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Original Article

Breathlessness Beliefs and Related Factors in Male Patients with Chronic Obstructive Pulmonary Disease

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Abstract

OBJECTIVE: Dyspnea may be a debilitating factor for people with pulmonary problems as it may cause fear of movement. The aim of the present study was to determine the related factors with breathlessness beliefs, in other words, dyspnea-related fear of movement, in patients with chronic obstructive pulmonary disease.

MATERIAL AND METHODS: Male patients with chronic obstructive pulmonary disease were included in the study. Breathlessness beliefs (Breathlessness Belief Questionnaire), perceived dyspnea severity (modified Medical Research Council Dyspnea Scale and modified Borg Scale), pulmonary function tests (forced vital capacity, forced expiration volume in 1 second, and peak expiratory flow), emotional status (Hospital Anxiety and Depression Scale), fatigue (Fatigue Impact Scale and Fatigue Severity Scale), physical activity level (International Physical Activity Questionnaire—Short Form), disease-related quality of life (St. George Respiratory Questionnaire), and generic quality of life (Short-Form 36) were evaluated.

RESULTS: A total of 70 patients were included. Significant correlations were detected between breathlessness beliefs and perceived dyspnea severity, pulmonary function tests, emotional status, fatigue, physical activity level, disease-related quality of life, and generic quality of life ($P < .001$). No correlations were detected between physical characteristics and dyspnea-related fear of movement ($P > .05$).

CONCLUSION: Dyspnea-related fear of movement was found to be strongly related to perceived dyspnea severity, pulmonary function tests, emotional status, fatigue, physical activity level, and quality of life; thus, including breathlessness beliefs assessment into clinical examination may help clinicians to understand their patients' needs comprehensively.

KEYWORDS: Dyspnea, fear of movement, pulmonary diseases
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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a progressive chronic disease which not only involves the lungs and respiratory tract but also causes systematic changes in the body.[1] Chronic obstructive pulmonary disease shows characteristic symptoms such as dyspnea, cough, and increased phlegm production. Among these symptoms, dyspnea is the most reported one (71%) and was found related to decreased physical activity levels.[2] Dyspnea is defined as a multidimensional subjective experience just as pain by some authors,[3] and perceived dyspnea severity of the patient has an important role in disease management. Dyspnea may also cause decreased physical activity levels in patients with COPD. Decreased activity levels may cause muscle weakness, increased anxiety and depression, and deteriorated quality of life in patients with COPD.[4] Thus, it is important to determine the dyspnea-related fear of movement, in other words, breathlessness beliefs, and its relationships with other clinical outcomes in patients with pulmonary problems.

Previously, breathlessness beliefs were associated to perceived dyspnea level, emotional status, and disease-related quality of life.[5-7] However, there are limited data regarding the relationships among breathlessness beliefs, fatigue, and physical activity levels.[8,9] Therefore, the aim of the present study was to determine the factors related to breathlessness beliefs in male patients with COPD.

MATERIAL AND METHODS

Patients

In this cross-sectional study, patients who were diagnosed with COPD according to Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria[10] (forced vital capacity (FVC)/forced expiration volume in 1 second (FEV_1) <0.70) and who visited the Dokuz Eylül University Hospital, Department of Pulmonary Diseases, for their routine assessment were invited for participation. Inclusion criteria were as follows: (a) being literate in Turkish language, (b) being male, (c) being diagnosed at least 1 month prior to the study, (d) being older than 45 years old, and (e) willingness to participate in the study. Patients were excluded if they (a) had severe pain (b) had any orthopedic or musculoskeletal

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problems, (c) had trauma in the last 6 months, (d) were hospitalized in the last 6 months, (e) need non-invasive mechanical ventilation, (f) need constant/long-term oxygen therapy, (g) had ongoing pulmonary rehabilitation, or (h) had another medical condition which may cause dyspnea. An informed consent was obtained from all the participants prior to the study. The ethical approval was obtained from Dokuz Eylül University with the number of 2016/23-17.

ASSESSMENTS

Physical and Clinical Characteristics

Physical characteristics (age, height, and weight) were recorded. Body mass index (BMI) was calculated according to the formula: kg/m^2.

Breathlessness Beliefs Questionnaire

Breathlessness Beliefs Questionnaire (BBQ), which was developed from a kinesiophobia questionnaire (Tampa Scale for Kinesiophobia), was used to evaluate the breathlessness beliefs.[5] Breathlessness Beliefs Questionnaire had 11 items, and each item was scored between 1 (strongly disagree) and 5 (strongly agree). Higher scores indicated higher dyspnea-related fear of movement. Breathlessness Beliefs Questionnaire had 2 subscales such as activity avoidance (BBQ-AA, 6 items) and somatic focus (BBQ-SF, 5 items). Breathlessness Beliefs Questionnaire was validated in Turkish.[7]

Perceived Dyspnea Severity

Perceived dyspnea severity was assessed by using modified Medical Research Council (mMRC) Dyspnea Scale[11] and modified Borg Scale.[12] Modified Medical Research Council Dyspnea Scale evaluated the generic perceived dyspnea in daily activities, while the modified Borg Scale evaluated the dyspnea level during physical effort.

Pulmonary Function Tests

Pulmonary function tests were performed by using spirometry. Forced vital capacity, FEV_1, FEV_1/FVC, and peak expiratory flow (PEF) were used in the analysis. The COPD severity was determined according to GOLD criteria[10] as follows: stage 1: $FEV_1 \geq 80\%$, stage 2: $50 \leq FEV_1 < 80\%$, stage 3: $30 \leq FEV_1 < 50$, and stage 4: $FEV_1 < 30$.

Emotional Status

The Hospital Anxiety and Depression (HAD) Scale was used for assessing emotional status. Hospital Anxiety and Depression Scale consisted of 14 questions and had 2 subscales such as anxiety (HAD-A) and depression (HAD-D). Higher scores indicated poor emotional status. The Turkish version of the HAD Scale was found reliable and valid.[13]

Fatigue

Fatigue was determined by using the Fatigue Impact Scale (FIS)[14] and Fatigue Severity Scale (FSS).[15] Both scales were shown valid and reliable in Turkish language. Fatigue Impact Scale had 40 questions, and each question was scored between 0 and 4. Higher scores indicated higher negative impact of fatigue on individuals' life. Fatigue Severity Scale consisted of 9 questions, and each question was scored between 0 and 7. Higher scores indicated higher levels of fatigue.

Physical Activity Level

International Physical Activity Questionnaire—Short Form (IPAQ) was used for evaluating the physical activity level. International Physical Activity Questionnaire—Short Form evaluated the time spent during walking, moderate-level physical activities, and high-level physical activities for the last 7 days. The Turkish version of IPAQ was reported as valid and reliable.[16]

Disease-Related Quality of Life

St. George Respiratory Questionnaire (SGRQ) was used for determining the disease-related quality of life. St. George Respiratory Questionnaire was analyzed under 4 scores such as symptoms, activity, impact, and total. Higher scores indicated more limitations in daily living activities. St. George Respiratory Questionnaire was found valid and reliable in Turkish language.[17]

Generic Quality of Life

Short-Form 36 (SF-36) was used for evaluating the general quality of life. Physical composite score and mental composite score were calculated as subscores. Higher scores defined a more favorable health state. The Turkish version of SF-36 was shown valid and reliable.[18]

Procedures

After recording the physical characteristics, all patients were evaluated by using pulmonary function tests, and then they completed the BBQ, HAD, FIS, FSS, IPAQ, SGRQ, and SF-36 questionnaires.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) version 15.0 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. The Kolmogorov–Smirnov test and histograms were used to evaluate the distribution of the data. As the parametric conditions were not met, data were presented as median and interquartile ranges (IQR 25/75) and minimum and maximum values. Spearman's rank-order correlation coefficients (rho) were used for exploring the relationships between BBQ and other assessments. The level of correlations[19] was categorized as follows: insignificant = 0-0.29, poor = 0.30-0.49, medium = 0.50-0.69, high = 0.70-0.89, and excellent = 0.90-1.00. $P < .05$ was considered as statistically significant.

MAIN POINTS

- Patients with chronic obstructive pulmonary disease (COPD) may present dyspnea-related fear of movement.
- Dyspnea-related fear of movement is related to perceived dyspnea, pulmonary function tests, emotional status, fatigue, physical activity level, and quality of life in male patients with COPD and thus should be considered as an asset in clinical examination.
- Assessing dyspnea-related fear of movement may help health professionals to prevent secondary morbidities earlier.

RESULTS

A total of 70 males with a median (IQR 25/75) age 69 years (61/75 years) and with a median (IQR 25/75) BMI

25.6 kg/m^2 (22.3/29.6 kg/m^2) participated in the study. Thirty (43%) patients had stage GOLD 2 COPD, 28 (40%) patients had GOLD stage 3 COPD, and 12 (17%) patients had GOLD stage 4 COPD. Fifty-eight patients (83%) reported smoking history. Physical, sociodemographic, and disease-related characteristics are presented in Table 1.

Breathlessness Beliefs Questionnaire-total, BBQ-AA, and BBQ-SF scores correlated with all the assessed parameters ($P < .05$, Table 2), except FEV_1/FVC and physical characteristics ($P > .05$, Table 2). Nearly all correlations were above the predetermined significant correlation level (rho >0.30, Table 2). Breathlessness beliefs were strongly correlated to fatigue severity, disease-related quality of life, and general quality of life (rho >0.70, Table 2), while poor correlations were detected between breathlessness beliefs and FVC, FEV_1, PEF, depression, physical activity, and mental component of generic quality of life (rho <0.50, Table 2).

DISCUSSION

The aim of the present study was to investigate the related factors to breathlessness beliefs in patients with COPD. According to our results, breathlessness beliefs seem related to perceived dyspnea, pulmonary function tests, emotional status, fatigue, physical activity level, and quality of life at different levels.

Breathlessness beliefs were investigated by using BBQ in Dutch, Chinese, and Turkish patients with COPD previously.[4-7] De Peuter et al[5] determined significant correlations between BBQ and HAD anxiety (rho between 0.45 and 0.60) and depression (rho between 0.46 and 0.47) scores in a Dutch outpatient group. Gurses et al[7] reported lower correlations between BBQ scores and HAD scores (*r* between 0.309 and 0.390) for Turkish patients. Similar results to the results of De Peuter et al both for anxiety (rho between 0.443 and 0.551) and for depression (rho between 0.394 and 0.463) were obtained in the present study. Despite slight differences between studies, it seems that emotional status is poorly/moderately related to breathlessness beliefs, and patients with higher levels of dyspnea-related fear of movement may experience more depression and anxiety and vice versa.

Wu et al[6] reported a poor relationship (rho = 0.40) between mMRC scores and Chinese version of BBQ. On the other hand, moderate to strong correlations were detected between these 2 parameters (rho between 0.514 and 0.708) in the present study. Especially, BBQ-AA subscores were found to be strongly correlated to mMRC scores, indicating that higher dyspnea may more likely result in activity avoidance. These differences between studies may be related to populations investigated.

The correlation between disease-related quality of life and dyspnea-related kinesiophobia was investigated in Turkish patients with COPD by Gurses et al.[7] recently. These authors used SGRQ as in the present study and concluded that breathlessness beliefs and disease-related quality of life poorly/moderately related (*r* between 0.226 and 0.619) to each other. Slightly higher correlations (rho between 0.521 and 0.736) were detected in the present study. Highest correlations were detected between BBQ-AA and SGRQ-total in both studies. This indicates that activity avoidance may deteriorate the disease-related quality of life. Moreover, negative correlations were detected between dyspnea-related kinesiophobia and generic quality of life in the present study, and breathlessness beliefs were more correlated to physical problems than mental problems.

In addition to the available evidence, the correlations among breathlessness beliefs and other important clinical aspects such as fatigue, physical activity level, and pulmonary function tests were also investigated in the present study. Our results revealed that both impact and severity of the fatigue increase with dyspnea-related fear of movement. Moreover, the highest correlation was detected between fatigue severity and breathlessness beliefs (rho = 0.771). It seems that fatigue is strongly related to dyspnea-related kinesiophobia and vice versa. Therefore, assessing the level of dyspnea-related kinesiophobia in a patient with a high level of fatigue may help clinicians to understand the roots of the problem.

As expected, physical activity levels showed a correlation to dyspnea-related kinesiophobia. This poor but statistically significant negative correlation (rho between –0.412 and –0.485) indicated that higher levels of dyspnea-related fear of movement may limit the physical activity levels of COPD patients.

The weakest correlations were detected between pulmonary function tests and breathlessness beliefs in the present study. Our results indicate that the role of pulmonary functions in dyspnea-related fear of movement may be limited. Patients with adequate pulmonary functions may still experience breathlessness beliefs. Thus, a comprehensive assessment would provide a better understanding instead of conducting solely pulmonary functions tests.

The majority of the patients were elderly in the present study. One can argue that dyspnea-related kinesiophobia may increase due to age. On the other hand, no correlations were found between age and breathlessness beliefs in the present study. Quality of life and related factors may change by aging in patients with COPD, and younger adults with COPD presented worse correlations between quality of life and dyspnea compared to older adults in previous studies.[20-22] Therefore, we would like to exclude this effect and include older adults in their late middle ages (45-64 years) and in their late adulthood (>65 years).[23] Besides, BMI was not correlated to dyspnea-related fear of movement according to our results. It seems that physical characteristics do not have an effect on breathlessness beliefs.

As fatigue severity, disease-related quality of life, and general quality of life were strongly correlated to breathlessness beliefs in the present study, pulmonary rehabilitation programs and psychological support may improve dyspnea-related fear of movement in patients with COPD.[24-27] However, the effects of such programs on breathlessness beliefs are yet to be discovered in future studies.

We included only male patients in the present study due to 2 factors. First, the representation of female patients was

Table 1. Patient Characteristics

n = 70	Median (IQR 25/75)	Minimum/Maximum
Physical characteristics		
Age (years)	69 (61/75)	46/85
Body mass index (kg/m^2)	25.6 (22.3/29.6)	16.9/40.3
Disease-related characteristics		
Time since diagnosis (months)	54.0 (12.0/114.0)	1/360
Educational status		
Literate	12 (17%)	–
Primary education (%)	34 (49%)	–
Secondary education (%)	14 (20%)	–
Higher education (%)	10 (14%)	–
Marital status		
Married (%)	65 (93%)	–
Working status		
Working (%)	27 (39)	–
Breathlessness beliefs		
BBQ-total (score: 11-55)	35 (28/39)	13/46
BBQ-AA (score: 6-30)	18 (15/21)	6/27
BBQ-SF (score 5-25)	16 (12/20)	6/23
Perceived dyspnea severity		
mMRC (score: 0-4)	1 (1/3)	0/4
Modified Borg Scale (score: 0-10)	3 (2/5)	0/10
Pulmonary function tests		
FVC (L)	2.3 (1.7/2.9)	0.9/4.1
FVC (%)	59.0 (51.0/78.0)	24.0/99.0
FEV_1 (L)	1.4 (0.9/1.8)	0.5/2.8
FEV_1 (%)	47.5 (36.0/61.0)	19.4/79.0
FEV_1/FVC (%)	58.4 (51.8/64.0)	31.6/69.4
PEF (L/s)	3.8 (3.1/4.9)	1.5/7.6
PEF (%)	49.0 (38.0/62.0)	23.0/93.0
Emotional status		
HAD-anxiety (score: 0-21)	6 (2/9)	0/19
HAD-depression (score: 0-21)	5 (2/9)	0/16
Fatigue		
Fatigue Impact Scale (score: 0-160)	31.5 (12/59)	0/123
Fatigue Severity Scale (score: 0-63)	43 (29/54)	9/63
Physical activity level		
IPAQ (MET-min/week)	373.5 (99/1386)	0/3612
Disease-related quality of life		
SGRQ-symptom (score: 0-100)	43.7 (29.1/68.5)	0/88.8
SGRQ-activity (score: 0-100)	60.6 (41.7/92.5)	0/100
SGRQ-impact (score: 0-100)	33.8 (13.2/63.2)	0/90.1
SGRQ-total (score: 0-100)	45.3 (28.2/69.8)	0/92.9
Generic quality of life		
SF-36 PCS (score:0-100)	37.5 (25.7/47.8)	10/59.2
SF-36 MCS (score:0-100)	50.4 (38.5/57.2)	27.2/65.2

BBQ-total, Breathlessness Beliefs Questionnaire total score; BBQ-AA, Breathlessness Beliefs Questionnaire activity avoidance score; BBQ-SF, Breathlessness Beliefs Questionnaire somatic focus score; FEV_1, forced expiration volume in 1 second; FVC, forced vital capacity; HAD, Hospital Anxiety and Depression Scale; IPAQ, International Physical Activity Questionnaire—Short Form; IQR, interquartile range; MET, metabolic equivalent; mMRC, modified Medical Research Council Dyspnea Scale; PEF, peak expiratory flow; SF-36 MCS, Short-Form 36 mental composite score; SF-36 PCS, Short-Form 36 physical composite score; SGRQ, St. George Respiratory Questionnaire.

Table 2. The Correlations Between Breathlessness Beliefs and Other Parameters

	BBQ-total		BBQ-AA		BBQ-SF	
n = 70	**Rho**	***P***	**Rho**	***P***	**Rho**	***P***
Physical characteristics						
Age (years)	0.119	.329	0.179	.138	0.052	.669
Body mass index (kg/m^2)	0.134	.270	–0.006	.960	0.227	.059
Perceived dyspnea severity						
mMRC (score: 0-4)	0.665	<.001	0.708	<.001	0.514	<.001
Modified Borg Scale (score: 0-10)	0.574	<.001	0.616	<.001	0.439	<.001
Pulmonary function tests						
FVC (L)	–0.433	<.001	–.505	<.001	–0.282	.018
FEV_1 (L)	–0.383	.001	–0.515	<.001	–0.206	.087
FEV_1/FVC (%)	–0.048	.696	–0.201	.095	0.038	.757
PEF (L/s)	–0.466	<.001	–0.561	<.001	–0.299	.012
Emotional status						
HAD-anxiety (score: 0-21)	0.551	<.001	0.443	<.001	0.536	<.001
HAD-depression (score: 0-21)	0.463	<.001	0.394	.001	0.432	<.001
Fatigue						
Fatigue Impact Scale (score: 0-160)	0.655	<.001	0.588	<.001	0.609	<.001
Fatigue Severity Scale (score: 0-63)	0.771	<.001	0.765	<.001	0.631	<.001
Physical activity level						
IPAQ (MET/week)	–0.485	<.001	–0.451	<.001	–0.412	<.001
Disease-related quality of life						
SGRQ-symptom (score: 0-100)	0.589	<.001	0.584	<.001	0.521	<.001
SGRQ-activity (score: 0-100)	0.734	<.001	0.728	<.001	0.628	<.001
SGRQ-impact (score: 0-100)	0.719	<.001	0.703	<.001	0.614	<.001
SGRQ-total (score: 0-100)	0.733	<.001	0.736	<.001	0.610	<.001
Generic quality of life						
SF-36 PCS (score: 0-100)	–0.718	<.001	–0.669	<.001	–0.652	<.001
SF-36 MCS (score: 0-100)	–0.478	<.001	–0.414	<.001	–0.441	<.001

BBQ-total, Breathlessness Beliefs Questionnaire total score; BBQ-AA, Breathlessness Beliefs Questionnaire activity avoidance score; BBQ-SF, Breathlessness Beliefs Questionnaire somatic focus score; FEV_1, forced expiration volume in 1 second; FVC, forced vital capacity; HAD, Hospital Anxiety and Depression Scale; IPAQ, International Physical Activity Questionnaire—Short Form; MET, metabolic equivalent; mMRC, modified Medical Research Council Dyspnea Scale; PEF, peak expiratory flow; SF-36 MCS, Short-Form 36 mental composite score; SF-36 PCS, Short-Form 36 physical composite score; SGRQ, St. George Respiratory Questionnaire.

low in our cohort. Despite the fact that the rates of COPD are increasing among females, only 7 eligible female patients (10% of male patients) have visited our clinic during the study. Moreover, fear of movement and related factors may be affected due to sex-related differences.[28,29] Thus, we preferred to include only male patients in our study.

There were some limitations in the present study. The study was conducted in a university hospital which was preferred mostly by patients with higher socioeconomic status; therefore, the results may be different for rural areas where people have different conditions to maintain their daily living activities due to economic concerns and environmental conditions. Also, our results were obtained from patients living in the west part of Turkey, and the perceived dyspnea-related fear may differ for other patients living in other regions of Turkey, or for other countries. Including only male patients and excluding patients who need constant/long-term oxygen therapy or mechanical ventilation and patients who were recently hospitalized also limited the generalizability of our results.

In conclusion, breathlessness beliefs which is defining fear of movement due to dyspnea was found to be related to perceived dyspnea, pulmonary function tests, emotional status, fatigue, physical activity level, and quality of life. Thus, many different factors should be taken into consideration when a patient with COPD with dyspnea-related kinesiophobia seeks advice. Including breathlessness beliefs assessment into clinical examination may help clinicians to understand their patients' needs comprehensively.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of Dokuz Eylül University (Approval No: 2016/23-17).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – D.B., E.F.; Design – D.B., E.F., A.Ö.A., S.Ö.; Supervision – S.Ö.; Data Collection and/or Processing – D.B., E.F.; Analysis and/or Interpretation – D.B., E.F.; Literature Review – D.B., E.F.; Writing – D.B., E.F.; Critical Review – A.Ö.A., S.Ö.

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