



Original Article

**Illness-related fatigue and its association with quality of life among people with chronic obstructive pulmonary disease: A cross-sectional survey from Jordan**

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ABSTRACT

**Background & Aim:** Fatigue is a commonly reported issue in individuals with chronic obstructive pulmonary disease (COPD), often overlooked or inadequately addressed in Jordan and globally. This study aimed to assess illness-related fatigue in COPD people, its contributing factors, and its impact on their quality of life (QOL).

**Methods & Materials:** A cross-sectional correlational design was employed, recruiting 200 people from four hospitals in Jordan between April and May 2021. Participants completed Arabic versions of the self-administered Fatigue Severity Scale and the WHOQOL questionnaire.

**Results:** The study revealed a high level of fatigue among COPD people, with an overall mean fatigue score of  $5.07 \pm 0.62$ . Particularly noteworthy was the association between heightened fatigue levels and factors such as disease-related disability and interference with daily responsibilities. The overall mean QOL score was low ( $2.665 \pm 0.39$ ), with the physical domain displaying the lowest mean score ( $2.6 \pm 0.47$ ). Fatigue and QOL were significantly and negatively correlated.

**Conclusion:** COPD people in Jordan experience substantial levels of fatigue, negatively impacting their QOL. Unfortunately, fatigue is often unnoticed in healthcare services. Addressing fatigue should be a crucial aspect of treatment plans for these people. Particularly during pandemics or service disruptions, additional attention is needed to manage fatigue among COPD people effectively. Digital health interventions may offer opportunities to enhance continuity and quality of care, especially during challenging times.

Introduction

Chronic obstructive pulmonary disease (COPD) is considered the third leading cause of death worldwide and accounted for 3.23 million deaths in 2019, with nearly 90% of deaths in those aged under 70 years occurring in low- and middle-income countries (1). In Jordan, the documented prevalence of COPD is 6.5% in people under 50 years and 37.5% in those aged  $\geq 70$  years, which is significantly higher than the prevalence recorded internationally, especially for the older age group (2). However, Jordan also has an issue with undiagnosed COPD cases. A

recent study reported the rate of COPD among young adults was 15.7%, which was more than double the prevalence reported in formal statistics (3).

COPD produces persistent, disabling, and worsening respiratory symptoms, including difficulty breathing, shortness of breath, cough, and a thick, viscous mucus secretion in the respiratory passages. These symptoms worsen significantly and quickly during physical activity and effort. COPD is typically brought on by extended exposure to tobacco smoking, indoor

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and outdoor air pollution, and occupational dust, gases, and chemicals, in addition to individual factors (e.g., heredity and early life experiences that affect lung development) (4). As COPD progresses, people struggle to perform regular daily activities, typically because of dyspnea and other illness-related symptoms. People may also experience increased symptoms during flare-ups, which necessitates further medication at home or hospitalization for emergency care, as severe flare-ups can be fatal. In addition to the health burden associated with COPD, people may experience a substantial financial burden because of decreased workplace and domestic production and increased medical care expenses. This burden seems to have worsened during the COVID-19 pandemic.

Recent evidence indicates there has been a change in the state of exacerbations of COPD from infrequent to frequent; this has resulted in a higher annual exacerbation rate, which leads to increased illness-related fatigue and decreased quality of life (QOL) among people with COPD (5). Unfortunately, fatigue is a common disorder among those with chronic diseases (6). Fatigue refers to a personal feeling of tiredness or extreme tiredness as a result of a chronic illness (7, 8). Although fatigue is the most commonly discovered problem among people with COPD, it is not officially diagnosed or treated (9-11). One randomized trial control trial worked on minimizing fatigue among COPD patients by using heat therapy found to be effective (12)

The literature suggests that fatigue profoundly influences daily functioning and QOL among people with COPD (2, 5, 12, 13). In addition, people who experience fatigue suffer from narrowing of the airways, and worsening symptoms and health conditions (14). Fatigue influences an individual's relative level of wellness and illness and can predict mortality in people with COPD (15, 16). Therefore, COPD-related fatigue has a severe, unfavorable influence on people's physical, cognitive, emotional, and social functioning. These obstacles to daily functioning negatively affect people's QOL, and impose a heavy mental load for a prolonged time, which decreases people's feelings of pleasure and happiness (11, 17).

Despite the high prevalence of COPD in the Jordanian population (2), the fatigue level among people with COPD in Jordan has not been assessed. The correlation between fatigue and QOL has not previously been explored and confirmed. This study aimed to assess the levels of fatigue and QOL among people with COPD in Jordan, explore the most affected QOL domains (physical, psychological, social, or environmental), and clarify the characteristics of those who are most severely affected by fatigue.

## Methods

This study employed a cross-sectional correlational design conducted at outpatient clinics in four diverse hospitals across Jordan, representing public, private, and educational sectors. The selection of outpatient clinics was based on accessibility and diversity, ensuring representation from different regions. All people with COPD people aged over 18 years attending these clinics were invited to participate, with explicit inclusion and exclusion criteria (The inclusion criteria for participation in the study is all COPD patients attending the Thoracic clinic above the age of 18 years . The exclusion criteria for participation were: a) people who require intensive care e.g. patients with myocardial infarction, angina, stroke, b) with other respiratory disorders, cancer, patients who have recently had surgery, blood transfusion, who take immunosuppressive medication, c) and mentally retardation that prevents them from giving consent to participate in the data collection phase of the study) and the provision of informed consent.

The sample size, calculated using G\*power software (alpha=0.05, effect size=0.5, power=0.95), was determined to be 176 people, and recruitment continued until this target was met, resulting in a total of 200 recruited people. For data collection, we used the Patients' Demographics Section, Fatigue, and Quality of Life scales.

*Patients' Demographics Section:* In this section patients' demographic information includes eleven variables: age, gender, marital status, smoking status, employment status, current living situation, educational level, monthly income (Jordanian Dinar), and variables

that give information about COPD such as COPD diagnosis date, duration of COPD, and respiratory symptoms. In terms of level of measurement, these variables can be divided into three groups as follows: categorical (marital status, smoking status, current living situation, employment status, respiratory symptoms, and educational level), dichotomous (gender), and continuous variables (age, monthly income, COPD diagnosis date, and duration of COPD).

*Fatigue Assessment:* The Arabic version of the Fatigue Severity Scale (FSS-Ar) was utilized. This validated scale comprises nine statements assessing the severity of fatigue symptoms. The FSS-Ar demonstrated excellent validity and reliability (Cronbach's  $\alpha=0.934$ ) in a study involving stroke survivors and healthy participants, with detailed psychometric properties reported (18). The FSS scale includes 9 statements that rate the severity of the patient's fatigue symptoms concerning affect motivation, exercise, physical function, and activities of daily living. The scale ranges from 1. Strongly disagree to 7 strongly agree., FSS scores can be calculated in two ways either by obtaining the total score, a high score means more severity of fatigue, or by calculating the mean score across the nine items, if the average is less than 4 this means that the participant does not suffer from fatigue, and an average score of more than 4 indicates the presence of fatigue.

*Quality of Life Assessment:* The Arabic version of the WHOQOL (Ar-WHOQOL), a 26-item questionnaire, was employed. It assesses individuals' well-being over the past 2 weeks across four domains. The Ar-WHOQOL's reliability and validity have been extensively established in the literature (19, 20).

The researcher conducted a pretest to achieve the following objectives: to know if there were any problems that the individuals faced while filling out the questionnaire, if the questions were easily answered, or if there were any incomprehensible, unclear questions, in addition to the time taken to fill out the questionnaire. In this study, the pretest will be conducted at Prince Hamza Hospital taking 10% of the sample size of 40 patients.

In each outpatient pulmonary clinic, the researchers obtained a list of people and identified those with COPD through collaboration with attending physicians. Invitations were extended to eligible people, and upon agreement, participants signed an informed consent form. Interviews were conducted in a designated private space near the clinic. Questionnaires were coded, securely stored, and subsequently entered for analysis.

SPSS version 26 facilitated data analysis. Descriptive statistics (mean and standard deviation) were employed for fatigue and QOL levels. Correlation tests assessed the relationship between fatigue and QOL scores. T-tests and analysis of variance were utilized to identify differences in fatigue and QOL among participant subgroups.

This study received ethical approval from the institutional review boards of the Applied Science Private University Ministry of Health and Prevention, and the respective participating hospitals. (IRB # 2020-2021-2-1). Before participation, individuals provided written informed consent after receiving a comprehensive explanation of the study. Participants were assured of their right to withdraw at any stage without providing a reason. The study adhered to ethical guidelines throughout its execution.

## **Results**

The majority of participating people were male (n=149, 74.5%), married (n=102, 51.0%), retired (n=147, 73.5%), smokers (n=105, 52.5%), and had a university degree (n=176, 88.0%). Participants' mean age was 59 years, and over half (n=113, 56.5%) earned less than 499 JD, which is considered a low income. Regarding respiratory symptoms, 94% (n=188) of participants reported having a constant cough problem, 90% (n=180) had shortness of breath, 68% (n=136) reported wheezing, and 2% (n=4) had sputum. Finally, the duration of COPD ranged from 1 month to 23 years, with a median of 8 years. Table 1 presents the participants' demographics.

**Table 1.** Participants' sociodemographic characteristics (N=200)

Variable	N (%)	
Gender	Female	51 (25.5)
	Male	149 (74.5)
Marital status	Married	102 (51.0)
	Unmarried	98 (49.0)
Age, years	≤50	34 (17.0)
	51–60	86 (43)
	≥61	80 (40)
	Mean ± SD	59±8.9
Employment status	Employed	25 (12.5)
	Not employed	28 (14.0)
	Retired	147 (73.5)
Disease symptoms	Cough	188 (94.0)
	Sputum	4 (2.0)
	Wheezing	136 (68.0)
	SOB	180 (90.0)
COPD duration	Mean ± SD	8.1±4.8
Monthly income	Less than 450	139 (69.5%)
	More than 450	61 (30.5%)
Smoking status	Smoker	105 (52.5)
	Non-smoker	95 (47.5)
Educational level	University degree	176 (88.0)
	School education	24 (12.0)

Participants' mean fatigue scores as measured by the Fatigue Severity Scale ranged from 4.86±0.80 to 5.20±0.79 with an overall mean of 5.07±0.62, indicating high fatigue levels based on the scale's normal reference ranges. The highest fatigue reported by participants was related to the disability caused by COPD and the associated interference with daily duties and responsibilities, including interference with

work, family, or social life. This was followed by interference with physical functioning and exercise. Participants' mean total QOL score was 2.66±0.39, which indicated low QOL. A comparison of the four QOL domains (physical, psychological, environmental, and social) showed the environmental domain had the highest mean score at 2.73±0.40, whereas the physical domain had the lowest mean score at 2.55±0.47. Table 2 presents details of participants' fatigue and QOL levels.

**Table 2.** Participants' fatigue and quality of life (n=200)

Fatigue items	Mean ± SD
Fatigue is among my three most disabling symptoms	5.20±0.79
Fatigue interferes with carrying out certain duties and responsibilities	5.19±0.83
Fatigue interferes with my work, family, and social life	5.14±0.80
Fatigue interferes with my physical functioning	5.10±0.82
Exercise brings on my fatigue	5.05±0.76
My fatigue prevents sustained physical functioning	5.05±0.82
Fatigue causes frequent problems for me	5.05±0.81
I am easily fatigued	4.96±0.81
My motivation is lower when I am fatigued	4.86±0.80
Total fatigue	5.07±0.62
<b>QOL dimensions</b>	
Physical	2.55±0.47
Psychological	2.72±0.47
Social	2.66±0.47
Environmental	2.73±0.40
Total QOL	2.66±0.39

The regression test revealed a moderate negative correlation between fatigue and total QOL ( $r=-0.45$ ,  $p\leq 0.001$ ), with 20.4% of the variation in QOL explained by fatigue ( $R^2=0.20$ ). In relation to the QOL domains, there was a moderate negative correlation between total fatigue and the

physical domain ( $r=0.26$ ,  $p\leq 0.001$ ), with 26.4% of the variation in QOL explained by the physical domain. The correlation with fatigue was lower for the psychological domain ( $r=-0.396$ ,  $p\leq 0.001$ ,  $R^2=0.15$ ) and lowest for the social domain ( $-0.254$ ,  $p\leq 0.001$ ,  $R^2=0.06$ ) (Table 3).

**Table 3.** Correlation between fatigue and total QoL and QoL domains

Variable	Correlation coefficient	R <sup>2</sup>	P value
TQOL	-0.452*	0.204	0.000
Total Fatigue			
Total fatigue Physical Domain	-0.514	0.264	0.000
Total Fatigue Psychological Domain	-0.396	0.156	0.000
Total Fatigue Social Domain	-0.254	0.064	0.000
Total Fatigue Environmental Domain	-0.287	0.082	0.000

\*Correlation is significant at the 0.01 level (2 tailed).

ANOVA test revealed a significant difference between the participants groups in terms of their Fatigue levels. Fatigue was significantly higher among smokers (5.37±0.49, p≤0.001), married participants (5.31±0.53, p≤0.001), unemployed (5.13±0.79) or retired participants (5.14±0.57) (p≤0.001), and those with older age (5.29±0.56, 5.01±0.58, p=0.01) compared with their non-smoking, unmarried, working, and younger counterparts.

**Discussion**

The present findings showed that people with COPD had a high level of fatigue related to impaired physical activity, severe respiratory symptoms, altered emotional and psychological states (e.g., anxiety and depression), and altered sleep. Participants' quality of life (QOL) was significantly impacted by elevated levels of fatigue, particularly in the physical domain.

Fatigue among COPD people can be associated with dyspnea. Dyspnea increases breathing rate with shallow characteristics, which requires more energy and leads to oxygen deficiency. Fatigue a multidimensional, influences cognitive, physical, and psychological functioning, and happens after physical activity that increases dyspnea, then anxiety and depression. Comorbidities, advanced age, medications, sleep disturbances, and pain, and also can increase fatigue, this was consistent with other studies (17, 21, 22)

Consistent with a previous study from Jordan, our results indicate altered QOL among people with COPD (21). The COVID-19 pandemic likely exacerbated these issues, emphasizing the necessity for specialized support mechanisms such as telehealth services

to address pandemic-related anxieties and minimize exposure risks (23).

The area of fatigue with the highest mean score was the disabling nature of COPD symptoms. This underscores the importance of policy interventions to provide financial aid and flexible work arrangements for COPD people, accommodating their physical limitations, this is consistent with previous literature (14, 24). Jordan's lack of formal governmental financial support schemes and special work arrangements for these people needs urgent attention.

Our study also found a significant association between smoking and increased fatigue. This finding was as expected, and there is a plethora of evidence supporting this association (5, 25, 26). This finding necessitates the establishment of formal smoking cessation programs, accessible and funded by the government, to support COPD people in quitting smoking.

Regarding social dynamics, marital status impacted people's feelings of fatigue which has also been indicated by literature (27-29). Unmarried people, having fewer economic and social responsibilities, reported less fatigue. This variance suggests the need for tailored social support systems, with additional assistance for married people in managing familial responsibilities to alleviate physical and psychological burdens.

Interestingly, employed people with COPD reported less fatigue and better QOL, highlighting the role of employment in providing financial stability and reducing mental suffering. This finding calls for workplace accommodations and support for COPD people, including flexible working hours and physical workplace adjustments (13, 30).

It is worth noting that in this study, 88% of the participants had a university degree. Despite the high prevalence of educated participants in the sample, there was no significant difference in levels of fatigue and quality of life compared to those with lower educational achievements. This suggests an indirect mediating effect of education, potentially through improved employment opportunities. However, this remains speculative and cannot be confirmed based on the current data.

Fatigue among individuals with COPD significantly impairs their quality of life, especially in the physical and psychological domains. This is attributed to the physical limitations caused by fatigue, hindering the performance of daily activities and contributing to sleep disturbances, thereby disrupting overall well-being. The resulting anxiety about the inability to fulfill work and family responsibilities can escalate into stress, depression, and anxiety. These findings align with conclusions from other studies (17, 21). In conclusion, the findings of this study call for a multidimensional approach to improve the QOL of COPD people. This approach should integrate health, social, and policy interventions, emphasizing the need for comprehensive support programs, policy reforms, and community involvement. The challenges faced by COPD people, particularly during the COVID-19 pandemic, highlight the need for collaborative efforts among healthcare providers, policymakers, and community leaders to create supportive environments that address the unique needs of this population.

This study had several limitations, including participant selection and recruitment, which were limited to people with stable COPD and fewer co-morbidities than many people usually seen in clinical practice. This was because this study was conducted during the COVID-19 pandemic; people with severe symptoms were hesitant to visit the hospital because they feared infection.

The majority of participants in this study were found to have higher educational degrees. Despite this, statistically, there was no significant difference between participants of

different educational levels. However, this may have affected the study results and could limit the generalizability of the findings to the general COPD population in Jordan.

Finally, this study provided a good general picture of people's fatigue levels and the affected domains. However, the collected data might have lacked the depth needed to fully understand the lived experiences of fatigue in this patient population.

## **Conclusion**

This study found that people with COPD were highly influenced by fatigue, which affected their physical and psychological well-being and lowered their perceived QOL. International evidence reports that fatigue tends to be ignored by healthcare professionals, and is not assessed, diagnosed, addressed, or treated, despite being the primary disabling symptom of COPD. Anticipating a similar situation in Jordan, healthcare providers, and healthcare facilities need to pay more attention to fatigue in people with COPD and provide more comprehensive and supportive services, especially during pandemics, natural disasters, or other atypical events, because of the critical nature of the illness. A possible solution is investing in digital health technology to create a system for support and follow-up for all people with COPD, especially during pandemics or atypical situations, to ensure continuity of treatment and good self-management for COPD.

Finally, when addressing fatigue in COPD people, health authorities might pay more attention to those who are married, unemployed, smokers, and those with work conditions that might exacerbate their illness. The results of this study highlighted the urgent need for comprehensive support programs that include both physical and psychological interventions, tailored to individual patient needs. Such programs could mitigate the impact of these symptoms on people's daily lives.

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### **Conflicts of interest**

The authors declared there are no conflicts of interest.

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