Original Article

The Effect of Regular Walking Programs on the Respiratory Parameters: Quality of Life and Emergency Service Visits Frequency in COPD Patients

Hatice Tel Aydin, PhD
Professor, Department of Internal Diseases Nursing, Faculty of Healthy Science, Cumhuriyet University, Sivas, Turkey

Feride Taskin Yilmaz, PhD
Assistant Professor, Department of Internal Diseases Nursing, Cumhuriyet University, School of Susehri Health High, Sivas, Turkey

Correspondence: Feride Taskin Yilmaz, PhD Assistant Professor, Department of Internal Diseases Nursing, Cumhuriyet University, School of Susehri Health High, Sivas, Turkey e-mail: feride_taskin@hotmail.com

Abstract

Objective: The aim of this study is to determine the effect of regular walking programs on the respiratory parameters, quality of life and emergency service presentation frequency in COPD patients.

Methods: A semi experimental study, 46 patients admitted to the respiratory clinic of a public hospital. The patients received a 16 week walking program using pedometers under nurse monitoring. Data was collected using a patient identification form, the St George Respiratory Diseases Questionnaire, and walking program application chart.

Results: After the regular walking program, an increase in the daily walking durations. One year after the walking program, no statistically significant differences in the respiratory parameters values of the patients could be found. The decreases in the quality of life total scores of the patients were found to be statistically significant. No statistically significant difference in the emergency service presentation and repeated hospitalization frequencies of the patients could be found.

Conclusion: In the study conducted under the nurse's accompaniment, regular walking program improved the quality of life of COPD patients in the long term without any effect on respiratory parameters or the frequencies of emergency service presentation and repeated hospitalization.

Key Words: COPD, walking, hospitalization, quality of life, nursing.

Introduction

Chronic Obstructive Pulmonary Disease (COPD), which is a disease characterized by limited airways, comes fifth among reasons for death worldwide and causes widespread hospital presentation and repeated hospitalizations because of acute exacerbations (Chan et al., 2011). The frequent hospital presentations and repeated hospitalizations in COPD are frequent conditions that increase cots for patients and health institutions (Moy et al., 2016; Nelson & Rosenthal, 2015), increase the load of health services (Chan et al,., 2011), cause disrupted morale and loss of control in patients as well as decreases in quality of life (Coventry, Gemmell, & Todd, 2011; Esteban et al., 2009) that are often preventable (Maddocks, Kon, Singh, & Man, 2015; Morgan, 2003).

The frequent hospital presentations and repeated hospitalizations of patients can increase because of factors such as insufficient self-management of the disease and problems regarding medical treatment (Dobrzanska, 2004). The disease management of patients with COPD includes applications such as using medication regularly and effectively, not smoking, and regular physical activity (Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease, 2018). However, in patients with COPD, the level of

physical activity decreases despite efficient respiratory treatment because of dyspnea and fatigue. This causes patients to adopt a more sedentary lifestyle (Arslan & Oztunc, 2016; Schonmann et al., 2015), and as a result decreased condition, worsening of functional exercise capacity and symptoms, difficulties in performing basic daily functions, increases in hospitalization and decreases in quality of life can be seen (Dürr et al., 2014; Martinez et al., 2014; van Gestel et al., 2012). However, in studies, it has been determined that regular physical activity in COPD patients, such as daily walks, causes improvements in respiratory parameters (Pitta et al., 2008; Waschki et al., 2015), provides a protective effect in extra pulmonary situations such as systemic exacerbation and cardiac dysfunction (Watz et al., 2008), increases quality of life (Esteban et al., 2010; Mendoza et al., 2015), causes reductions in presentation for health services and frequency of repeated hospitalizations (Esteban et al., 2014; Morgan, 2003; Moy et al., 2013; Nguyen et al., 2014; Pitta et al., 2006), and decreases mortality (Esteban et al., 2016).

Nurses have an important role in increasing quality of life and preventing repeated hospitalizations through causing an increase in the physical activity levels of patients by effective coordination, communication, training, and planning methods during hospitalization and after discharge (Garcia-Aymerich et al., 2006; Nelson & Rosenthal, 2015). In this context, it is important for nurses to teach, monitor, and evaluate applications that support disease management, such as physical activity including regular walks at home to the COPD patients under risk of acute exacerbation.

In the literature, there are studies examining the effect of physical activity levels on attack exacerbations and repeated hospitalization frequency in COPD patients (Esteban et al., 2014; Garcia-Aymerich et al., 2006; Moy et al., 2013; Nguyen et al., 2014; Pitta et al., 2006; Schonmann et al., 2015).

Alongside this, there are no studies in the literature that examine the effect of regular walking programs, which are easy to apply personally at home, the work carried out in the presence of the nurse, on emergency service presentation and repeated hospitalization frequency. Additionally, studies evaluating the long term effects of regular walking on life parameters and quality of life in COPD patients are also insufficient (Donesky-Cuenco et al., 2007). This study was performed in order to determine the effect of regular walking programs on the physical activity levels (daily walking duration and steps), respiratory parameters, quality of life, and emergency service presentation and repeated hospitalization frequency in COPD patients.

Methods

Study Aim and Design: We used a semi experimental design for the following research questions: (a) Do regular walking affect physical activity levels in COPD patients?, (b) Do regular walking affect respiratory parameters in COPD patients?, (c) Do regular walking affect quality of life in COPD patients?, and (d) Do regular walking affect emergency service presentation and repeated hospitalization frequency in COPD patients?

Sample: The universe of this study consisted of 50 COPD patients that presente at the chest diseases polyclinic of the Susehri State Hospital in Sivas, Turkey between November 1st 2014 and July 31st 2015 who were diagnosed with phase I or II COPD according to the Global Iniative for Chronic Obstructive Lung Disease classification method at least a year ago, had a stable clinical condition, were at least literate, who didn't join a regular exercise program and/or a pulmonary rehabilitation program in the last six months, who had no orthopedic diseases or lower extremity amputations that would prevent participation in exercise programs, who completed the regular walk program and agreed to participate in the study. Without sample selection, a year after the regular walking program, between the dates of July 1st and 31st 2016, all of the patients agreeing to participate in the study were included in the study. However, since two patients couldn't be reached via phone, one patient moved out of the city, and one patient was diagnosed with lung cancer, the study was completed with 46 patients (Figure 1).

Data collection: Data was collected using a patient identification form, a patient monitoring and evaluation form, the St. George Respiratory Diseases Questionnaire (SGRQ), and a walking program application chart.

The Patient Identification Form: The form, which was prepared by the researcher following contemporary literature, included the demographic characteristics of the patients and their characteristics regarding their disease (Arslan & Oztunc, 2016; Esteban et al., 2014; Garcia-Aymerich et al., 2006; Martinez et al., 2014; Mendoza et al., 2015).

The Patient Monitoring and Evaluation Form: The respiratory parameters of the patients and their emergency service presentation and repeated hospitalization frequencies were monitored through this form. The tests for the respiratory parameters were performed by the nurses working at the institution using an Omnia spirometer. In the evaluation of the respiratory parameters of the patients, forced vital capacity (FVC), forced expiration volume in the first second (FEV_1), and FEV_1/FVC values were obtained from the test result paper. The answers to the questions regarding emergency service presentation and repeated hospitalization frequency in the form were obtained from the patient automation system of the public hospital where the study was conducted.

The St. George Respiratory Diseases Questionnaire (SGRQ): The Turkish validity and reliability test of the questionnaire, which was developed by Jones et al (1992), was performed by Durna and Ozcan (2003). The SGRQ is a 76 item self-report specific quality of life questionnaire that takes approximately 15-20 minutes to complete. In the SGRQ, three sub dimensions are evaluated, namely disease symptoms, activities limited because of the symptoms, and the effects of the disease on daily life. Coughing, phlegm, wheezing, and shortness of breath are among the examined symptoms. The scores attained as a result of the evaluation vary between 0 (perfect health) and 100 (worst possible condition) and a change of 4 points is interpreted as a significant response to treatment (Durna & Ozcan, 2003). In this study, the Cronbach alpha value of the questionnaire was found to be 0.90.

The walking program application chart: The form, which was kept monthly to determine whether the patients performed regular walks or not, included walking duration, number of steps, complaints during walking, and reasons for not walking. The form was handed to the patients in the first interview and the patients were informed to fill out the form after each walk.

Pedometers: The patients were given Omron (HJ-321-E) pedometers to determine daily step numbers and walking durations. These pedometers used in the study are usually attached to the waist. The pedometer has a lever arm attached to a vertical spring that beats with the vertical acceleration of the hips through walking (vertical movement during walking) and records the daily step numbers of the patients. The use of pedometers, which are small, light, and portable, is suggested in the evaluation of physical activity in COPD patients.

Procedure: Data for the research was collected over three separate interviews. In the first interview, each patient was given 20-30 minutes of training personally through written forms and computerized power point presentations by the researcher. In the single session training, information on what kind of disease COPD is, the necessity of exercise in the effective management of COPD, the benefits of exercising with regular walks, and the points to pay attention to during regular exercising by walks was given. At the end of the training, the patients were asked to walk at least 30 minutes a day using the pedometers provided individually to each patient by the researchers. They were informed that the speed and duration of the walks would be little at first and that they should increase the speed and duration of walking as tolerance increased. They were also told that they could use short term bronchodilator medicine before walks, that they should rest when complaints during walking such as leg fatigue, cramps, dyspnea, or general fatigue occurred, and that they should continue walking after the complaints passed. During the regular walking program, the patients were called twice a week via phone, and their weekly walking program application, relevant complaint and questions, and recording of the walking program were evaluated. This walking program was applied for 16 weeks.

The second interview took place in the 16th week when the regular walking program was completed. At this phase, the daily walk durations and number of steps of the individuals participating in the study, their respiratory

parameters, and their quality of life levels were evaluated.

The third interview was performed a year after the regular walking program. In this interview, the patients were called via phone for data collection and the respiratory parameters and quality of life levels of the patients who presented at the health institution were reevaluated.

Statistical analysis: Data was analyzed using the SPSS (Statistical Package for Social Sciences) 22.0 package program. The socio demographic and disease related characteristics of the patients were evaluated using percentages and mean values. In the comparison of the respiratory parameters and quality of life mean scores of the patients before and a year after the walking program, the Paired sample t test was used, while for comparisons between interviews the ANOVA for repeated measurements was used. Which interview the data which turned out to be significant during analysis stemmed from was found using the Bonferroni test. In the comparison of the emergency service presentation and repeated hospitalization frequencies of the patients before and after the regular walking program, the Wilcoxon signed test was used. In statistical evaluation, the level of significance was accepted as p<0.05.

Ethical approval

Written permissions were taken from the Cumhuriyet University Non-Invasive Clinical Studies Board of Ethics (ethical approval no: 2016-06/15) and the institution to which the Susehri State Hospital where the study would be conducted was attached. Each patient to participate in the study was informed and told that participation was on a voluntary basis. Written consent from all of the patients participating in the study was taken. The study was conducted in accordance with the ethical standards of the Helsinki declaration.

Results

The mean age of the patients was 63.58±6.45 (min=47, max=74) where 87% were male, 78.3% were elementary school graduates, 97.8% were married, and 76.1% were retired. All of the participants had social security, and 4.3% stated that they lived alone, 73.9% stated that they had

medium income levels, and 39.1% stated that they currently were actively employed. The distribution of the disease related characteristics of the patients was given in Table 1.

Changes in walking duration and the number of steps

When the changes in the walking durations of the patients were evaluated, the walking duration values in the second interview were found to be higher than the values in the first interview with a statistically significant difference (p<0.01). Similarly, an increase in the daily number of steps of the patients was found in the last interview, with the difference being statistically significant (p<0.01) (Table 2).

Changes observed in respiratory parameters

When data from before the walking program and a year after were evaluated, no statistically significant differences in the FVC, FEV1, and FEV1/FVC values of the COPD patients could be found (p>0.05). In the comparison between interviews, a repeated measurement analysis was performed and similar results were obtained (p>0.05) (Table 3).

Changes observed in quality of life

One year after the walking program, the decreases in the symptom (p=0.029) and effect (p=0.016) sub dimension and quality of life total (p=0.024) scores were found to be statistically significant. When the quality of life mean scores of the patients were compared between interviews, an advanced statistically significant difference between all sub dimension (p=0.000) and total mean scores (p=0.000) was found (Table 3). According to the Bonferroni test, the difference seen in the sub dimension and total scores of quality of life was found to stem from the mean scores attained in the interview performed after 16 weeks of walking program application.

Changes in emergency service presentation and repeated hospitalization frequencies

No statistically significant difference in the emergency service presentation and repeated hospitalization frequencies of the COPD patients a year before and after the walking program could be found (p>0.05) (Table 4).

Table 1. **The Disease Related Characteristics of the Patients**

Characteristics	Mean ± SD / n (%)
Duration of disease (year)	6.32 ± 6.04 (min=1, max=30)
Allergy status	
Yes	6 (13.1)
No	40 (86.9)
Body Mass Index (kg/m^2)	
Normal weight (18.5-24.9)	11 (23.9)
Overweight (25-29.9)	17 (37.0)
Obese (>30)	18 (39.1)
Other chronic disease	
Yes	16 (34.8)
Hypertension	8 (50)
Heart failure	5 (31.3)
Diabetes mellitus	2 (12.5)
Coronary artery disease	1 (6.2)
No	30 (65.2)
Smoking status	
Current smoker	10 (21.7)
Numbers of cigarettes smoked per day	19.60 ± 8.78 (min=6, max=40)
Duration of smoking (year)	39.50 ± 9.46 (min=18, max=49)
Ex-smoker	35 (76.1)
Never smoked	1 (2.2)
Usage of drugs is prescribed	
Takes regularly	17 (37.0)
Only as needed	29 (63.0)

Table 2. The Comparison of the Walking Durations and Daily Step Numbers of the Patients Before the Regular Walking Program and After 16 Weeks

Variables	The first interview Mean ± SD	The second interview Mean ± SD	*t	p
Walking duration (min)	29.30 ± 6.49	41.93 ± 9.39	-7.902	<0.001
Daily step numbers	2359.16 ± 910.18	3513.84 ± 899.84	-6.543	<0.001

*Paired simple t test

Table 3. The Comparison of the Respiratory Parameters and Quality of Life Levels of the Patients Before and After the Regular Walking Program

Parameters	The first interview	The second interview	The third interview	*t / p	**F /p
	Mean ± SD	Mean ± SD	Mean ± SD		
Respiratory parameters					
FVC	2.60 ± 0.68	2.67 ± 0.69	2.61 ± 0.68	-0.237 / 0.814	0.919 / 0.365
FEV_1	1.52 ± 0.45	1.64 ± 0.43	1.57 ± 0.42	-0.782 / 0.438	3.198 / 0.068
FEV_1/FVC	58.76 ± 6.69	61.69 ± 6.27	59.03 ± 10.92	-0.184 / 0.855	3.047 / 0.052
The St. George Respiratory Diseases Questionnaire					
Symptoms	50.19 ± 12.97	29.09 ± 6.58	43.84 ± 13.80	2.250 / <0.05	48.357 / <0.001
Activities	49.44 ± 14.56	27.86 ± 4.49	47.13 ± 15.02	1.386 / 0.173	42.436 / <0.001
Effect	44.24 ± 19.65	21.94 ± 5.94	36.90 ± 16.73	2.511 / <0.05	31.621 / <0.001
Total	46.67 ± 15.55	25.22 ± 3.63	41.96 ± 14.08	2.342 / <0.05	42.277 / <0.001

FVC: The forced vital capacity; FEV1: The forced expiratory volume in one second;
*Paired simple t test ;   **The ANOVA for repeated measurements

Table 4. The Comparison of the Emergency Service Presentation and Repeated Hospitalization Frequencies of the Patients Before and After the Regular Walking Program

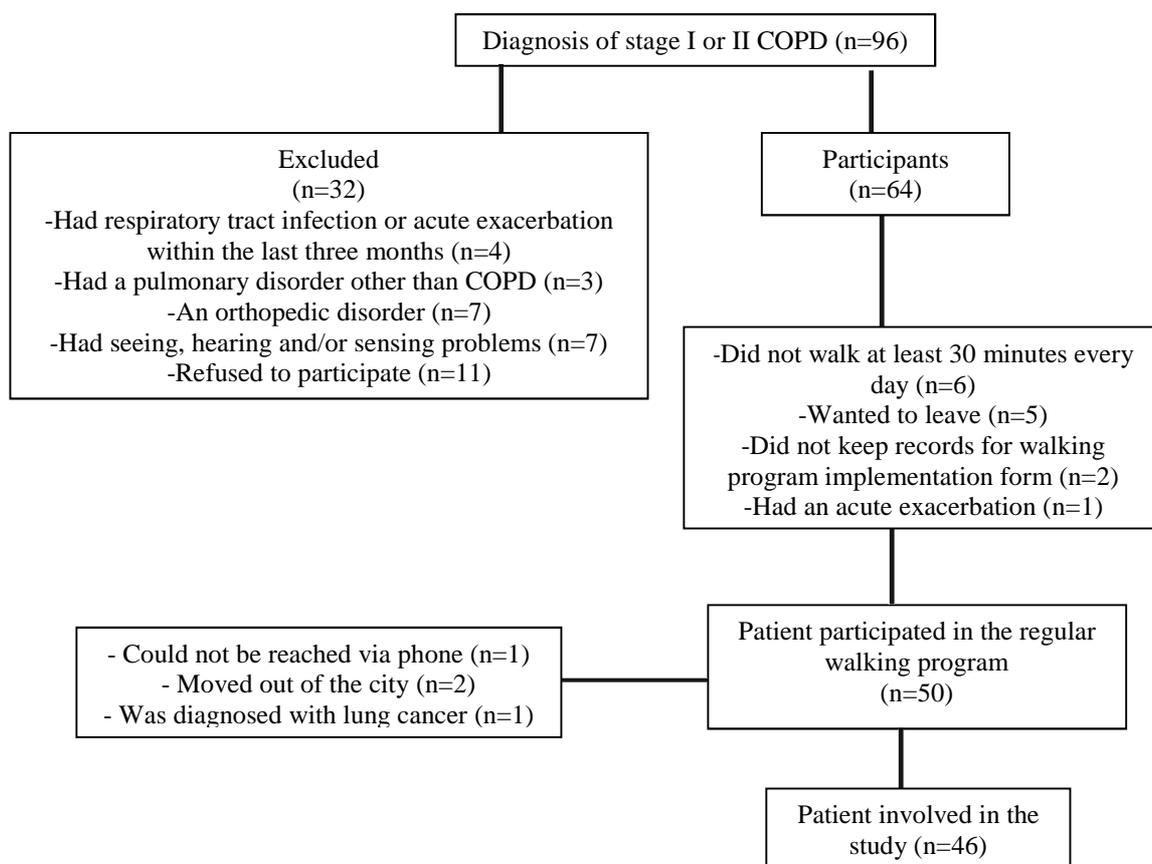| Parameters	A year before the walking program	A year after the walking program	*Z	p
	n (%)	n (%)		
Emergency service presentation frequencies				
No application	39 (84.8)	41 (89.1)		
One time	5 (10.9)	4 (8.7)	-0.660	0.509
Twice and over	2 (4.3)	1 (2.2)		
Repeated hospitalization frequencies				
No hospitalization	43 (93.5)	41 (89.1)		
One time	3 (6.5)	4 (8.7)	-0.905	0.366
Twice and over	0 (0)	1 (2.2)		

*Wilcoxon sign test

Figure 1. The study profile

Discussion

For patients with chronic obstructive pulmonary disease and their families, quality of life, emergency service presentation and hospitalization, and mortality are the three most important outcome indicators with regard to disease management. Each of these indicators has a negative relation with physical activity (Moy et al., 2016; ZuWallack & Esteban, 2014). In the official paper published by the European Respiratory Society regarding he importance of physical activity in COPD patients, studies stressing that the patients had lower physical activity levels compared to healthy individuals, and that there were relationships between physical inactivity and decreases in respiratory parameters, acute exacerbation, bad health status, and repeated hospitalization, and the importance of increasing physical activity in COPD patients was further stressed (Watz et al., 2014).

However, in previous studies, physical activity was only evaluated using accelerometers (Schonmann et al., 2015). In this study, COPD patients were made to perform regular walks using a pedometer, and the effects of the regular walking program on daily walk duration and number of steps in the short term and respiratory parameters, quality of life, emergency service presentation and attack frequency in the long term were examined.

Effects of the regular walking program on physical activity levels

Physical activity is an important issue for COPD patients. Because of physical symptoms, COPD patients adopt an inactive lifestyle (Schonmann et al., 2015) and give less importance to physical activity than health checkups (Esteban et al., 2016). However, international guidelines suggest that all COPD patients should walk for 30

minutes or 3500-5500 steps each day (Mendoza et al., 2015; Tudor-Locke et al., 2011). In the study, the daily walk durations and step numbers of patients were found to be lower before the regular walk program than suggestions. In other studies, contrary to our findings, the daily step numbers of patients have been found to be on better levels (Arslan & Oztunc, 2016; Martinez et al., 2014). The fact that the patients included in the study walked less steps during the day than the number of steps suggested may have stemmed from most of the patients being retired with nothing to keep them busy or the patients living in rural areas. However, this may cause serious problems with regard to disease management.

In the study, increases in the daily walk durations and step numbers of the patients were seen after the regular walking program. In other studies conducted with the aid of pedometers, significant increases in the step numbers of COPD patients were seen (Altenburg et al., 2015; Arslan & Oztunc, 2016; Mendoza et al., 2015; de Blok et al., 2006). The fact that there was an increase in the daily walk durations and step numbers of all the patients is important with regard to showing that incentivizing programs such as the regular walking program are effective in increasing the physical activity of the patients.

Effects of the regular walking program on respiratory parameters

The level of physical activity is a strong indicator of respiratory parameters in COPD patients (Martinez et al., 2014; Mendoza et al., 2015). In studies, a relationship between high physical activity levels and the desired respiratory parameters was found (Pitta et al., 2005; van Gestel et al., 2012). However, the findings of long or short term descriptive or intervention studies on increasing physical activity differ. In our study, no significant difference before and after the walking program in the long or short terms were seen in the respiratory parameters of the patients. Similarly, after an eight week pulmonary rehabilitation program applied to patients hospitalized for acute exacerbation which included walking, no difference in the FEV_1 values of the patients compared to patients who weren't included in the program was seen (Ko et al., 2011). Despite this, in a prospective study performed with 170 patients, a significant

improvement in the physical activity levels and respiratory parameters of the patients in three year follow up was seen (Waschki et al., 2015). In another study, a relationship between FEV_1 values and the time spent by the patient outside of his/her home was found (Donaldson et al., 2005).

Effects of the regular walking program on quality of life

Effective COPD management usually includes symptom control and the improvement of quality of life (Martinez et al., 2014). In COPD, quality of life is lower in inactive patients and increasing physical activity is seen as an important approach for increasing quality of life (Dürr et al., 2014). In our study, an improvement in the symptom and effect sub dimensions of quality of life as well as quality of life total scores was seen a year after the regular walk program, with the improvement mostly occurring during the walking program and the effects fading at the end of one year. Parallel to our findings, in a study where regular walking and long term care outcomes were examined after pulmonary rehabilitation, the quality of life of patients who regularly walked was seen to be higher than those that didn't (Heppner, Morgan, Kaplan, & Ries, 2006). In another study, the relationship between the physical activity levels and quality of life of 391 patients who survived in the five years after the initial interview was examined and all of the fields of quality of life (symptom, activity, and effect) were found to be better in patients whose physical activity levels were higher (Esteban et al., 2010). In a study where the one year data of 147 patients diagnosed with COPD were recorded, an inverse relationship between the time spent outside home and the general, effect, and activity mean scores of quality of life was found with no difference in the symptom sub dimension (Donaldson et al., 2005). Other studies have found that walking programs have positive effects on quality of life as well (Donesky-Cuenco et al., 2007; Mendoza et al., 2015; Hospes et al., 2009). Patients who were hospitalized for acute exacerbation and were taken into an eight week pulmonary rehabilitation program were compared to patients who weren't included in the program in one study, and at was found that significant differences occurred in the symptom, activity, and effect sub dimensions of quality of life at the

end of six months between the groups, with no such difference at the end of the 12th month (Ko et al., 2011). In a study by Martinez et al. (2014) where patients who were and were not included in an internet based pedometer walking program were compared, no significant differences between the groups at the end of one year with regard to quality of life could be found. Similarly, no relationship between physical activity levels and quality of life could be found in other prospective studies (Altenburg et al., 2015; de Blok et al., 2006; Hornikx et al., 2015; Waschki et al., 2015). The findings of our study may be caused by the patients not continuing the walking program after 16 weeks. While this finding shows that increasing physical activity levels has a positive effect on quality of life, it also shows that this effect can diminish after the walking program is completed and that patients thus need counseling processes on regular walking.

Effects of the regular walking program on emergency service presentation and repeated hospitalization frequencies

Beside negatively affecting the outcome of the disease in COPD patients, acute exacerbations also increase emergency service presentation and repeated hospitalization frequencies (Chan et al., 2011; Pitta et al., 2006). There is increasing evidence that repeated hospitalizations for COPD can be prevented by nonpharmacological methods, including physical activity (Morgan, 2003). In a study where Nguyen et al. (2014) evaluated 5862 patients, it was found that the repeated hospitalization rate of patients that were inactive for 30 days was higher than active patients. In another study, patients with lower activity levels were found to have higher frequencies of emergency service presentations in the last two years for acute exacerbations (Esteban et al., 2010). In another study by Esteban et al. (2014), the rate of repeated hospitalization was found to be higher in patients who had low levels of physical activity (no regular walking or walking less than three km a day) compared to patients who had high physical activity levels (walking more than six km a day). In a study by Garcia-Aymerich et al. (2003), patients with high physical activity levels (232 kcal/day, equivalent to 60 min of walking) were found to have less repeated hospitalization for acute exacerbation rates compared to patients

who had less than 79 kcal/day physical activity. In a study by Moy et al. (2013), the rates of acute exacerbation and COPD related repeated hospitalization in patients who had a daily step number of 3667 were found to be higher compared to those with a daily step number of over 5232. In other epidemiological studies, physical activity was shown to play an important role in the prevention of acute exacerbation and thus a decrease in emergency service presentations (Chawla et al., 2014; Garcia-Aymerich et al., 2006; Maddocks, Kon, Singh, & Man, 2015; Seidel et al., 2012; Zanoria & ZuWallack, 2013). However, in our study, no significant difference was found between the emergency service presentation and repeated hospitalization frequencies of the patients a year before and after the regular walking program. Parallel to our findings, in a study by Schonmann et al. (2015), no relationship between physical activity levels and acute exacerbation could be found. In a study by Ko et al. (2011), programs for increasing physical activity were found to have no effect on repeated hospitalization frequency and the number of acute exacerbations. The findings of our study are thought to stem from the diseases of the patients being in the starting phases and the small number of the sample.

Conclusion

According to the findings of the study, after the regular walking program the physical activity levels and quality of life of the patients were found to increase with no difference in respiratory parameters and emergency service presentation and repeated hospitalization frequencies. Nurses, after the diagnosis is made, should train patients on the positive effects of regular walking in addition to giving information on the disease in order to increase daily activity levels. Additionally, nurses should support patients in adopting regular walks and evaluate the compliance of patients with regular walking programs and their health levels in every checkup.

Limitations of the study

Since the study was performed in a limited time with patients who presented at the chest diseases polyclinic of a hospital and met inclusion criteria, it is limited with regard to sample and time. Additionally, the self-reports of the patients

regarding quality of life were limited to the SGRQ.

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