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Research Paper – Araştırma Makalesi

DOES ANXIETY HAVE AN EFFECT ON WALKING DISTANCE IN INDIVIDUALS WITH COPD?

KOAH'LI BİREYLERDE ANKSİYETENİN YÜRÜME MESAFESİ ÜZERİNE ETKİSİ VAR MIDIR?

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Özet

Literatürde Kronik Obstrüktif Akciğer Hastalığında (KOAH) anksiyetenin fonksiyonel kapasite ile ilişkisini inceleyen az sayıda çalışma bulunmaktadır. Bu çalışma, KOAH'lı bireylerde anksiyetenin yürüme mesafesi üzerine etkisi olup olmadığını araştırmak için planlandı. Çalışmaya Global Initiative for Obstructive Lung Disease (GOLD) kriterlerine uygun olacak şekilde KOAH teşhisi konulan 125 birey dahil edildi. Bireylerin sosyodemografik verileri kaydedildi. 6 dakika yürüme testi yürüme mesafesini değerlendirmek için kullanıldı. Anxiety Inventory Respiratory (AIR) Ölçeği anksiyete düzeyini değerlendirmek için kullanıldı. Bu çalışmaya alınan KOAH'lı hastaların yaşlarının ortalaması 66,1±9,011 yıldı. Hastanın anksiyete düzeyinin yürüme mesafesi üzerine negatif etkisi istatistiksel olarak anlamlı bulundu (Regresyon katsayısı (B) (Standart hata (SE)) = -5,618 (1,454), p<0,001). Ek olarak, hastanın yaşı arttıkça yürüme mesafesi kısalmaktadır (B (SE) = -9,924 (0,985), p<0,001). Sonuç olarak, stabil dönemde KOAH hastalarında anksiyete düzeyinin yürüme mesafesi üzerinde negatif etkisi vardır. Ayrıca hastanın yaşı arttıkça yürüme mesafesi azalmaktadır.

Anahtar Kelimeler: Akciğer Hastalıkları, KOAH, Anksiyete, Yürüme

Abstract

There are few studies examining the relationship of anxiety with functional capacity in Chronic Obstructive Pulmonary Disease (COPD) in the literature. The current study was planned to investigate whether anxiety has an effect on walking distance in individuals with COPD. 125 individuals who were diagnosed with COPD according to Global Initiative for Obstructive Lung Disease (GOLD) criteria were included in the current study. Sociodemographic data of the individuals were recorded. The 6-Minute Walk Test was used to assess walking distance. The Anxiety Inventory Respiratory (AIR) scale was used to assess the level of anxiety. The mean age of COPD patients included in this study was 66.1±9.011 years. The negative effect of the patient's anxiety level on the walking distance was found to be statistically significant (Regression coefficient (B) (Standard error (SE)) = -5.618 (1.454), p<0.001). In addition, as the patient's age increases, the walking distance shortens (B (SE) = -9.924 (0.985), p<0.001). In conclusion, anxiety level has a negative effect on walking distance in COPD patients in the stable period. Furthermore, as the patient's age increases, the walking distance decreases.

Keywords: Lung Diseases, COPD, Anxiety, Walking

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1. INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is an obstructive lung disease characterized by a persistent inflammatory response in the airways and lungs due to harmful particles and gases (Global Initiative for Chronic Obstructive Lung Disease, 2013). COPD is marked by irreversible airflow limitation and is accompanied by symptoms such as cough, shortness of breath, wheezing, chest tightness, sputum production, and fatigue. (https://www.nhlbi.nih.gov/health-topics/copd).

In the study of Adeloye et al. (2015, pp. 020415), it was estimated that there were 227.3 million COPD cases in people aged ≥30 in the world in 1990. Also, the global COPD prevalence in 1990 was reported to be 10.7 percent. Furthermore, it has been explained that the number of COPD cases in the same age group was 384 million in the world and the global prevalence of COPD was 11.7 percent in 2010. It has been stated that the 68.9 percent increase in the number of COPD cases was due to global demographic changes. When analyzed by gender, it has been shown that the overall prevalence of COPD in individuals aged ≥30 is 14.3 percent for men and 7.6 percent for women in the world (Adeloye et al., 2015, pp. 020415).

COPD is believed to be one of the leading causes of workforce loss. In terms of the community healthcare system, COPD plays a significant role in hospital admissions and primary healthcare services (Penña et al., 2000, pp. 981-989).

COPD patients may face disabilities in daily activities, a decline in quality of life (QoL), and psychological issues such as dyspnea, cough, etc. As a result, comorbidities related to COPD symptoms play a significant role in this disease (Pommer et al., 2012, pp. 6-13). The prevalence of anxiety, which is one of the most common comorbidities in COPD patients, may vary between 10 percent and 100 percent (Hynninen et al., 2005, pp. 429-443). Anxiety is related to pulmonary symptoms such as dyspnea, cough, etc. Thereby, in the literature, it has been reported that these pulmonary symptoms may become more potential stimuli as the anxiety level rises (Hill et al., 2008, pp. 667-677; Eisner et al., 2010, pp. 229-234; Doyle et al., 2013, pp. 189-202). In addition, anxiety may increase as a side effect of short-acting beta-agonist drugs used in some COPD treatments (Eisner et al., 2010, pp. 229-234; Doyle et al., 2013, pp. 189-202).

Anxiety is the most common psychological issue in respiratory system diseases. It negatively impacts the health-related QoL and functional independence of individuals with COPD. Despite its impact on the incidence of depression, anxiety, and COPD-related morbidity, less attention has been paid to these psychological problems and their improvement, especially in lung diseases (Seemungal et al., 1998, pp. 1418-1422; Garcia-Aymerich et al., 2003, pp. 100-105; Van Ede et al., 1999, pp. 688-692). Also, there are few studies examining the relationship of anxiety with functional capacity in Chronic Obstructive Pulmonary Disease (COPD) in the literature (Doyle et al., 2013, pp. 189-202; Altenburg et al., 2013, pp. 1740-1747; Giardino et al., 2010, pp. 1-11; Borak et al., 1998, pp. 370-373; Weaver et al., 1997, pp. 26-31). Based on the lack of literature on this issue, we aimed to investigate whether anxiety has an effect on walking distance in individuals with COPD.

2. METHODS

2.1. Study Design

This study was a cross-sectional study. Before starting the study, necessary permissions were provided from the Abant Izzet Baysal University Non-Interventional Clinical Research

and Ethics Committee (2017/05). The principles of the Declaration of Helsinki were followed while implementing this study. Individuals included in the study were given comprehensive information about this study before evaluation. In addition, the informed consent form was signed by each participant.

2.2. Study Population

The present study included 125 patients diagnosed with COPD according to the Global Initiative for Obstructive Lung Diseases (GOLD) 2017 criteria and applied to the Pulmonary Diseases Outpatient Clinic. Inclusion criteria were determined as being in a stable period in addition to being diagnosed with COPD according to the GOLD 2017 criteria and not having a mental problem to be able to answer questions. Exclusion criteria were defined as having cognitive problems, being in the attack period, and having vascular, neuromuscular, or musculoskeletal diseases to limit the ability of the participant while performing the 6-minute walking test. The number of individuals to be included in the study was calculated using the G*Power program (G*Power 3.0.10 system, Franz Faul, Universität Kiel, Germany). In calculating the estimated sample size, an α value of 0.05, an effect size of 0.98 and a power of 95% were used to calculate a minimum of 110 individuals.

2.3. Measurements

2.3.1. Descriptive Characteristics

Gender, age, height, weight, body mass index (BMI), education status, working status, job, marital status, social assurance, individuals living together, disease duration, pain, past diseases and surgeries, drugs and devices used, accompanying diseases, allergies, habits, smoking status, and family history were questioned within the demographic scope of the cases.

2.3.2. 6-Minute Walking Test

The 6-Minute Walking Test (6-MWT) is a test applied to show shortness of breath induced by effort. The test was performed following the guidelines of the American Thoracic Society (American Thoracic Society, 2002, pp. 111-117). Participants were told to walk at their speed along a straight corridor that is 30 meters. Each participant was instructed to walk as fast as possible without running as long-distance as possible for 6 minutes. Standardized instructions and encouragement were given verbally during testing. Before starting the test, it was explained to participants that if they felt too much breathlessness and severe pain, cramps, and stiffness in their legs during the test, they could rest, and this time would be included in the test. The total distance walked in 6 minutes was measured and recorded in meters (American Thoracic Society, 2002, pp. 111-117).

2.3.3. Anxiety Inventory Respiratory Scale

Anxiety Inventory Respiratory (AIR) Scale determines the anxiety level of patients. The AIR Scale aims to determine the risk group by evaluating anxiety in patients with COPD. Each question of the 10-item scale is scored between 0 (never) and 3 (almost always). The patient is asked to give the most appropriate answer from four scores for each question. The total score is between “0” and “30”, and high scores indicate increased anxiety symptoms in patients with COPD (Willgoss et al., 2013, pp. 1587-1596; Yohannes & Willgoss, 2015, pp. 106-108).

2.4. Statistical Analyses

Descriptive values were given as mean, standard deviation, frequency, and percentage. The effect of anxiety on the 6MWT result of the patient was analyzed with a multiple linear regression model. In this model, the 6MWT result was used as the dependent variable. In addition to the AIR scale score, which indicates the anxiety level of the patient, factors such as gender, age, BMI, GOLD stage, smoking status, COPD-related medication use, and presence of systemic disease were also investigated as independent variables. Before performing the regression analysis, the assumptions of the multiple linear regression model were examined (Mazmanoğlu, 2016, pp 550-560).

3. RESULTS

Descriptive statistics of physical characteristics such as gender, age, height, weight, and BMI for 125 patients who participated in the present study were given in Table-1. Mean values were 66.1 ± 9.011 years for age, 1.69 ± 0.065 m for height, 77.29 ± 16.087 kg for weight, and 27.13 ± 5.49 kg/m^2 for BMI. The frequency distributions according to the demographic characteristics of patients were shown in Table-2.

Table 1. Physical Characteristics of COPD Patients.

Characteristics	COPD Patients (n=125) x±SD / n; %
Gender (n; %) **Male** **Female**	 115; 92% 10; 8%
Age (year)	66.10±9.011
Height (m)	1.69±0.065
Weight (kg)	77.29±16.087
BMI (kg/m^2)	27.13±5.49

COPD: Chronic Obstructive Pulmonary Disease, BMI: Body Mass Index, x±SD: mean±standard deviation, n: frequency, %: percentage, m: meter, kg: kilogram.

Table 2. Demographic Characteristics of COPD Patients.

Characteristics	COPD Patients (n=125) n; %
Education Status **Uneducated** **Primary education** **Secondary education** **Higher education**	 8; 6.4% 93; 74.4% 21; 16.8% 3; 2.4%
Working Status **Working** **Retired**	 16; 12.8% 109; 87.2%
Job **Public officer** **Artisan or self-employment** **Worker or servant** **Retired** **Others**	 4; 3.2% 9; 7.2% 7; 5.6% 93; 74.4% 12; 9.6%

Marital Status	
Married	111; 88.8%
Single	14; 11.2%
Social Assurance	
Yes	121; 96.8%
No	4; 3.2%
Individuals Living Together	
Alone	6; 4.8%
Spouse/child	116; 92.8%
Mother/father	2; 1.6%
Others	1; 0.8%
GOLD Stage	
A	80; 64%
B	30; 24%
C	4; 3.2%
D	11; 8.8%

COPD: Chronic Obstructive Pulmonary Disease, GOLD: Global Initiative for Obstructive Lung Disease, n: frequency, %: percentage.

The effect of anxiety on the patient's 6-minute walking distance was analyzed with a multiple linear regression model. In line with the assumptions of the multiple linear regression model, it was seen that the error terms of the regression model fit the normal distribution and provide the equal variance condition. The regression coefficients showing the effect levels of the independent variables in the regression model and the statistical significance levels of these coefficients were given in Table-3. Also, the reference categories of the categorical variables included in the independent variables were marked. In addition, interpretations were made for categorical variables based on these reference categories. As shown in Table-3, the negative effect of the patient's anxiety level on the walking distance was found statistically significant (Regression coefficient (B) (Standard error (SE)) = -5.618 (1.454), $p<0.001$). Accordingly, when other factors are kept constant, a 1-point increase in the AIR scale score means that the walking distance decreases by approximately 5.6 meters. Another factor affecting the walking distance of the patient was found to be age. So that, as the patient's age increases, the walking distance shortens (B (SE) = -9.924 (0.985), $p<0.001$). That is, a 1-year increase in the patient's age means that the walking distance decreases by approximately 4 meters, when other factors are kept constant. Other factors had no statistically significant effect on walking distance.

Table 3. Factors Affecting Walking Distance of COPD Patients.

Independent Variables	B	SE	t	p
AIR Scale	-5.618	1.454	-3.864	**<0.001***
GOLD Stage				
A	0[a]			
B	-24.822	21.186	-1.172	0.244
C	-78.747	55.040	-1.431	0.155
D	-35.851	31.620	-1.134	0.259
BMI	-1.568	1.630	-0.962	0.338
Age	-3.924	0.985	-3.983	**<0.001***
Gender				
Female	0[a]			
Male	-3.101	32.884	-0.094	0.925
Medication Use				
Yes	0[a]			
No	-40.274	24.775	-1.626	0.107

Smoking status				
Yes	0[a]			
No	65.742	38.233	1.719	0.088
Give up smoking	1.054	23.180	0.045	0.964
Systemic Disease				
Yes	0[a]			
No	19.703	18.004	1.094	0.276

AIR: Anxiety Inventory Respiratory, GOLD: Global Initiative for Obstructive Lung Disease, BMI: Body Mass Index, B: Regression Coefficient, SE: Standard Error, [a]: Reference Category, *: p<0.001.

4. DISCUSSION

In the current study, it was found that the anxiety levels of COPD patients in a stable period had a negative effect on walking distance. It was also concluded that the walking distance became shorter as the patient's age increased. When other factors are kept constant, a 1-year increase in the patient's age indicates a shortening of walking distance by approximately 4 meters. Other factors did not have a statistically significant effect on walking distance.

In the literature, although there was no relationship between walking distance and anxiety in some studies (Altenburg et al., 2013, pp. 1740-1747; Borak et al., 1998, pp. 370-373; Weaver et al., 1997, pp. 26-31), other studies (Doyle et al., 2013, pp. 189-202; Giardino et al., 2010, pp. 1-11) showed that higher anxiety level was related to lower walking distance. In the study of Lin et al. (2019, pp. 3632-3640), the effects of 2-month breathing-based walking training on dyspnea, QoL, depression, and anxiety were investigated. As a result, significant changes were observed in dyspnea, QoL, depression, and anxiety in the intervention group compared to both baseline values and the control group (Lin et al., 2019, pp. 3632-3640).

As the anxiety level increases, pulmonary symptoms such as dyspnea and cough may become more potential stimuli (Hill et al., 2008, pp. 667-677; Eisner et al., 2010, pp. 229-234; Doyle et al., 2013, pp. 189-202). In the study of Giardino et al. (2010, pp. 1-11), the relationship of anxiety with functional measures, QoL, and dyspnea was investigated in clinically stable patients who had moderate to severe emphysema and had not smoked for at least 6 months. In parallel with our study, it has been reported that anxiety is associated with worse exercise performance. It has been shown that a 10-point increase in the anxiety value evaluated with the State-Trait Anxiety Inventory (STAI) is associated with an average of 9-meter decrease in walking distance evaluated with the 6-MWT (Giardino et al., 2010, pp. 1-11). In our study, in which anxiety was evaluated with the AIR scale, 1 point higher on the AIR scale was found to be associated with a shorter walking distance by approximately 5.6 meters. Although there were COPD patients who smoked in our study and we evaluated anxiety with different assessment scale, the study of Giardino et al. (2010, pp. 1-11) supports our study because higher levels of anxiety are associated with shorter walking distances. The authors (Giardino et al., 2010, pp. 1-11) stated that the connection between anxiety and functional impairment in COPD patients may be explained by different mechanisms. The first of these mechanisms is that anxiety may cause disability in COPD since it increases vigilance and amplification for distressing respiratory sensations. Many anxiety disorders include misinterpretation of unclear or potentially threatening stimuli. This situation will lead COPD patients with anxiety to avoid any activity that may cause these sensations. The second mechanism is that COPD patients with higher anxiety may become more sensitive to unpleasant somatic sensations when somatic symptoms occur in these individuals. Another mechanism is that longitudinal experience with COPD symptoms creates catastrophic and fearful beliefs about respiratory sensations (Giardino

et al., 2010, pp. 1-11). This may trigger anxiety and thus reduce participation in physical activity.

In the study of Doyle et al. (2013, pp. 189-202), higher levels of depression and anxiety were found to be associated with higher levels of fatigue, dyspnea, and frequency of COPD symptoms. Also, it has been noted that functional capacity assessed with the 6-MWT is a moderator of anxiety and pulmonary-specific COPD symptoms measured with the STAI. It has been reported that the relationship between anxiety, dyspnea, and the frequency of COPD symptoms is higher in patients with lower functional capacity (Doyle et al., 2013, pp. 189-202). In another study of Altindag et al. (2021, pp. 172-177), the effects of pulmonary rehabilitation applied three times a week for eight weeks on QoL and respiratory variables were investigated in COPD patients. While an increase in QoL and exercise capacity measured with 6-MWT was found in COPD patients after pulmonary rehabilitation, a decrease in dyspnea severity and levels of depression and anxiety were reported. The authors (Altindag et al., 2021, pp. 172-177) stated that the decrease in anxiety level detected may be related to decreased respiratory distress.

A vicious cycle consisting of decreased lung function, dyspnea due to physical activity, immobilization, decreased muscle strength, and muscle fatigue may be seen in COPD patients. This vicious circle may cause a decrease in the daily physical activity level (Altenburg et al., 2013, pp. 1740-1747). In the study of Altenburg et al. (2013, pp. 1740-1747), the relationship of daily physical activity with functional and psychological variables was investigated in stable COPD patients. Functional exercise capacity was assessed using the 6-MWT and anxiety level was evaluated using the Hospital Anxiety and Depression Scale. In the study (Altenburg et al., 2013, pp. 1740-1747), it has been shown that a higher daily physical activity level is associated with higher functional capacity and lower depression levels. However, no significant relationship was found between functional exercise capacity and anxiety level. The authors (Altenburg et al., 2013, pp. 1740-1747) stated that depression indirectly affects the level of daily physical activity by affecting functional variables. However, such a situation was not mentioned for anxiety since there was no significant relationship between anxiety levels and daily physical activity levels (Altenburg et al., 2013, pp. 1740-1747).

In the study of Borak et al. (1998, pp. 370-373), the relationship between emotional status and exercise tolerance assessed with 6-MWT was researched in stable COPD patients. As a result, an increase was observed in the anxiety level of all participants at the end of the 6-MWT. It has been reported that the emotional state is characterized by increased psychological tension, anxiety, and depression. However, in contrast to our study, the authors (Borak et al., 1998, pp. 370-373) concluded that they did not affect exercise tolerance. Since 49 COPD patients were included in their study (Borak et al., 1998, pp. 370-373), it is thought that the number of participants might have been insufficient to detect anything but very large effects (Giardino et al., 2010, pp. 1-11). For this reason, we think that Borak et al. (1998, pp. 370-373) could not show the relationship between anxiety levels and 6-MWT results.

In the study of Weaver et al. (1997, pp. 26-31), it has been reported that exercise capacity measured with the 12-minute walk test, dyspnea, and depressed mood directly affect functional status. It has also been stated that self-esteem and anxiety indirectly affect functional status through depressive mood. Contrary to our results, the authors (Weaver et al., 1997, pp. 26-31) emphasized that anxiety was associated with exercise capacity through its association with dyspnea and depression. We think that the differences between our results and the results of these studies (Altenburg et al., 2013, pp. 1740-1747; Borak et al., 1998, pp. 370-373; Weaver et al., 1997, pp. 26-31) in the literature may be due to the different anxiety assessment methods.

One of the limitations of our study is that COPD patients were not evaluated in similar numbers according to their GOLD stages. We think that it would be useful to evaluate functional capacity by including a similar number of patients in each of the GOLD stages in future studies. Another limitation is the insufficient number of participants to see the overall

effect. The strength of our study is that anxiety in COPD patients is generally overlooked and not evaluated in the literature. Our study is important in terms of evaluating the psychosocial status of COPD patients.

5. CONCLUSION

In conclusion, anxiety level has a negative effect on walking distance in COPD patients in the stable period. Furthermore, as the patient's age increases, the walking distance decreases. Considering that anxiety affects functional status and health-related QoL in COPD patients, it may be beneficial to add anxiety to the evaluation parameters. Therefore, healthcare professionals should consider that walking distance, which is an indicator of functional capacity, may be lower in COPD patients with higher anxiety levels and advanced age.

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