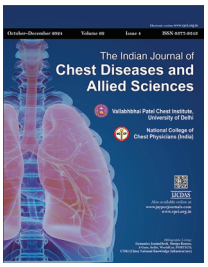
ORIGINAL RESEARCH

Comparative Study of Frailty Phenotype and Short Physical Performance Battery for Frailty Assessment in Chronic Obstructive Pulmonary Disease



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Abstract

Aim and background: Frailty is a multidimensional syndrome of physical and cognitive impairments predisposing patients to increased risk of hospitalizations and poorer health-related quality of life. We conducted this study with the aim of comparing the frailty phenotype (FP) and short physical performance battery (SPPB) methods for the assessment of frailty in chronic obstructive pulmonary disease (COPD).

Materials and methods: This is a descriptive cross-sectional study conducted in 150 stable COPD patients. Frailty was assessed using the FP and SPPB methods, followed by a comparative evaluation of the two methods.

Results: The prevalence of frailty was 51.33% ($n = 77$) by the FP method and 21.33% ($n = 32$) by SPPB. Frail patients in both groups had the lowest post-bronchodilator forced expiratory volume in 1 second (FEV1) (%) ($p < 0.0001$). The median St. George's Respiratory Questionnaire (SGRQ) score was highest in the Frail group by the FP method [43.21 (32.116–58.338)] and pre-frail group by SPPB [43.47 (30.913–59.02)] ($p = 0.007$). The association between FP and SPPB was significant but with poor inter-rater kappa agreement (0.196, $p = 0.0001$). Frailty phenotype method showed a significant positive correlation, whereas SPPB had a significant negative correlation with duration of dyspnea ($r = 0.3$; $r = –0.269$), frequency of exacerbations ($r = 0.498$; $r = –0.548$), mMRC score ($r = 0.525$; $r = –0.408$), CAT score ($r = 0.478$; $r = –0.52$) and pack-years of smoking ($r = 0.301$; $r = –0.278$). Six-minute walk test (6MWT) distance had a significant association with frailty ($p < 0.0001$) by both methods.

Conclusion: Frailty phenotype is a more sensitive method of frailty assessment in COPD compared to SPPB and correlates better with the severity of the disease. However, both methods showed a significant positive correlation with distance covered in 6MWT.

Clinical significance: The FP and SPPB both identified a group of stable COPD patients with frailty. Our study underscores the importance of early identification and timely intervention to prevent deconditioning of muscular and cardiovascular systems which can otherwise progress to frailty.

Keywords: Chronic obstructive, Frailty, Pulmonary disease, Quality of life, Six-minute walk test.

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Abbreviations used in this Article

ATS = American Thoracic Society; CAT = COPD assessment test; CI = Confidence intervals; CFS = Clinical frailty scale; CRP = C-reactive protein; FFP = Fried frailty phenotype; FP = Frailty phenotype; mMRC = Modified medical research council; OPD = Outpatient department; OR = Odds ratios; SPPB = Short physical performance battery; TNF = Tumor necrosis factor; UCSD SOBQ = University of California San Diego shortness of breath questionnaire; 6MWT = Six-minute walk test.

Introduction

Frailty is a syndrome characterized by an aggregation of physiologic deficits across different interconnected body systems, leading to functional limitations and heightened vulnerability to new stressors that would otherwise be inconsequential.[1] The pathways contributing to frailty involve chronic systemic inflammation, marked by elevated serum levels of proinflammatory cytokines such as interleukin-6, tumor necrosis factor (TNF)-α, and C-reactive protein (CRP). Chronic obstructive pulmonary disease (COPD) impairs peripheral muscle performance and reduces functional capacity, making patients more prone to frailty, with a prevalence ranging from 6 to 57.8%.[2,3] Additionally, acute exacerbations of COPD are associated with impaired lung function, reduced muscle strength, and physical inactivity.[3–6] Valenza MC conducted a study on adult COPD patients and found that more frequent exacerbations of lung disease, hospitalizations, functional status

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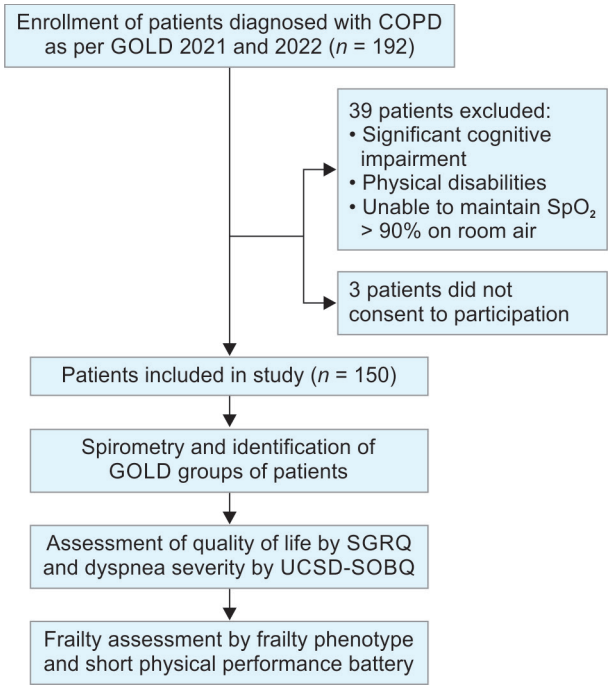


Fig. 1: Methodology of study

decline, and all-cause mortality are all independently associated with frailty.[7]

Numerous measures have been devised for the assessment of frailty including the fried frailty phenotype (FFP),[8] short physical performance battery (SPPB),[9] Frailty Index,[10] Clinical Frailty Scale (CFS),[11] and Reported Edmonton Frail Scale.[12] Limpawattana et al. conducted a study that reported a 10.2% prevalence of frailty in elderly COPD patients, as determined by the FFP method.[13] In the study by Patel et al., determinants of frailty in COPD by SPPB were quadriceps strength and functional exercise capacity rather than lung function.[14] Research on frailty in COPD patients is limited, especially in Southeast Asia, where lifestyle and ethnic factors differ from those in other regions. Given the limited availability of Indian studies on the prevalence of frailty in COPD, this study was conducted to assess frailty among COPD patients in India using two distinct methods: FP and SPPB. The prevalence obtained by each method was correlated with other predictors of disease severity and quality of life followed by a comparative assessment of the two methods.

Materials and Methods

This was a prospective descriptive cross-sectional study. In the study, we recruited 150 patients visiting the outpatient department (OPD) at Vallabhbhai Patel Chest Institute, Delhi, India during 2021–2022. The ethical clearance for the study was taken from the Institutional Ethics Committee. Patients diagnosed with COPD as per the GOLD 2021 guidelines and giving their informed consent, were included in the study.[15] Patients with significant cognitive impairment or with any physical disability or unable to maintain $SpO_2 > 90\%$ on room air were excluded. Patients who did not give full voluntary informed consent were also excluded from the study. The sample size was based on the reported average mean prevalence of frailty in COPD by using formula $n = [Z^2 \times p(1-p)]/d^2$ where "*n*" is the sample size, prevalence "*p*" was 5%, "*z*" was 1.96 (for a level of confidence of 95% according to the standard normal distribution) and "*d*" was precision (tolerated margin of error), i.e., 0.05. The computed minimal sample size was 64. To improve the power of our study, we have taken a sample size of 150 patients.

The methodology followed is as depicted in Figure 1. All baseline characteristics, such as age, gender, body mass index (BMI), and smoking status including pack-years of smoking, were recorded. Pulmonary function tests were conducted in accordance with the 2019 guidelines of the American Thoracic Society (ATS) and European Respiratory Society guidelines of 2021.[16,17] All the recruited patients were assessed for frailty by the following two methods:

Frailty Phenotype

A modified version of the FP was used, based on the criteria originally defined by Fried et al.[8] Patients with ≥3 of the 5 following components were identified as frail:[4,5]

- Weakness: Jamar Hand-held Dynamometer was used to measure Handgrip strength.[18] A score of 1 was assigned for reduced grip strength in the dominant hand, adjusted for sex and BMI.
- Weight loss: A score of 1 was assigned for unintentional weight loss exceeding 5% of body weight or a loss of 4.5 kg within the past year.[8]
- Exhaustion: Self-reported exhaustion was assessed using two questions from the Center for Epidemiological Studies Depression Scale, which evaluated feelings of constant fatigue and difficulty initiating tasks in the past week.[19]
- Functional limitation: A score of 1 was assigned to patients who were unable to complete five consecutive Sit-to-stand tests in <12 seconds.
- Low physical activity: A score of 1 was assigned for low levels of moderate physical activity, defined as less than 150 minutes per week.[20] Moderate physical activities included brisk walking (4 mph), heavy cleaning (e.g., washing windows, vacuuming, mopping), light-effort bicycling (10–12 mph), and recreational activities like badminton and tennis.[20]

Maximum score was 5. If the score was ≥3, it was interpreted as Frail, 1–2 was as Pre-frail, and a score of 0 was Not Frail.

Short Physical Performance Battery

Thereafter, the frailty was assessed using the SPPB. SPPB is a three-component assessment of lower extremity performance including scoring of gait speed, chair stands, and balance. The individual components are given scores ranging from 0 to 4, with a total SPPB score ranging from 0 to 12. An SPPB score of ≤7 indicates frailty, 8–9 denotes pre-frailty, and ≥10 represents an absence of frailty.[9]

A correlation analysis was performed between frailty, as determined by the FP and SPPB methods, and the following parameters:

Dyspnea severity: Dyspnea severity was evaluated using the University of California San Diego Shortness of Breath Questionnaire (UCSD SOBQ).[21] Patients were asked to grade their dyspnea severity as experienced by them during 24 common daily activities (e.g., walking upstairs, dressing, bathing) resulting in a total score ranging from 0 to 120.

- Six-minute-walk test (6MWT),[22]
- COPD assessment test (CAT) score,[15]
- Spirometry parameters performed as per ATS criteria,[16]
- Quality of life by St George's Respiratory Questionnaire,[23]
- Modified Medical Research Council (mMRC) dyspnea scale.[24]

Statistical Analysis

Descriptive statistics were presented as percentages for categorical variables, mean (SD) for normally distributed continuous variables, and median for non-normally distributed continuous variables. The Chi-square test or Fisher's Exact test was used to assess the relationships between two categorical variables. A p-value of < 0.05 was considered statistically significant. The correlation between frailty and various parameters was analyzed using the Pearson Rho coefficient. Factors associated with frailty were analyzed using univariate and multivariate logistic regression. Univariate analysis provided crude odds ratios (OR) with 95% confidence intervals (CI), and factors with $p < 0.05$ were included in the multivariate model to determine adjusted ORs (95% CI). Statistical analyses were performed using IBM-SPSS Statistics version 23.

Results

The baseline characteristics of the study population are depicted in Table 1. The mean SD age of the participants was 60.59 (5.91) years. Out of these, there were 133 males (88.67%). Among them, 47 individuals (31.33%) were current smokers. Upon evaluation by the FP method, the prevalence of frailty was found to be 51.33% whereas, the prevalence of frailty by the SPPB method was found to be 20%. Patients identified as Frail by the FP measure had a higher number of exacerbations as compared to the frail patients by SPPB. By the FP measure, 51 (66.23%) frail patients were in GOLD group D whereas 21 (65.63%) frail patients by the SPPB method had similar severity of disease. Eighty-two patients (54.67%) experienced at least one exacerbation in the past 12 months. The majority of participants had cardiometabolic conditions, such as hypertension (44, 29.33%), type 2 diabetes mellitus (18, 12%), and coronary artery disease (15, 10%).

The total St. George's Respiratory Questionnaire (SGRQ) score was comparable in both Frail groups (43.21 vs 42.78) whereas the Frail group by SPPB measure had slightly better symptoms' score (43.01 ± 14.86 vs 45.71 ± 14.77) ($p = 0.1156$; 6.066–0.666) and activity score (44.19 vs 45.5). Participants classified as frail by either the FFP or SPPB did not show a significant difference in forced expiratory volume in 1 second (FEV1)% predicted [FP {40(36–47)} vs SPPB {40(33–47.25)}] or BMI [FP (21.84 ± 4.11) vs SPPB (22.65 ± 3.68)] ($p = 0.0732$; 1.6964–0.0764).

As depicted in Figure 2, our study demonstrated a significant positive correlation between frailty, assessed using the FP method, and factors such as age (p-value = 0.009), mMRC score, CAT score, and SGRQ scores. Pack-years of smoking, duration of dyspnea, and number of exacerbations in the past year. On the contrary, frailty evaluated through the SPPB method showed a significant negative correlation with the same factors. A significant negative correlation was found between frailty by either measure with post-bronchodilator FEV1(%), FVC(%), FEV1/FVC, 6MWT distance, and dyspnea severity.

Table 2 is representative of the association between FP and SPPB, which was significant but with a poor inter-rater kappa agreement of 0.196 (p-value = 0.0001). Among the 51.33% ($n = 77$) patients classified into the Frail group by the FP method, only 20% ($n = 30$) were categorized as Frail by SPPB. The rest 28.67% ($n = 43$) and 2.67% ($n = 4$) were categorized as pre-frail and not frail, respectively. This could possibly be due to the three objective measures in the SPPB method as compared to the four subjective and one objective parameter of FP method.

The univariate regression analysis for the FP measure, as presented in Table 3, revealed that the risk of frailty significantly increased with a history of ≥1 exacerbation in the past year, use of oral corticosteroid, pack-years of smoking, co-morbidities, CAT score, UCSD-SOBQ score, GOLD stages moderate and severe, GOLD group B and GOLD group D. The risk of frailty was significantly lower in patients with higher post-bronchodilator FEV1 (%), FVC (%), and greater distance covered during the 6MWT. In the multivariate regression analysis shown in Table 4, the only significant independent risk factors for frailty based on the FP measure were 6MWT distance and GOLD group B.

For frailty assessed using the SPPB method, univariate analysis identified symptom scores, impact scores, and total scores from the SGRQ as significant risk factors. However, multivariate logistic regression revealed that the 6MWT distance and severity of dyspnea were the significant independent predictors of frailty by the SPPB measure after adjusting for confounding factors.

Discussion

This study evaluated frailty in stable COPD patients by comparing the FP and SPPB frailty assessment methods. We found a significant association between FP and SPPB methods but with poor inter-rater kappa agreement, including an overlap of frailty classification in only 20% of cases. This finding contrasts with the study by Brighton et al., which reported approximately 80% agreement between the two measures.[4]

Participants classified as frail by either method showed significant differences from those categorized as non-frail or pre-frail. Frail subjects were predominantly male, exhibited lower post-bronchodilator FEV1, demonstrated poorer functional exercise capacity (6MWD), had a higher number of comorbidities, and experienced higher dyspnea severity. Our findings align with those of Singer et al., who reported that 28% of participants were identified as frail by the FFP and 10% by the SPPB, with higher frailty scores in both assessments independently associated with greater disability and a higher risk of mortality.[5]

The two measures showed significant differences in their associations with the duration of dyspnea, exacerbations in the past year, mMRC score, CAT score, SGRQ score, and pack-years of smoking. Frailty by FP measure showed a significant positive correlation with these characteristics in contrast to a significant negative correlation demonstrated by the SPPB measure. This could possibly be due to the objective measures of SPPB as compared to a rather subjective assessment by FP. This implies that FP and SPPB could not be used interchangeably in assessing frailty status in COPD patients.

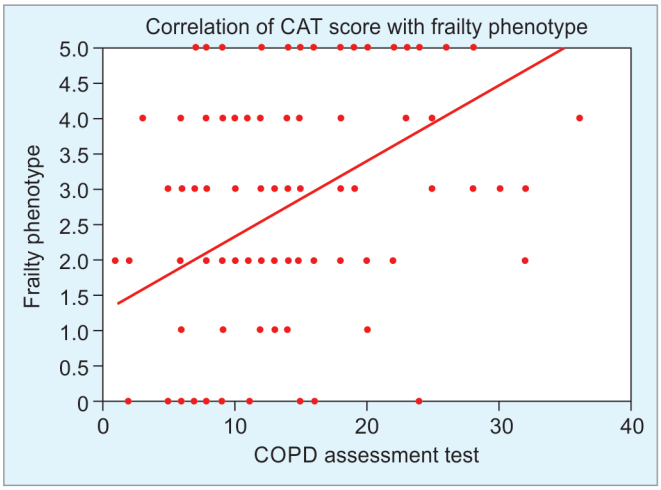
A common predictor of frailty by both the methods was distance covered in a 6MWT test. The distance covered in this self-paced test (6MWT) is a tool for assessing response to therapy and assessing symptom burden. In our study, the 6MWT distance was significantly lower in patients in the Frail group than those classified as Not Frail or Pre-frail. The negative correlation between 6MWT distance and frailty was also a notable finding in the study by Gale et al.[25] This signifies that frailty predisposes COPD patients to have poor functional capacity due to limb muscle dysfunction and reduced gait speed.

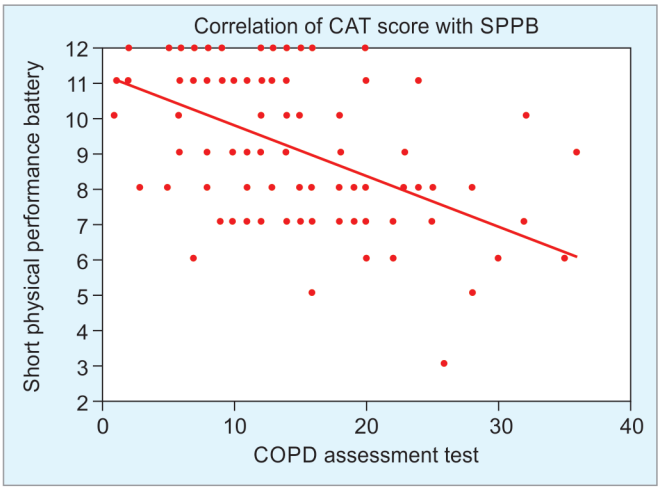
The assessment of frailty in respiratory care is gaining importance with the increasing availability of resources and equipment across various settings (e.g., handgrip dynamometers) highlighting the need to understand the utilities of different

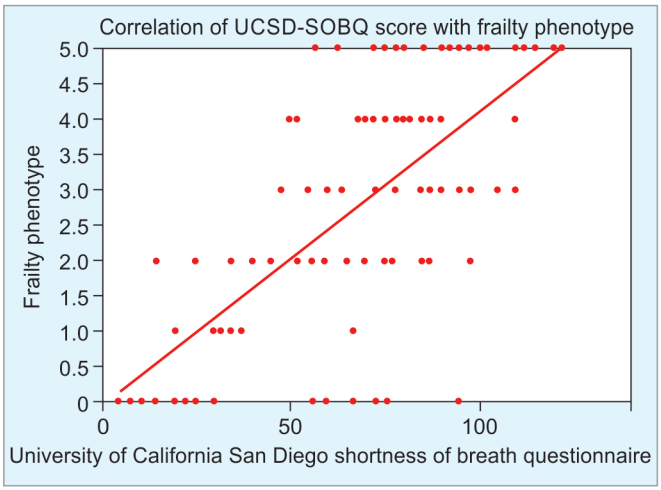
Table 1: Characteristics of study population

	Total	*Frailty phenotype*				*Short physical performance battery*			
Characteristics	*n (%)**	*Not frail (n = 24)*	*Pre-frail (n = 49)*	*Frail (n = 77)*	*p-value***	*Not frail (n = 64)*	*Pre-frail (n = 54)*	*Frail (n = 32)*	*p-value***
Gender									
Female	17 (11.33%)	2 (8.33%)	9 (18.37%)	6 (7.79%)	0.197	10 (15.6%)	5 (9.26%)	2 (6.25%)	0.399
Male	133 (88.67%)	22 (91.6%)	40 (81.63%)	71 (92.21%)		54 (84.3%)	49 (90.7%)	30 (93.7%)	
Age (in years) Mean ± SD	60.59 ± 5.91	59.21 ± 7.95	59.06 ± 5.66	62 ± 4.99	0.01	59 ± 6.72	61.3 ± 4.7	62.4 ± 5.2	0.011
Number of exacerbations in last 1 year									
0	68 (45.33%)	19 (79.17%)	34 (69.39%)	15 (19.48%)	<0.0001	48 (75%)	16 (29.6%)	4 (12.50%)	<0.01
1	63 (42%)	3 (12.50%)	12 (24.49%)	48 (62.34%)		12 (18.7%)	34 (62.9%)	17 (53.1%)	
2	10 (6.67%)	1 (4.17%)	1 (2.04%)	8 (10.39%)		1 (1.56%)	3 (5.56%)	6 (18.75%)	
3	9 (6%)	1 (4.17%)	2 (4.08%)	6 (7.79%)		3 (4.69%)	1 (1.85%)	5 (15.63%)	
Smoking history									
Never smoker	23 (15.33%)	3 (12.5%)	11 (22.45%)	9 (11.69%)	0.195	13 (20.3%)	5 (9.26%)	5 (15.63%)	0.603
Current smoker	47 (31.33%)	11 (45.83%)	15 (30.61%)	21 (27.27%)		19 (29.6%)	18 (33.3%)	10 (31.2%)	
Ex-smoker	80 (53.33%)	10 (41.67%)	23 (46.94%)	47 (61.04%)		32 (50%)	31 (57.4%)	17 (53.1%)	
GOLD groups									
A	31 (20.67%)	17 (70.83%)	8 (16.33%)	6 (7.79%)	<0.0001	26 (40.63%)	3 (5.56%)	2 (6.25%)	<0.0001
B	52 (34.67%)	4 (16.67%)	33 (67.35%)	15 (19.48%)		28 (43.75%)	17 (31.48%)	7 (21.88%)	
C	7 (4.67%)	0 (0%)	2 (4.08%)	5 (6.49%)		1 (1.56%)	4 (7.41%)	2 (6.25%)	
D	60 (40%)	3 (12.50%)	6 (12.24%)	51 (66.23%)		9 (14.06%)	30 (55.56%)	21 (65.63%)	
Total	150 (100%)	24 (100%)	49 (100%)	77 (100%)		64 (100%)	54 (100%)	32 (100%)	
Spirometry Post-bronchodilator FEV1 (%)	76.43 ± 14.21	84.75 ± 13.41	79.86 ± 13.68	71.66 ± 13.07	0.002	80.83 ± 13.13	74.41 ± 13.57	71.06 ± 15.13	0.002
6 MWD Median (IQR)	340 (280–400)	410 (400–420)	360 (360–400)	280 (240–320)	<0.0001	400 (360–420)	300 (280–355)	240 (200–300)	<0.0001
Dyspnea severity by UCSD-SOBQ (Mean ± SD)	67.71 ± 27.99	41.33 ± 29.88	52.53 ± 20.81	85.58 ± 17.34	<0.0001	46.7 ± 24.37	78.37 ± 18.84	91.72 ± 15.75	<0.0001
SGRQ Total score Median (IQR).	39.72 (22.95–50.82)	39.72 (20.89–48.11)	30.2 (18.6–46.558)	43.21 (32.11–58.33)	0.007	32.38 (18.47–47.69)	43.47 (30.9–59.02)	42.78 (28.85–54.66)	0.004

*All results are in *n* (%), except wherever specified. ***p*-values obtained by Fisher's exact test, Chi-square test, ANOVA, and Kruskal–Wallis test


Correlation of CAT score with frailty phenotype
Frailty phenotype
COPD assessment test


Correlation of CAT score with SPPB
Short physical performance battery
COPD assessment test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Frailty phenotype
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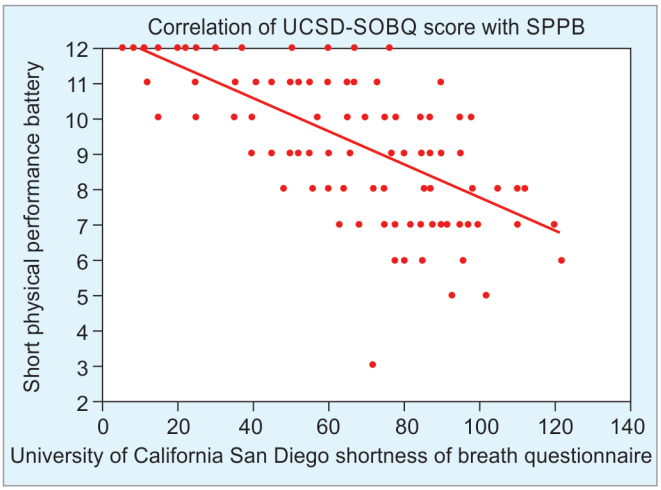
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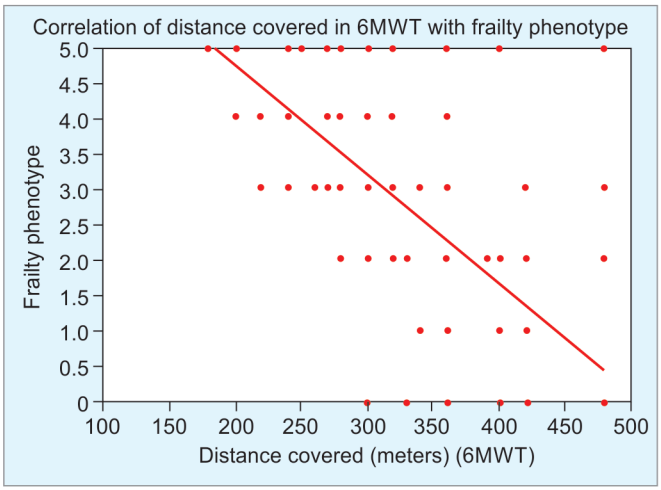
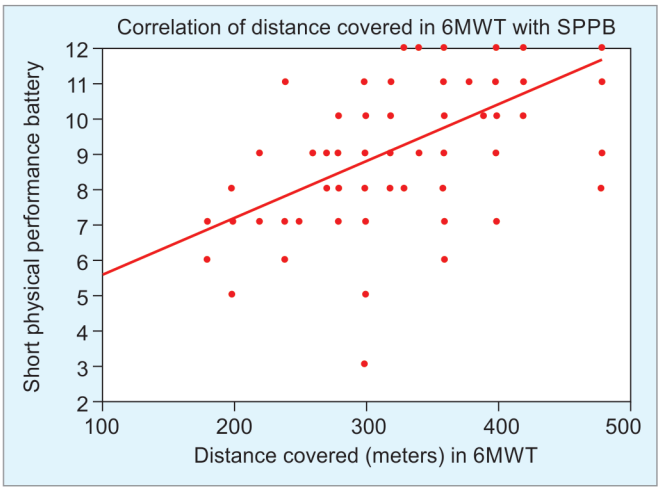

Correlation of distance covered in 6MWT with frailty phenotype
Frailty phenotype
Distance covered (meters) (6MWT)


Correlation of distance covered in 6MWT with SPPB
Short physical performance battery
Distance covered (meters) in 6MWT

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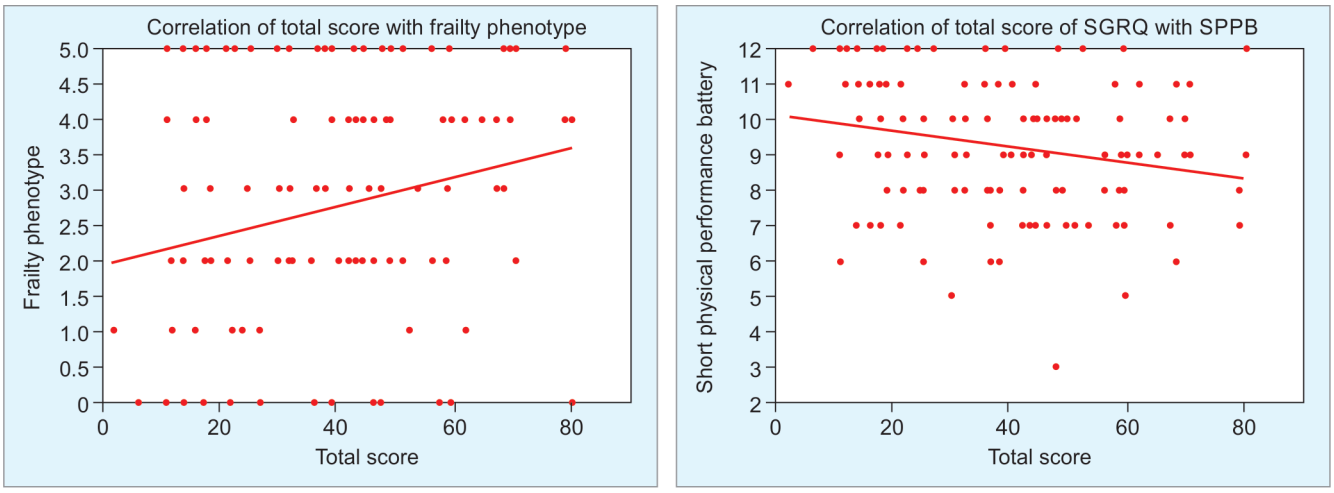

Fig. 2: Correlation of frailty by FP and SPPB measures CAT score, University of California San Diego-Shortness of Breath Questionnaire (UCSD-SOBQ), 6MWT and SGRQ

Table 2: Inter-rater kappa agreement between FP and SPPB ($n = 150$)

	Short physical performance battery					
Frailty phenotype	*Not frail (n = 64)*	*Pre-frail (n = 54)*	*Frail (n = 32)*	*Total*	*p-value*	*Kappa*
Not frail	24 (16.00%)	0 (0.00%)	0 (0.00%)	24 (16.00%)	0.0001	0.196
Pre-frail	36 (24.00%)	11 (7.33%)	2 (1.33%)	49 (32.67%)		
Frail	4 (2.67%)	43 (28.67%)	30 (20.00%)	77 (51.33%)		
Total	64 (42.67%)	54 (36.00%)	32 (21.33%)	150 (100.00%)		

Table 3: Univariate analysis of predictive factors comparing the SPPB and FP

	Short physical performance battery			*Frailty phenotype*		
Variables	*p-value*	*Odds ratio*	*95% CI*	*p-value*	*Odds ratio*	*95% CI*
Age (years)	0.006	1.086	1.152–1.024	0.214	1.048	1.127–0.974
Duration of cough (years)	0.007	1.127	1.230–1.033	0.090	1.117	1.27–0.983
COPD assessment test	<0.0001	1.151	1.230–1.033	0.001	1.175	1.294–1.066
Pack years	0.0004	1.048	1.076–1.021	0.046	1.036	1.074–1.001
Post-bronchodilator FVC (%)	0.002	0.961	0.985–0.937	0.003	0.955	0.985–0.926
Post-bronchodilator FEV1 (%)	<0.0001	0.928	0.954–0.903	<0.0001	0.940	0.913–0.968
Post-bronchodilator FEV1/FVC	<0.0001	0.973	0.982–0.965	0.060	0.969	1.001–0.938
Distance covered (m){6MWT}	<0.0001	0.973	0.992–0.965	<0.0001	0.975	0.986–0.965
University of California San Diego shortness of breath questionnaire	<0.0001	1.075	1.100–1.051	<0.0001	1.044	1.063–1.024
Symptoms score	0.104	1.014	1.031–0.997	0.676	1.006	1.033–0.979
Impacts score	0.001	1.029	1.046–1.012	0.743	1.003	1.024–0.983
Total score	0.001	1.033	1.054–1.013	0.636	1.006	1.030–0.982
1	<0.0001	9.724	21.887–4.320	0.002	6.810	22.779–2.036
2	0.005	14.987	98.337–2.284	0.341	2.495	16.378–0.380
3	0.049	4.367	18.888–1.010	0.409	2.232	14.989–0.332
Comorbidities	0.014	2.321	4.542–1.186	0.046	2.673	7.030–1.016
GOLD groups						
A		1.000			1.000	
B	0.01	4.142	12.306–1.406	<0.0001	13.060	43.566–3.915
C	0.005	20.92	173.671–2.522	0.070	18.197	421.795–0.785
D	<0.0001	26.12	83.770–8.148	<0.0001	19.880	72.751–5.432

Table 4: Multivariate analysis of predictive factors comparing the short physical performance battery and frailty phenotype

	Short physical performance battery			*Frailty phenotype*		
Variables	*p-value*	*Odds ratio*	*95% CI*	*p-value*	*Odds ratio*	*95% CI*
Age (years)	0.729	1.019	0.916–1.134			
Duration of cough (years)	0.843	1.017	0.862–1.199			
COPD assessment test	0.959	0.997	0.897–1.109	0.510	0.956	0.835–1.094
Pack years	0.2609	1.027	0.981–1.075	0.779	0.994	0.951–1.038
Post-bronchodilator FVC (%)	0.333	1.035	0.966–1.108	0.191	0.964	0.911–1.019
Post-bronchodilator FEV1 (%)	0.235	0.939	0.845–1.042	0.786	0.990	0.917–1.068
Post-bronchodilator FEV1/FVC	0.322	1.045	0.958–1.140			
Distance covered in 6MWT	0.017	0.986	0.975–0.998	0.004	0.979	0.965–0.993
University of California San Diego shortness of breath questionnaire	0.005	1.046	1.013–1.080	0.789	1.004	0.977–1.031
Symptoms score	0.093	1.050	0.992–1.111			
Impacts score	0.289	1.032	0.973–1.095			
Total score	0.138	0.941	0.869–1.020			
Number of exacerbations in last 1 year						
0		1.000			1.000	
1	0.578	0.552	0.068–4.477	0.298	0.254	0.019–3.355
2	0.729	0.472	0.007–32.761	0.119	0.042	0.001–2.246
3	0.213	0.114	0.004–3.477	0.079	0.025	0.000–1.521
Use of steroid	0.147	4.643	0.581–37.078	0.248	4.239	0.365–49.162
Comorbidities	0.184	2.251	0.681–7.446	0.186	2.612	0.630–10.831
GOLD stages						
Mild		1.000			1.000	
Moderate	0.677	1.726	0.132–22.602	0.095	7.403	0.708–77.376
Severe	0.4102	4.668	0.119–182.676	0.3428	5.917	0.150–233.084
Very severe	0.926	0.797	0.007–94.853	0.853	1.592	0.012–215.509
GOLD groups						
A		1.000			1.000	
B	0.41	2.304	0.321–16.531	0.004	13.593	2.265–81.589
C	0.336	5.971	0.157–227.595	0.220	11.073	0.238–514.822
D	0.709	1.815	0.079–41.517	0.232	6.922	0.289–165.658

measures when deciding on a screening approach.[18] For instance, the FP might focus more on identifying individuals with subjective symptoms, placing less emphasis on balance and gait issues which the SPPB method addresses, while being less sensitive to parameters such as exhaustion and weight loss. Wherever physical tests are not feasible, self-reported screening tools, (e.g., frail scale) are necessitated.[26–28] Comprehensive geriatric assessment is considered the gold standard for identifying frailty syndrome.[6]

The absence of follow-up in our study limited the ability to use frailty assessments to foretell risks of exacerbations, time to first hospitalization, or mortality, while the single-center design and limited number of participants may affect the external validity of the results. Although both measures were performed by the patients and the sequence of the tests was allotted randomly to reduce the learning effect, parameters like gait speed test, chair stand test, or hand grip strength might have been impacted.

Conclusion

In conclusion, in Indian patients with stable COPD, we found the prevalence of frailty to be 51.33% by FP and 21.33% by short performance physical battery. We found that both these methods of frailty assessment cannot be used interchangeably. 6MWT distance was found to be the most important predictor of frailty and it correlated with frailty by both methods.

Clinical Significance

The FP and SPPB both identified a group of stable COPD patients with a multidimensional syndrome that is frailty. By illustrating associations of either measure with a poorer functional status and higher disease severity, we aim to stress the importance of early identification and prompt intervention to ameliorate the deconditioning of muscular and cardiovascular systems that contribute to frailty. Alongside this, the limitation in activities of

daily living and heightened risk of mortality emphasize the need for an integrated approach that includes palliative care and easy access to appropriate care settings.

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