping patients maintain their independence and quality of life. Future studies should follow COPD patients over time to better understand how FOF develops and changes. We need randomized trials testing whether specific balance training programs actually reduce both fall fears and real falls. Research should also explore how anxiety and depression contribute to FOF, and whether fall prevention programs save money in the long run. Studies with more women and diverse populations would help us understand FOF patterns across different groups of COPD patients.

Disclosure

The authors report no conflicts of interest in this work.

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