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DOES THE HAND-HELD FAN APPLIED FOR THE PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE AFFECT RESPIRATORY FUNCTION TESTS, DYSPNOEA, AND FATIGUE? [1]

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ABSTRACT

Aim: The study was conducted to investigate the effect of fan on respiratory function tests, dyspnoea and fatigue levels in patients with COPD.

Methods: The study was conducted with pretest-posttest design. Patients who met inclusion criteria of study were divided into intervention group (67) and control group (64). For respiratory function tests of patients; forced vital capacity (FVC), forced expiratory volume in one second (FEV1) and FEV1 / FVC values were used. While fatigue level was assessed by using COPD and Asthma Fatigue Scale (CAFS), dyspnoea level was assessed by using Medical Research Council Scale (MRCS) and Visual Analogue Scale (VAS).

Results: It was observed that COPD patients had dyspnoea and fatigue at "moderate/severe" level. Dyspnoea and fatigue severity of intervention group decreased after fan application. FVC, FEV1 and FEV1 / FVC levels significantly increased.

Conclusion: It may be recommended to provide training on the fan application for the patients diagnosed with COPD and in order to decrease their dyspnoea and fatigue level and improve positively their respiratory function parameters.

Keywords: COPD, hand-held fan application, dyspnoea, fatigue, respiratory function tests, nursing

1. INTRODUCTION

Chronic airway diseases are among the most important reasons for mortality and morbidity in the world and in Turkey and bring a major social and economic burden. It has been reported that chronic obstructive pulmonary disease (COPD), one of these diseases, will be the fourth common cause of death in the developed countries in 2030. It has been emphasized that 288.284 of totally 357.581 deaths calculated for 2013 in Turkey happened due to chronic diseases and the number of deaths caused by respiratory system diseases is ranked as the third after cardiovascular diseases and cancer (Turkey Chronic Respiratory Disease Prevention and Control Program 2014-2017). COPD is characterized by irreversible airflow obstruction (Turkey Chronic Respiratory Disease Prevention and Control Program 2014-2017; Jones,Watz, Wouters & Cazzola, 2016; Kara, Yıldız, Ertürk, Gürsel, Köktürk & Akansel, 2013). Airflow obstruction is generally progressive and associated with the abnormal inflammatory response occurring in the lungs against harmful particles and gases (Turkey Chronic Respiratory Disease Prevention and Control Program 2014-2017). In addition, COPD is a problem that leads to a decrease in the forced expiratory volume in one

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second (FEV1), dyspnoea and impaired quality of life (Çiçek & Akbayrak, 2004). It has been stated in the literature that the symptom that significantly limits the lives of individuals with COPD is often dyspnoea (Jones,Watz, Wouters & Cazzola, 2016; Kara, Yıldız, Ertürk, Gürsel, Köktürk & Akansel, 2013). In this patient group, fatigue is another important symptom that may be observed due to the conditions related to the disease such as both dyspnoea and depression and sleeplessness. Fatigue is the second most common and disturbing symptom observed in COPD patients. It impairs the life quality of the patients and increases the hospitalization risk (Kentson, Tödt, Skargren, Jakobsen, Erneruth, Unosson & Theander, 2016). For this reason, nonpharmacological methods are also used along with the optimal pharmacological treatment (Çiçek & Akbayrak, 2004), in the management of the dyspnoea and fatigue developing in patients with COPD (Antoniu & Ungureanu 2015). It is stated that fan application, which is one of these methods, may decrease the dyspnoea severity after the cold air reaches the face, nasal mucosa, or pharynx region. It has been emphasized that this non-invasive method does not have any side effect, is patient-oriented, cheap, practical and safe and does not require no complicated equipment (Bausewein, Booth, Gysels, Künbach & Higginson, 2010; Galbraith, Fagan, Perkins, Lynch & Booth, 2010). Although the mechanism of fan application is not known in detail, it has been reported that it may be used in reducing dyspnoea (Bausewein, Booth, Gysels, Künbach & Higginson, 2010). However, upon the literature review, no study assessing effectiveness of fan application in the dyspnoea and fatigue management of the patients diagnosed with COPD was found in Turkey. For this reason, this study was conducted to examine the effect of the fan application applied for the patients diagnosed with COPD on respiratory function tests, dyspnoea, and fatigue and to contribute to the patient care in accordance with the data obtained.

2. MATERIALS AND METHODS

2.1. Design

This randomized controlled trial with pretest-posttest design was conducted to investigate the effect of the fan application on respiratory function tests, dyspnoea, and fatigue in patients with COPD.

2.2. Setting and sample

The study was conducted in the chest diseases clinic and outpatient clinic of a state hospital between May 2017 and March 2018. The number of patients to be included in the intervention and control groups was determined as 64 as a result of the power analysis by taking the other related studies into consideration (Bausewein, Booth, Gysels, Künbach & Higginson, 2010; Revicki, Meads, McKenna, Gale, Glendenning& Pokrzywinski, 2010). The study was completed with a total of 131 patients including 67 in the intervention group and 64 in the control group (Figure 1).

2.3. Data collection

The data of the study were collected using the questionnaire including sociodemographic and disease characteristics as well as respiratory function tests, COPD and Asthma Fatigue Scale (CAFS), Medical Research Council Scale (MRCS), and Visual Analog Scale.

2.4. Respiratory Function Tests

In this study, when patients were in the sitting position and their nostrils were closed, consecutive measurements are performed and the optimal one among them was included in the assessment. After the measurement, the forced vital capacity (FVC), forced expiratory volume in one second (FEV1), and FEV1/FVC values were recorded.

2.5. COPD and Asthma Fatigue Scale (CAFS)

COPD and Asthma Fatigue Scale was developed by Revicki et al., in 2010 (Revicki, Meads, McKenna, Gale, Glendenning& Pokrzywinski, 2010) and its reliability and validity study was conducted by Yel in (2012) for Turkey. Total raw score is obtained by adding all item scores and the raw scores are converted into the scale score ranging between 0 and 100. A single score is obtained in the scale for fatigue and there is no assessment for the subscales. High score indicates that the fatigue level of a person increases. For the reliability coefficient of the scale, the Cronbach's Alpha coefficient is determined as 0.95 (Yel 2012). In this study, Cronbach's Alpha coefficient of the COPD and Asthma Fatigue Scale was found as 0.92.

2.6. Dyspnoea Scales

In this study, MRCS and VAS were used to assess the severity of dyspnoea.

2.7. Medical Research Council Scale (MRCS)

This is a scale with five items prepared based on various physical activities that causes the feeling of the dyspnoea. Patients read the choices in the scale and select the most suitable one for the dyspnoea distress. The scoring is performed based on following categories: no dyspnoea=0, mild dyspnoea=1, moderate dyspnoea=2, severe dyspnoea=3, very severe dyspnoea=4. The increase of the number signifies "the increase in the dyspnoea severity " (Ulaşlı & Ünlü, 2013; Yilmaz & Kapucu, 2017).

2.8. Visual Analog Scale

In this scale, the point on 0 mm shows “no dyspnoea” and the point on 100 mm shows "worst dyspnoea". Patient marks the severity of his/her respiratory distress at that moment by considering these two levels as the criteria. In this study, VAS and MRCS were used together in order to assess the dyspnoea perception both unilaterally and bilaterally.

2.9. Procedure

Before collecting data, the required institutional permissions and ethics committee approval were obtained. The chief nurse and physicians of the unit were interviewed, the participants were informed on the aim and implementation of the study and their consents were received. At the beginning of the study, the questionnaire, CAFS, MRCS, and VAS were applied to both groups the results of the respiratory function tests, performed as the routine of the clinic, were recorded. It took about 15-20 minutes to apply the forms.

After filling out the forms and recording the respiratory function tests, the researcher provided an individual training on the use of fan to the patients in the intervention group by the face-to-face interview technique. During the training, how the fan would be used was demonstrated in practice and whether or not the patients continued to use the fan at home was checked through the weekly phone interviews. No application was conducted for the control group and they continued to have the routine treatment of the clinic. Eight weeks after the first assessment, CAFS, MRCS and VAS were reapplied in both the intervention and control groups, the respiratory function tests were repeated, and the results were recorded (Figure 2).

2.10. Fan Application

In this study, a mini hand-held three-blade fan was used. The fan to be given to the patients was supplied by the researchers. Fan application was directed to the area of the face innervated by the second and third trigeminal nerve branches. The researcher provided the training to the patients in the intervention group about holding the fan to their upper lip, the side part of nose and middle part of face at the distance of 15 cm, for five minutes every day. In addition, it was told to the patients that they should perform pursed-lip breathing during the use of the fan. The fan application procedure was decided based on the previous studies (Galbraith, Fagan, Perkins, Lynch & Booth, 2010; Puspawati, Sitorus & Herawati, 2017).

2.11. Ethical Considerations of the Study

The ethics committee approval, institutional permission, and patients’ consents were obtained to conduct the study.

2.12. Data analysis

Shapiro Wilk test was used to assess the compliance of the continuous variables to the normal distribution. Student t test was used in the comparison of the normally distributed variables between two groups and Mann Whitney U test was used for those not showing a normal distribution. The paired t-test was used in two dependent groups comparison of the normally distributed variables and Wilcoxon test was used for the two dependent groups comparison of the variables without normal distribution. McNemar-Bowker test was used to compare the categorical measurements, obtained in two different times. Chi-square test was used to determine the correlation between the categorical variables. The value of $p<0.0.5$ was accepted as statistically significant.

3. RESULTS

3.1. The Distribution of Some Characteristics of the Patients

It was determined that most of the patients in the intervention and control groups were aged 65 and over, male, and unemployed. A great majority of the patients gave up smoking after being diagnosed, they stated that they took their medicine for COPD treatment "when they had complaints", they were hospitalized before due to COPD, they had to apply to the emergency department due to the disease in the last six months, and they did not receive any training on the disease.

3.2. The Comparison of the Dyspnoea Levels of the Patients Before and After the Fan Application

It was determined that 40.3% of the patients in the intervention group stated their dyspnoea level as "moderate and severe" before the application and 23.9% of them defined their dyspnoea level as "severe" after the application. In the control group, it was observed that 48.4% of the patients in the first assessment and 51.6% in the last assessment stated that they had a "moderate" level of dyspnoea.

In the assessment of the dyspnoea level by VAS, it was found that the mean dyspnoea level in the intervention group, which was 72.4±12.1 before the fan application, decreased to 59.6±13.7 after the application ($p<0.05$). On the other hand, the mean dyspnoea level in the control group, which was 64.7±13.8 before the fan application, increased to 65.8±14.3 after the application. It was determined that while the change in the severity of dyspnoea before and after the application was statistically significant in the intervention group ($p<0.05$), it was not significant in the control group ($p>0.05$) (Table 1).

The Comparison of the Respiratory Function Test Values of the Patients Before and After Fan Application

It was determined that FVC, FEV1 and FEV1/FVC levels of the intervention group before the fan application increased after the application; however, these values did not change in the control group (Table 2).

3.3. The Comparison of the Fatigue Levels of the Patients

It was determined that the fatigue mean score of the patients in the intervention group, which was 60.4±12.3 before the fan application, decreased to 54.7±11.4 after the fan application and the change was statistically significant ($p<0.05$). The fatigue mean score of the patients in the control group, which was 58.6±16.6 before the fan application decreased to 57.7±13.6 after the fan application; however, the change was not statistically significant ($p>0.05$) (Table 3).

4. DISCUSSION

Chronic obstructive pulmonary disease is the most common respiratory disease and it affects the quality of life negatively by causing various physical and psychological symptoms (Lim, Kim, Kim & Kim, 2017). It has been emphasized that the most common symptom experienced by the patients diagnosed with this disease are dyspnoea and fatigue (Chen, Camp, Coxson, Road, Gueette, Hunt & Reid, 2018) and the dyspnoea, which is a subjective symptom, leads to difficulty in breathing, uneasiness, limitation of activity, and fatigue (Yilmaz & Kapucu 2017). Especially due to the increase of the energy spent for respiration, the amount of energy allocated by the patients for the activities of daily life decreases, their productivity activities also decrease, and social isolation develops. In order to eliminate or decrease these problems that causes a vicious circle gradually (Çiçek & Akbayrak 2004), it has been reported that it is highly important to teach respiratory control to the patients, decrease the respiratory load by providing relaxation, provide better distribution of ventilation, increase the conformity with the chest wall by improving the function of respiratory muscles, provide the relaxation of accessory respiratory muscles and teach the respiratory exercises to decrease dyspnoea (Kara, Yıldız, Ertürk, Gürsel, Köktürk & Akansel, 2013). Accordingly, in this study, it was aimed to support the ventilation process, decrease dyspnoea and fatigue and contribute to the disease management positively with the fan application applied to the COPD patients.

As is known, the nonpharmacological approaches such as physical activity, breathing exercises, the use of a hand held fan to move air on the face, walking aids, smoking cessation, vaccination, exercise training programs, pulmonary rehabilitation, reflexology, and music are utilized in the symptom management in this patient group (Jones,Watz, Wouters & Cazzola, 2016; Yilmaz & Kapucu, 2017; Polat & Ergüney, 2017;

Guimaraes, Bugalho, Oliveira, Moita & Marques, 2016; Lee, Dolmage, Rhim, Goldstein & Brooks, 2018; Qian, Politis, Thompson, Wong, Le, Irving & Smallwood, 2018) along with the medical treatment (Yilmaz & Kapucu, 2017). Patients with dyspnoea generally feel more comfortable near an open window or in front of the fan so that dyspnoea is reduced. Its mechanism uses mechanoreceptors on skin which is innervated by sensory nerve branches of the trigeminal nerve (Puspawati, Sitorus, & Herawati 2017). In a study conducted with COPD patients; it was concluded that an individualized breathlessness plan, information leaflets, breathlessness education and a hand-held fan approaches affected dyspnoea positively (Qian, Politis, Thompson, Wong, Le, Irving & Smallwood, 2018). In a study examining the effect of fan application on chronic dyspnoea, it was determined that the dyspnoea feeling of the patients decreased (Galbraith, Fagan, Perkins, Lynch & Booth, 2010). When the studies investigating the effect of the other nonpharmacological methods in the COPD patients were evaluated, it was concluded that the dyspnoea level of the patients decreased while listening to music and their exercise tolerance increased (Lee, Dolmage, Rhim, Goldstein & Brooks, 2018), the reflexology decreased the severity of dyspnoea and fatigue in COPD patients, for this reason, the complementary approaches may be used in reducing dyspnoea and fatigue together with the pharmacological methods (Polat & Ergüney, 2017), in addition, it was determined that the progressive relaxation exercises statistically significantly affected the dyspnoea, fatigue and sleep scores (Yilmaz & Kapucu, 2017). In the present study, it was observed that the dyspnoea and fatigue levels of the patients in the intervention group decreased with the fan application and FEV_1 and FVC values, being among the respiratory function parameters, increased. In another study analysing the effect of fan application on the chronic dyspnoea management, 72% of the patients stated that the fan application provided benefit to the dyspnoea management, 7.5% of them stated that the application decreased the need for oxygen consumption and inhaled β-agonist medications at home (Luckett, Philips, Johnson, Farquhar, Swan, Assen, Bhattarai & Booth, 2017). Similarly, in the present study, the patients using the fan also stated that they did not have any problem, they thought that this application was beneficial, and they stated that they would continue to use it at home. These results indicate that the complementary approaches such as the fan application, which is quite simple, cheap and safe to apply may be preferred in the management of dyspnoea and the fatigue related to dyspnoea in the patients followed-up due to COPD. Especially, nurses, who are in continuous interaction with the patients, may utilize the fan application which is quite practical and easy to use in the management of dyspnoea and fatigue. Because the fear of dyspnoea is an important obstacle for the people with chronic dyspnoea to exercise and being unable to participate in the rehabilitation programs is an important factor. When viewed from these aspects, it may be asserted that the fan application will contribute to the healing process positively, increase the patient comfort, and encourage the patients to exercise. It may also be useful to help adherence to pulmonary rehabilitation and long-term maintenance of outcomes (Swan, English, Allgar, Hart & Johnson, 2019).

4.1. Implications for clinical practice

As it was determined in this study that the severity of the dyspnoea and fatigue of the patients may be reduced by the fan application, nurses may utilize the easy-to-use and non-invasive approaches such as fan application for the management of the dyspnoea and fatigue experienced by the COPD patients. The fan application may be integrated especially into training of the deep breath exercises. Consequently, fan application could be recommended to be involved in nursing approaches.

4.2. Study limitations

The limitation of this study is that the dyspnoea and fatigue experienced by COPD patients is assessed only with the scales. For this reason, assessing the changes in ventilation and muscle function during the use of fan by more objective methods will be important in terms of examining the fan application by making comparison with other complementary methods as well as explaining the effect mechanism of the fan application. Also, different studies on the follow-up of the duration, frequency and effect of the fan application for a longer period may be conducted.

5. CONCLUSION

It was observed that the patients had dyspnoea and fatigue at "moderate and severe" level, the dyspnoea and fatigue severity of the intervention group decreased after the fan application and their FVC, FEV1 and FEV1/FVC levels increased significantly. It may be recommended to provide training on the fan application to patients, maintain the continuity of these trainings, and reflect the study results to the patient

care in order to decrease the dyspnoea and fatigue level of the patients diagnosed with COPD, and improve their respiratory function parameters.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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