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Investigation of Dyspnea Conditions Experienced by Individuals Engaged in Bodybuilding and Fitness Sports During Training According to Various Variables

Yusuf Gozacik[1,*], Recai Mimaroglu[2] and Muhsin Duran[1]
[1]Dicle University, College of Physical Education and Sports, Diyarbakir, Turkey.
[2]Ministry of National Education, Dilekpinar Canaydin Secondary School, Diyarbakir, Turkey.

Corresponding author: Yusuf Gozacik (e-mail: yusuf.gozacik@dicle.edu.tr).

Abstract **Objective:** It was aimed to examine the dyspnea (shortness of breath) conditions experienced by individuals interested in bodybuilding and fitness sports during training according to various variables. **Method:** The study was conducted using the relational survey model, which is one of the descriptive survey models. The population for the research comprises individuals who are members of fitness and bodybuilding centres operating in Diyarbakir. The sample was made up of 379 individuals, consisting of 209 males and 170 females aged between 18 to 32, who had been members of these centres and engaged in sports for at least one year, based on the appropriate sampling criteria. The Personal Information Form and Dyspnea-12 Scale were utilised as data collection tools in the investigation. **Results:** The study determined that the average age of the participants was 24.21 (±3.93) years. Demographic data showed that 39.3% of the athletes were identified as smokers, 16.1% suffered from chronic diseases, and 38% were diagnosed with Covid-19. Upon examining dyspnea conditions experienced during training, it was discovered that men (11.01), smokers (5.49), individuals with chronic diseases (21.04), and those diagnosed with Covid-19 (18.03) exhibited higher Dyspnea-12 scale scores. Furthermore, a positive and significant correlation between participant age, total scale score, and sub-dimension scores was identified. **Conclusion:** It has been observed that male individuals, smokers, individuals with chronic diseases and individuals diagnosed with Covid-19 experience greater shortness of breath. Moreover, it has been noticed that the severity of shortness of breath during exercise increases with participant age.

Key Words bodybuilding, fitness, dyspnea

1. Introduction

A. Bodybuilding

Bodybuilding is a sport rooted in science that targets the growth of muscles and body systems via specialised equipment and a structured training regimen. The program is predesigned and intends to cultivate strength and endurance through repetition and progressive overload. By committing to this process, athletes can make remarkable improvements in their physical capabilities and esthetics [1].

Nowadays, in line with the expansion of the fitness industry, physical fitness is now an integral aspect of daily life. Bodybuilding and muscularity have become integral parts of men's physical fitness regimes [2].

Psychological research has demonstrated that men who aspire to an idealised body image tend to suffer from lower levels of self-esteem, self-confidence and body satisfaction. Additionally, they exhibit dysfunctional patterns of thinking coupled with behaviours such as the misuse of anabolic steroids or similar substances. Other related concerns such as exercise addiction, unwarranted cosmetic interventions and inappropriate dieting are also commonly reported amongst those pursuing bodybuilding [3].

The desire for a well-proportioned and symmetrical physique dates back to the ancient Greek and Egyptian civilizations. Physical training was highly valued by the Greeks, and it played a significant role in their economic, social, and political lives. The training regimes of the ancient Greeks, conducted in palaestras and gymnasiums, also continue within contemporary fitness centres. A wide latissimus dorsi muscle, strong biceps and triceps, broad deltoids, and a narrow waist were indications of masculinity and physical health in ancient Greece. Surviving statues of Olympians

and deities from that era reflect this trend. The tradition of bodybuilding and exercise dates back to ancient times, predating contemporary competitions and feats of strength that have gained popularity in recent years. Since ancient times, people have recognized that lifting affects physical fitness and improves muscular strength and muscular endurance [4].

B. Training

The definition of training in the sports community is to prepare athletes to perform at their highest level of efficiency. These expressions are aimed at achieving the optimal level of readiness for athletes. Sports training can be more specifically defined as the physical, mental, and psychological preparation of individuals engaged in sporting activities through various physical exercises, such as strength and endurance exercises, as well as training methods and techniques. In general, sports training refers to "all the systematic methods of preparation that allow athletes to achieve their best athletic performance." This involves education and activities that entail self-growth and training for the sportsman, in addition to enhancing their athletic performance [5].

C. Dyspnea

Dyspnea is the perception of breathing with difficulty and the inability to breathe comfortably. It is characterized by laboured and uncomfortable breathing [6]. The American Thoracic Society describes dyspnea as a condition or experience characterized by a subjective difficulty in breathing, the severity of which varies qualitatively from individual to individual [7]. Dyspnea, a prevalent symptom among millions of individuals with lung conditions, could be an initial indication of various illnesses such as anaemia, myocardial ischaemia, neuromuscular distress, obesity, and anxiety reactions. A patient's description of dyspnea may help us to understand the pathophysiology of the underlying causes of the condition [8], [9].

Old age, strenuous exercise, high altitude, poor fitness levels, and breathing difficulties may cause dyspnea in healthy adults [10]. Dyspnea, like pain, also has a psychological component. Emotional state, an individual's structure, and their level of consciousness can all have an impact. In unforeseen circumstances, if an individual perceives danger, dyspnea may become even more severe. The American Thoracic Society (ATS) report defines dyspnea as a personal breathing disorder caused by unpleasant or uncomfortable sensations of varying intensity, without expressing subjective evaluations. Abbreviated technical terms are always explained upon first use. The structure follows a logical progression with causal connections between statements. Precise subject-specific terms are used throughout. Spelling follows British English standards, including "colour" and "centre". The origins of the term reveal that it stems from "dys: power, causing pain" and "pneumea: breathing". The text maintains proper style, adhering to grammatical and citation conventions. The language used is formal, objective, and free from ornamental language and colloquialisms, favoring hedging to express positions. The state of panic experienced by unwell individuals due to breathing difficulties heightens the respiratory burden and leads to gradual inactivity, ultimately resulting in a state of powerlessness. As such, dyspnea is a crucial factor affecting patients' quality of life, particularly those coping with airway, chest wall and lung parenchymal disorders. Accurate identification of dyspnea symptoms plays a crucial role in the diagnosis, treatment and planning of rehabilitation interventions [11].

This study aims to identify the degree of dyspnea that bodybuilding and fitness athletes experience during training and suggest possible solutions. Additionally, by examining the dyspnea status of individuals engaged in these sports, it may contribute to addressing relevant issues.

2. Materıals and Methods

A. Research Model

This study was carried out following the "relational survey" model, which is one of several descriptive survey models. Surveys are research approaches used to describe the current or past state of a given situation. The participants for this study were chosen using the convenience sampling method [12], [13].

B. Research Group

In the context of our research on the application process, all participants voluntarily took part. The participants were provided with necessary explanations and the research was conducted in accordance with the Declaration of Helsinki. In this study, the population was made up of individuals who were members of bodybuilding and fitness centres situated in Diyarbakır. The sample included 379 individuals that voluntarily participated in the study, 209 of whom were male and 170 of whom were female, between the ages of 18-32 (with an average age of 24.2±3.93 years). All participants had been engaged in this sport for at least 1 year and were selected using a simple random sampling method.

C. Data Collection Tools

The main data collection tools in the study consisted of the Dyspnea-12 scale developed by Yorke et al. (2010) and the Turkish reliability and validity study conducted by Gök Metin and Helvacı (2018), which included demographic variables and descriptive information of the participants.

D. Demographic Variables Information Form

Shortness of breath (dyspnea) is a symptom that can affect all individuals, regardless of their gender or age. Although this symptom is present in various sports disciplines, it can also occur in individuals who are interested in bodybuilding and fitness. Consequently, the study included variables such as participants' gender, age, smoking status, chronic disease status, and whether they had been diagnosed with Covid-19.

Parameter	Skewness	Kurtosis
Physical Sub-dimension Score	,668	-,790
Emotional Sub-dimension Score	,445	-,813
Total Score of Dyspnea-12 Scale	,676	-,935

Table 1: Normality distributions of the score values of the dyspnea-12 scale and its subscales obtained from individuals engaged in bodybuilding and fitness sports

E. Dyspnea -12 Scale

The Yorke et al. (2010) developed a four-point Likert scale with 12 statements to measure dyspnea's severity, ranging from 0 (none) to 3 (severe). In a Turkish reliability and validity study by Gök Metin and Helvacı (2018), the scale exhibited a Cronbach's alpha value of 0.97. The scale consists of two sub-dimensions- emotional and physical. The initial 7 queries on the scale assess the physical constraints that individuals with dyspnea undergo, encompassing problems with air intake and breathing, as well as the effort required. The remaining 5 queries investigate emotional states such as stress, irritability and depression that may develop alongside dyspnea. The physical dimension of the scale has the highest score of 21, whereas the emotional dimension has a score of up to 15. In total, the scale ranges from 0 to 36. Observations on dyspnea severity indicate a positive correlation with the scale scores, whereby the severity of dyspnea increases with higher scores [14].

F. Statistical analysis

The data obtained was analyzed using the SPSS 26.0 package. Demographic information and data collection tool parameters were utilized to determine the arithmetic mean (X), standard deviation (SD), maximum (Max), and minimum (Min) values. To identify the normality distribution of the data, skewness and kurtosis values were calculated. After verifying the assumptions of parametric tests, the correlation between variables was examined through Pearson Correlation Test, and the differences among independent groups were determined through Independent Samples T-Test. Statistical significance $p<0.05$ was considered acceptable [15].

The obtained data follow a normal distribution, as evidenced by both the skewness and kurtosis values falling within the range of ±1.50 as determined through the administered normality test [16]. Table 1 shows that the total score and all sub-dimension scores obtained using the Dyspnea-12 Scale, which assesses dyspnea experienced by individuals during bodybuilding and fitness training, follow a normal distribution as indicated by the kurtosis and skewness values. Technical abbreviations such as Dyspnea-12 Scale will be explained as they are used.

3. Results

All of the study's findings are accessible in tables. Table 2 details the frequency of gender and the mean, standard deviation, and minimum-maximum values of age status among the participants' demographic information.

Gender	Age	n			
	X	SD.	Min.	Max.	
Male	24,67	4,13	18	32	209
Female	23,65	3,61	18	32	170
Total	24,21	3,93	18	32	379

Table 2: Data on gender and age of participants

Gender	Parameters								
	Smoking Status			Chronic Disease			Covid-19 Diagnosis		
		n	%		n	%		n	%
Male	Smoker	90	43,1	Yes	31	14,8	Diagnosed	84	40,2
	Non-smoker	119	56,9	No	178	85,2	Undiagnosed	125	59,8
Female	Smoker	59	34,7	Yes	30	17,6	Diagnosed	60	35,3
	Non-smoker	111	65,3	No	140	82,4	Undiagnosed	110	64,7
Total	Smoker	149	39,3	Yes	61	16,1	Diagnosed	144	38
	Non-smoker	230	60,7	No	318	83,9	Undiagnosed	235	62

Table 3: Data on demographic information of participants

Table 2 presents the study group composed of a total of 379 athletes, comprising 209 males and 170 females. The average age of male athletes was 24.67 (±4.13) years, while that of female athletes was 23.65 (±3.61) years, resulting in a total average age of athletes in the study to be 24.21 (±3.93) years. Moreover, the age range of participants was between 18 and 32 years, irrespective of gender.

Table 3 presents the gender-based frequency and percentage distributions of the responses to the demographic information questionnaire. The findings reveal that smoking was reported by 43.1% of male and 34.7% of female participants. Moreover, 14.8% of males and 17.6% of females were diagnosed with chronic diseases. Additionally, 40.2% of males and 35.3% of females were diagnosed with Covid-19. Thirty-nine point three percent of participants were smokers, while 16.1% had chronic conditions and 38% received a Covid-19 diagnosis.

Table 4 displays the scores obtained from the Dyspnea-12 Scale and its related sub-dimensions, which assess the dyspnea experienced by bodybuilding and fitness athletes during training. The Physical sub-dimension had a mean score of 5.49±3.71, the Emotional sub-dimension had a mean score of 5.18±3.31, and the total Dyspnea-12 Scale score was 10.68±6.70. In addition, the sub-dimensions had a minimum score of 0 and a maximum score of 13, with a total scale score ranging from 2 to 25.

Table 5 reveals that the study found a statistically significant difference in the emotional sub-dimension of the Dyspnea-12 scale based on the gender of the participants ($p<0.05$). However, no statistically significant difference was found in the physical sub-dimension and total score. In the overall scale score, the average score of male individuals (11.01) exceeded that of their female counterparts (10.27).

Parameter	n	X	SD.	Min.	Max.
Physical Sub-dimension Score	379	5,49	3,71	0	13
Emotional Sub-dimension Score	379	5,18	3,31	0	13
Total Score of Dyspnea-12 Scale	379	10,68	6,70	2	25
X: mean, SD: standard deviation, Min: minimum, Max: maximum					

Table 4: Participants' scores from the dyspnea-12 scale and its sub-dimensions

Parameter	Group	n	X	SD.	t	DF.	p
Physical Sub-Dimension	Male	209	5,46	4,20	-,191	371,69	,848
	Female	170	5,53	3,02			
Emotional Sub-dimension	Male	209	5,55	3,61	2,47	376,58	,014*
	Female	170	4,73	2,84			
Dyspnea-12 Scale (Total)	Male	209	11,01	7,47	1,11	374,55	,266
	Female	170	10,27	5,60			

Table 5: Participants' scores from the dyspnea-12 scale and its sub-dimensions by gender

Parameter	Group	n	X	SD.	t	DF.	p
Physical Sub-Dimension	Smoker	149	8,46	3,12	15,80	279,90	,000*
	Non-smoker	230	3,56	2,65			
Emotional Sub-dimension	Smoker	149	7,67	2,76	14,80	377	,000*
	Non-smoker	230	3,57	2,54			
Dyspnea-12 Scale (Total)	Smoker	149	5,49	5,49	16,41	283,78	,000*
	Non-smoker	230	4,76	4,76			

Table 6: Participants' scores from the dyspnea-12 scale and its sub-dimensions according to smoking status

Table 6 analysis shows a significant difference in the Dyspnea-12 score and all its sub-dimensions between smokers and non-smokers (p<0.01). Smokers obtained a higher mean score (5.49) compared to non-smokers (4.76).

Table 7 displays a significant variation in scores between the Dyspnea-12 scale and all sub-dimensions for individuals participating in the study, based on their chronic disease status (p<0.01). The mean scores of individuals with chronic disease indicated higher scores than those without chronic disease across all dimensions of Dyspnea-12.

When examining Table 8, a significant difference was found between the Dyspnea-12 scale and sub-dimension scores of the study participants based on their Covid-19 diagnosis status (p<0.01). The mean scores of individuals diagnosed with Covid-19 in both the Dyspnea-12 scale and its sub-dimensions were higher than those of individuals without a diagnosis.

Table 9 depicts the correlation between the overall score of the Dyspnea-12 Scale, its sub-dimension scores, and the age of the participants. The study found a positive and statistically significant relationship (p<0.01) between the age of the participants and both the total scores of the Dyspnea-12 scale and all its sub-dimensions.

Parameter	Group	n	X	SD.	t	DF.	p
Physical Sub-Dimension	Yes	61	10,90	1,90	21,71	126,29	,000*
	No	318	4,45	3,01			
Emotional Sub-dimension	Yes	61	10,14	1,62	23,21	129,72	,000*
	No	318	4,23	2,63			
Dyspnea-12 Scale (Total)	Yes	61	21,04	3,19	24,61	130,27	,000*
	No	318	8,69	5,19			

Table 7: Participants' scores from the dyspnea-12 scale and its sub-dimensions according to their chronic disease status

Parameter	Group	n	X	SD.	t	DF.	p
Physical Sub-Dimension	Diagnosed	144	9,36	2,85	23,98	198,03	,000*
	Undiagnosed	235	3,12	1,59			
Emotional Sub-dimension	Diagnosed	144	8,67	2,03	27,42	269,34	,000*
	Undiagnosed	235	3,05	1,76			
Dyspnea-12 Scale (Total)	Diagnosed	144	18,03	4,51	28,81	199,70	,000*
	Undiagnosed	235	6,17	2,55			

Table 8: Participants' scores from the dyspnea-12 scale and its sub-dimensions according to Covid-19 diagnosis status

		Physical Sub-Dimension	Emotional Sub-dimension	Dyspnea-12 Scale (Total)
Age	Pearson r	,306**	,338**	,337**
	p	,000	,000	,000
**. p<0.01				

Table 9: The relationship between the scores of the participants on the dyspnea-12 scale and its sub-dimensions and their age

4. Discussion

Shortness of breath, or dyspnea as referred to in literature, is characterised by an individual's inability to breathe adequately. It occurs when an individual experiences difficulty filling their entire lung capacity with the air they inhale during breathing, resulting in a feeling of breathing differently from normal. In addition to complains such as dyspnea, hyperventilation and air hunger, shortness of breath manifests itself through signals like struggling to climb stairs that were previously easy, feeling slower than others on level ground, needing frequent stops and breaths. This condition can be due to an increased workload on the heart or respiratory problems in the individual [17]. In this study, which investigated dyspnea in individuals participating in bodybuilding and fitness sports, it was found that age and shortness of breath were related. Specifically, shortness of breath increased with age, and furthermore, male individuals, smokers, those with chronic diseases, and those diagnosed with Covid-19 experienced more difficulties with dyspnea. In this context, the discussion focussed on socio-demographic characteristics and the severity of dyspnea, while considering various variables in accordance with the literature.

When reviewing the literature on the dyspnea status of individuals, it was found that Amado et al. reported a mean of 12.32 ± 7.64 on the Dyspnea-12 Scale [18]. In our investigation, comparable to past studies, all individuals had a mean Dyspnea-12 total dimension score of 10.68±6.70.

When analyzing dyspnea severity levels by gender, it was found that females with chronic diseases at the same stage as males experienced higher levels of dyspnea severity [19], [20]. The study by DeMeo et al. (2018) examined 2522 individuals under 65 years old and revealed that females experienced greater dyspnea severity in comparison to males [20]. There is a belief that this discrepancy in circumstances, specifically regarding dyspnea among different genders, negatively affects females. This can be attributed to various factors such as anatomical, hormonal, biological, genetic, social, and environmental factors. Additionally, it is believed that females are more vulnerable to dyspnea due to their increased susceptibility to smoking, a significant factor that leads to faster deterioration in lung function [19], [21], [22]. While the results of our study are consistent with the existing literature, we also found conflicting results. Our results suggest that male individuals experience a higher level of dyspnea during exercise compared to their female counterparts, depending on the branch of sport in which they participate. It is plausible that this can be attributed to numerous dependent variables, including smoking, among male individuals in our

research group. Proper acknowledgment of this is necessary for future research in this area.

Age impacts the severity of dyspnea. The literature reports that dyspnea severity remained constant across different ages in certain studies [23]. However, some studies discovered that dyspnea severity increased with advanced age [24]. Sharma et al. (2019) reported a significant correlation between age and dyspnea in their study, with dyspnea severity increasing as age increased [25]. Our study, in line with existing literature, identified a correlation between age and dyspnea severity during exercise, with dyspnea severity increasing as individuals grew older.

Smoking significantly impacts patients' health status and the severity of dyspnea. Numerous studies have reported that the duration and amount of smoking increase the severity of dyspnea [24], [26], [27]. In line with existing literature, our study found a positive correlation between smoking levels among participants in our research group and the severity of dyspnea experienced during bodybuilding and fitness training. Specifically, we observed that increasing smoking levels were associated with greater dyspnea severity.

Dyspnea is a noteworthy predictor of mortality, particularly in older age groups [28], [29]. The perception of dyspnea originates from a complex system that involves the coupling of respiration and muscle activity, motor impulses from both the medulla and motor cortex, alongside spinal motor neurons. This system transmits affective information to higher centres that are influenced by breathing-related signals and cognitive behavioural factors. Consequently, dyspnea is not simply a single perception, but rather a disorganised perception that relies upon multiple systems [30]. It is advisable to assess dyspnea in three distinct categories: emotional, sensory, and daily life impact or burden [28]. Akıncı and colleagues (2021) conducted a study evaluating the emotional and physical perceptions of dyspnea as well as dyspnea related to activity among individuals over the age of 65. The results showed that the Dyspnea-12 total score and sub-dimension scores of the participants were lower compared to those of individuals with chronic diseases (such as COPD and asthma) in the literature [31]–[33]. In this research, we found that individuals with chronic diseases experienced higher dyspnea severity during bodybuilding and fitness training compared to those without chronic diseases. Our results are consistent with previous literature suggesting an association between chronic diseases and the severity of breathlessness.

5. Conclusion

The study concluded that individuals participating in bodybuilding and fitness sports training experience more severe dyspnea. Male individuals, smokers, those with chronic illnesses, and those diagnosed with Covid-19 have a higher likelihood of experiencing it, regardless of gender. Additionally, age is a factor in dyspnea severity, with increasing age corresponding to greater severity. The study's discoveries indicate that bodybuilding and fitness enthusiasts should consider socio-demographic parameters in addition to relevant dyspnea variables that emerge during training, to create personalized guidance and training programs for individuals at risk of dyspnea.

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

References

[1] Hartgens, F., Lichtenbelt, W. V. M., Ebbing, S., Vollaard, N., Rietjens, G. J. W. M., & Kuipers, H. (2001). Body composition and anthropometry in bodybuilders: regional changes due to nandrolone decanoate administration. *International Journal of Sports Medicine, 22*(03), 235-241.

[2] Lambert, C. P., Frank, L. L., & Evans, W. J. (2004). Macronutrient considerations for the sport of bodybuilding. *Sports Medicine, 34*, 317-327.

[3] Holm, S. (2000). Changes to bodily appearance: the aesthetics of deliberate intervention. *Medical Humanities, 26*(1), 43-48.

[4] Homeros Ilias. Text and Translation: Homer, Iliad, trans: Azra Erhat-A. Kadir, Istanbul, 2012.

[5] Harre, D. (1982). Special problems in preparing for athletic competitions. Principles of Sports Training.-Berlin: *Sportverlag,* 216-227.

[6] Simon, P. M., Schwartzstein, R. M., Weiss, J. W., & Lahive, K. (1989). Distinguishable sensations of breathlessness induced in normal Volunteers1-3. *Am Rev Respir Dis, 140*, 1021-1027.

[7] Parshall, M. B., Schwartzstein, R. M., Adams, L., Banzett, R. B., Manning, H. L., Bourbeau, J., ... & ATS Committee on Dyspnea. (2012). An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. *American Journal of Respiratory and Critical Care Medicine, 185*(4), 435-452.

[8] Simon, P. M., Schwartzstein, R. M., Weiss, J. W., Fencl, V., Teghtsoonian, M., & Weinberger, S. E. (1990). Distinguishable types of dyspnea in patients with shortness of Breath1-3. *Am Rev Respir Dis, 142*(5), 1009-1014.

[9] Mahler, D. A., Harver, A., Lentine, T., Scott, J. A., Beck, K., & Schwartzstein, R. M. (1996). Descriptors of breathlessness in cardiorespiratory diseases. *American Journal of Respiratory and Critical Care Medicine, 154*(5), 1357-1363.

[10] Parshall, M. B., Schwartzstein, R. M., Adams, L., Banzett, R. B., Manning, H. L., Bourbeau, J., ... & ATS Committee on Dyspnea. (2012). An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. *American Journal of Respiratory and Critical Care Medicine, 185*(4), 435-452.

[11] Akyüz, G., & Çelenlioğlu, A. E. (2015). Pulmoner rehabilitasyon. *Göğüs Cerrahisi*, 195.

[12] Karasar, N. (2007). Bilimsel araştırma yöntemi: kavramlar, ilkeler, teknikler. Nobel yayın dağıtım.

[13] Kalaycı, Ş. (2009). Spps Uygulamalı Çok Değişkenli İstatistik Teknikleri, Ankara: Asil Yayınevi, 5.

[14] Yorke, J., Moosavi, S. H., Shuldham, C., & Jones, P. W. (2010). Quantification of dyspnoea using descriptors: development and initial testing of the Dyspnoea-12. *Thorax, 65*(1), 21-26.

[15] Clewer, A. G., & Scarisbrick, D. H. (2013). *Practical statistics and experimental design for plant and crop science*. John Wiley & Sons.

[16] Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics,* 6th edn Boston. Ma: Pearson.

[17] Shortness of breath, (2022). (https://www.medicalpark.com.tr/nefes-darligi/hg-2109). Access Date: 15.10.2022.

[18] Diago, C. A. A., Maestu, L. P., Bolado, B. A., Calvo, J. A., Hernando, M. H., Bats, I. P., & Balbín, R. A. (2018). Translation and validation of the multidimensional dyspnea-12 questionnaire. *Archivos de Bronconeumología (English Edition), 54*(2), 74-78.

[19] Kokturk, N., Kilic, H., Baha, A., Lee, S. D., & Jones, P. W. (2016). Sex difference in chronic obstructive lung disease. Does it matter? A concise review. COPD: *Journal of Chronic Obstructive Pulmonary Disease, 13*(6), 799-806.

[20] DeMeo, D. L., Ramagopalan, S., Kavati, A., Vegesna, A., Han, M. K., Yadao, A., ... & COPDGene Investigators. (2018). Women manifest more severe COPD symptoms across the life course. *International Journal of Chronic Obstructive Pulmonary Disease*, 3021-3029.

[21] Kamil, F., Pinzon, I., & Foreman, M. G. (2013). Sex and race factors in early-onset COPD. *Current Opinion in Pulmonary Medicine, 19*(2), 140-144.

[22] Raghavan, D., Varkey, A., & Bartter, T. (2017). Chronic obstructive pulmonary disease: the impact of gender. *Current Opinion in Pulmonary Medicine, 23*(2), 117-123.

[23] Martinez, C. H., Diaz, A. A., Parulekar, A. D., Rennard, S. I., Kanner, R. E., Hansel, N. N., ... & COPDGene and SPIROMICS Investigators. (2016). Age-related differences in health-related quality of life in COPD: an analysis of the COPDGene and SPIROMICS cohorts. *Chest, 149*(4), 927-935.

[24] Janson, C., Marks, G., Buist, S., Gnatiuc, L., Gislason, T., McBurnie, M. A., ... & Burney, P. (2013). The impact of COPD on health status: findings from the BOLD study. *European Respiratory Journal, 42*(6), 1472-1483.

[25] Sharma, S., & Sharma, P. (2019). Prevalence of dyspnea and its associated factors in patients with chronic obstructive pulmonary disease. *Indian Journal of Respiratory Care, 8*(1), 36-41.

[26] Liu, Y., Pleasants, R. A., Croft, J. B., Wheaton, A. G., Heidari, K., Malarcher, A. M., ... & Strange, C. (2015). Smoking duration, respiratory symptoms, and COPD in adults aged$\geq$ 45 years with a smoking history. *International Journal of Chronic Obstructive Pulmonary Disease,* 1409-1416.

[27] Rosi, E., & Scano, G. (2004). Cigarette smoking and dyspnea perception. *Tobacco induced diseases, 2*, 1-8.

[28] Parshall, M. B., Schwartzstein, R. M., Adams, L., Banzett, R. B., Manning, H. L., Bourbeau, J., ... & ATS Committee on Dyspnea. (2012). An official American Thoracic Society statement: update on the mechanisms, assessment, and management of dyspnea. *American Journal of Respiratory and Critical Care Medicine, 185*(4), 435-452.

[29] Berraho, M. (2013). Dyspnea: a strong independent factor for long-term mortality in the elderly. *The Journal of Nutrition, Health & Aging, 17,* 908-912.

[30] Laviolette, L., & Laveneziana, P. (2014). Dyspnoea: a multidimensional and multidisciplinary approach. *European Respiratory Journal, 43*(6), 1750-1762.

[31] Akıncı, B., Karaduman, S., Seferoğlu, S., Yalçın, R., Özenç, B., Şahin, Ö., ... & Özkan, E. (2021). COVID-19 Pandemisi Sebebiyle Ev Karantinasi Uygulanan Ileri Yaştaki Bireylerde Dispne Algisinin Incelenmesi. *Haliç Üniversitesi Sağlık Bilimleri Dergisi, 4*(1), 35-47.

[32] Lee, S., Lee, J. S., Song, J. W., Choi, C. M., Shim, T. S., Kim, T. B., ... & Oh, Y. M. (2010). Validation of the Korean version of chronic obstructive pulmonary disease assessment test (CAT) and Dyspnea-12 questionnaire. *Tuberculosis and Respiratory Diseases, 69*(3), 171-176.

[33] Beaumont, M., Couturaud, F., Jego, F., Pichon, R., Le Ber, C., Péran, L., ... & Reychler, G. (2018). Validation of the French version of the London Chest Activity of Daily Living scale and the Dyspnea-12 questionnaire. *International journal of chronic obstructive pulmonary disease*, 1399-1405.