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Comparison of Pulmonary Function, Physical Function, Quality of Life, Depressive Symptoms and Cognitive Abilities between Patients with Chronic Obstructive Pulmonary Disease and Healthy Subjects

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The aim of this study is to compare pulmonary function, physical function, quality of life, depressive symptoms and cognitive abilities of patients with COPD and healthy subjects in order to describe how patients are affected and to organize the most suitable treatment program. The study was carried out in School of Physical Therapy and Rehabilitation at Pamukkale University. Fifty COPD patients aged between 47-81 years who were followed by Pamukkale University, Medical Faculty, Department of Pulmonary Disease were included in the study. Fifty healthy subjects aged between 55-83 years participated as controls. The average age of all subjects was 65.24±7.45. Pulmonary function tests, physical performance test, St. George Respiratory Questionnaire, Beck Depression Questionnaire and Mini Mental Test were used to evaluate all the subjects. The results of this study showed that COPD affects quality of life, physical function, psychological and cognitive function, beside pulmonary functions. When the results belonging to the groups were compared, there was significant difference between the groups in terms of all measurements ($p = 0.0001$). Therefore, physical therapists should evaluate COPD patients with these functional tests to prepare the most suitable rehabilitation program.

Key words: Chronic obstructive pulmonary disease, quality of life, cognitive ability, depression, physical functioning

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of morbidity in old age, affecting approximately 16% of people over the age of 65 (Goldracre and Ferguson, 1995). COPD is seen to be a collective term for chronic bronchitis and emphysema. The definition of COPD that is currently accepted internationally is summarized as follows: COPD is a chronic disease characterized by progressive airflow obstruction, chronic cough and dyspnea in advanced stages, caused by smoking, environmental and hereditary factors (Pauwels *et al*., 2001). For some time, spirometric measurements such as forced expiratory volume in 1 s (FEV1) have served as core measures in COPD research and in the assessment of treatment response. However, FEV1 measures alone are not sufficient to define treatment response, as this marker does not fully reflect the pervasive nature of and the burden associated with COPD. Recent momentum in the field has increased the number of treatment options available, which in turn require adequate characterisation in terms of their benefit to the patient (Paul *et al*., 2005). Elderly patients affected with COPD-related respiratory failure are frequently impaired in their social life, psychic function and Activities of Daily Living (ADL) (Yohannes *et al*., 1998); therefore, it is of crucial importance to establish the relationship between COPD and quality of life (QoL) in this population. Although psychological processes are more or less ignored in medical and treatment guides (Global Initiative for Chronic Obstructive Lung Disease, 2003), research has indicated a high prevalence of psychological disorders in this population. In particular, the incidence of anxiety disorders and depression has been found to be elevated in patients with COPD (Kim *et al*., 2000; Mikkelsen *et al*., 2004). The age-related decline in the cognitive functioning of healthy adults is a well-documented phenomenon (Jacewicz and Hartley, 1987; Schaie, 1994). As healthy people advance in age beyond the sixth decade, they typically experience declines in a variety of cognitive functions. However, while these age-related declines are well established, the cause of these declines remains unclear. One hypothesis which has been proposed is that the declines in cognitive functioning are due to a decrease in the transport of oxygen to the cerebral environment (Dustman *et al*., 1994). Indirect support for this hypothesis is provided by evidence that older deconditioned individuals have decreased oxygen transport to the brain (Hagstadius and Risberg, 1989; Marchal *et al*., 1992). The hypothesis contends that decreased oxygen transport to the brain results in a decline in cognitive capabilities. Because of the proposed link between cognitive functioning and oxygen transport, the study of cognitive functioning capabilities in older individuals with COPD is of particular interest. Arterial oxygen desaturation may develop in these patients as a result of their disease (Hansen, 1993). Therefore, patients with COPD may have more cognitive decline than healthy subjects. Having taken into account these considerations, we carried out a study aimed at comparing pulmonary function, physical function, quality of life, depressive symptoms and cognitive abilities of patients with COPD and healthy subjects in order to describe how patients affected and to organize the most suitable treatment program.

MATERIALS AND METHODS

Subjects: All participants were previously diagnosed by chest physician. Patients who were included had stable state, hadn't had an operation for this reason, were middle aged and old aged, stage I-II-III-IV, hadn't had any neurological, orthopaedic, verbal and mental disorders and were illiterate. The control group was composed of patients who weren't diagnosed any lung disease, didn't have any neurological, orthopaedic, verbal and mental disorders that would cause respiratory problems and were literate. All participants were informed about the study and agreed to participate in the study and signed informed consent form before research. The patients, who had an active infection, weren't diagnosed as COPD and who didn't want to participate after the information about the study was given was excluded. Subjects who weren't at similar ages to patients, were diagnosed with COPD or any of pulmonary disease and had an active infection were excluded from controls. Thus, 76 patients in study population and 70 subjects in controls were examined by planned tools. Finally, 50 of 76 subjects were accepted as patients and 26 subjects were excluded whereas 50 of 70 subjects were accepted as controls and 20 subjects were excluded since they weren't up to the criteria. This study was carried out between November 2006 and March 2007 at Pamukkale University, Medical Faculty, Department of Pulmonary Disease and the School of Physical Therapy and Rehabilitation after the patients and controls gave their informed consent to participate in the study and the study design was approved by the Ethical Committee of the University of Pamukkale on November 13th 2006. All subjects underwent pulmonary function tests, physical performance test, Saint George Respiratory Questionnaire, Beck Depression Inventory, Mini Mental State Examination and multidimensional assessment.

Assessment: In order to determine demographic data and the other data, a form was prepared. The form included

name-surname, sexuality, occupation, age, height, weight, marital status, educational level, illness duration, pain, experienced diseases-operations, medications, comorbid diseases, social security, habits, allergies and vital findings. After all subjects had been evaluated by this form, tests were conducted on each subject one by one as follows.

Tests

Pulmonary function tests: Pulmonary function tests were performed using a portable, calibrable, volume-sensitive tool called MIR Spirobank that functions with the dry system-infrared interruption system by the same person and each patient performed at least three forced expiratory manoeuvres in the sitting position (Miller and Pincock, 1988). Spirometric parameters, FEV1, forced vital capacity (FVC), FEV1/FVC and forced expiratory flow (FEF25-75) were measured. Patients were classified according to GOLD as stage 1 (FEV1>70%), stage 2 (70%>FEV1>50%), stage 3 (50%>FEV1>30%) and stage 4 (FEV1<30%). The study group contained subjects who were not in acute fever period and showed no higher improvement than 15% in 1 sec Forced Expiratory Volume (FEV_1) and in bronchodilatation test. The control group contained subjects in whom no lung disease had been diagnosed in clinic or in examination and who showed no signs of obstruction in pulmonary function test.

Physical function tests: The PPT is a global measure of physical performance that assesses performance of basic and complex ADL tasks. The 9 item test includes the following items: writing a sentence, simulated eating, donning and doffing a jacket, turning 360 degrees right and left, lifting a book to a shelf, picking up a penny from the floor, walking 15 m (50 ft), climbing 1 flight of stairs and climbing several flights of stairs (a maximum of 4). In the 7-item test, the tasks of climbing 1 flight of stairs and several flights of stairs were eliminated from the scoring. On the 9-item PPT, a score of 36 is the highest score possible and on the 7 item PPT, a score of 28 is the highest score possible; these highest scores would be considered to indicate optimal performance. The PPT was used in this study to determine whether any unreported motor, sensory, or cognitive problems were affecting a subject's physical function. Test items were timed with a standard stopwatch and times were rounded off to the nearest 10th of a second. The time for task completion was recorded. Time was also converted into an ordinal scale (0-4) as suggested for the original test. The PPT was administered only by the primary investigator for the study. Seven item PPT was used in this study and the test was administered and scored according to the protocol published by Reuben and Siu (1990).

St George's respiratory questionnaire: The best-known and most frequently used disease-specific HRQL questionnaire for respiratory diseases is the St George's Respiratory Questionnaire (SGRQ) (Jones *et al*., 1991, 1992). The SGRQ is a standardized, self-administered questionnaire for measuring impaired health and perceived HRQL in airways disease. It contains 50 items, divided into three domains: Symptoms, Activity and Impacts. A score is calculated for each domain and a total score, including all items, is also calculated. Each item has an empirically derived weight. Low scores indicate a better HRQL. Recent publications by the developer (PW Jones) have confirmed that the minimal important difference relevant to the patients (MID) is 4 on a scale of 0 to 100 (Jones, 2001, 2002).

The beck depression inventory: The Beck Depression Inventory (BDI) (Beck *et al*., 1961) measures depressive symptoms experienced over the past week. The scores range from a minimum of zero to a possible maximum of 63. A patient with a total score of >15 is considered to have significant depression (Nielsen and Williams, 1980; Beydemir *et al*., 2009).

Mini mental state examination: The MMSE is a common test usually administered for screening dementia. It includes 30 items and yields a score ranging from 0 to 30; a score lower than 24 is suggestive of significant cognitive deterioration (Folstein *et al*., 1975).

Statistical analysis: All statistical analyses were performed using SPSS 11,05 for windows. Significance was accepted at $p = 0.05$. Independent sample *t* test and Mann Whitney U Test were used to determine if significant differences existed between patients with COPD and healthy subjects. Descriptive statistical information was shown as Mean±SD (X±SD) or %. In all the statistics, the value of p was accepted as significant (<0.05).

RESULTS

Demographical data: Present study was carried out on total 100 individuals (96 M, 4 F), 50 (48 M, 2 F) of whom were healthy with no diagnosis of any lung disease and 50 (48 M, 2 F) of whom were diagnosed COPD and were being followed at stable period by Pamukkale University, Medical Faculty, Department of Pulmonary Disease. While the average age of study group was 65.92±8.22, that of the control was 64.56±6.61 years. While the mean of height, weight and BMI in study group were 168.96±6.06 cm, 73.76±13.43 kg and 25.75±4.03 kg cm^{-2}, for control group they were 169.20±6.22, 80.44±9.50 and 28.09±3.03, respectively. No significant difference was

Table 1: Demographics of study group and control group

	Study group (n = 50)			Control group (n = 50)			
Variables	Min.	Max.	X±SD	Min.	Max.	X±SD	p-value
Age (year)	47	81	65.92±8.22	55	83	64.56±6.61	0.423
Height (cm)	157	185	168.96±6.06	155	184	169.20±6.22	0.877
Weight (kg)	47	101	73.76±13.43	61	100	80.44±9.50	0.022
BMI (kg cm^{-2})	17	34.90	25.75±4.03	22.10	36.70	28.09±3.03	0.012
Cigarette pack year	10	135	48.60±28.83	2	70	25.82±17.87	0.0001

cm: Centimeter, kg: Kilogram, BWI: Body mass index, X: Mean, SD: Standard deviation, Min.: Minimum, Max.: Maximum

Table 2: Comparison of pulmonary function test between groups

	Study group (n = 50)			Control group (n = 50)			
Variables	Min.	Max.	X±SD	Min.	Max.	X±SD	p-value
FVC	1.06	3.52	2.13±0.58	2.02	4.31	3.34±0.60	0.0001
FVC% expected	22.90	116.20	62.47±18.36	68	116.00	92.85±11.73	0.0001
FEV_1	0.71	2.20	1.39±0.40	1.68	3.89	2.88±0.50	0.0001
FEV_1% expected	21.40	89.30	51.23±15.46	72.20	135.70	100.75±15.24	0.0001
FEV_1/FVC	45.80	94.20	65.72±11.30	74.30	99.10	86.64±5.48	0.0001
FEF_{25-75}	0.36	2.21	0.96±0.41	1.58	6.21	3.50±1	0.0001
FEF_{25-75}% expected	10.90	63.80	34.77±14.81	62.80	250.30	119.98±40.16	0.0001

FVC: Forced vital capacity, FEV_1: Forced expiration volume in 1s, FEF_{25-75}: Forced expiration flow

found between the groups (p>0.05). The average cigarettes pack-years were 48.60±28.83 years in the study group and 25.82±17.87 years in the control group and the difference between the groups were statistically significant (p = 0.0001), the demographic characteristics of the 100 patients who completed the study are summarized in Table 1.

Comparison of the pulmonary function test results of the groups: Respiratory functions are affected severely in COPD individuals. Therefore, pulmonary function tests play a crucial role in diagnosis and determination of treatment programs. In our study, in order to evaluate the pulmonary functions of subjects, Pulmonary Function Tests (PFT) were conducted and the study and control groups were compared in terms of PFT. The data were compared among between the groups and it was found that the respiratory function values of individuals with COPD were lower than those of healthy ones. The data from PFT were found as follows: in study group: FVC (2.13±0.58), FVC% expected (62.47±18.36), FEV_1 (1.39±0.40), FEV_1% expected (51.23±15.46), FEV_1/FVC (65.72±11.30), FEF_{25-75} (0.96±0.41), FEF_{25-75}% expected (34.77±14.81); in control group: FVC (3.34±0.60), FVC% expected (92.85±11.73), FEV_1 (2.88±0.50), FEV_1% expected (100.75±15.24), FEV_1/FVC (86.64±5.48), FEF_{25-75} (3.50±1), FEF_{25-75}% expected (119.98±40.16), it was obtained that there were statistically significant differences between the groups for PFT's all subgroup tests (p<0.001) (Table 2).

Patients were classified according to GOLD as stage I (FEV1>70%), stage II (70%>FEV1>50%), stage III (50%>FEV1>30%) and stage IV (FEV1<30%). From the total of 50 patients 2 were in the Stage I, 27 were in the Stage II, 15 were in the StageIII and 6 were in the Stage IV (Table 3).

Table 3: Classification of the severity of COPD in patients according to GOLD

Stage	Frequency	Percentage
I (Mild)	2	4
II (Medium)	27	54
III (Severe)	15	30
IV (Very severe)	6	12
Total	50	100

It was determined that quality of life of individuals with COPD were influenced proportionate to the decrease in respiratory functions. In our study, in order to compare the quality of life of healthy subjects with that of COPD patients, a survey peculiar to this disease was used which is called Saint George Respiratory Questionnaire (SGRQ). It was found that SGRQ's total score was 43.81±18.46 in the study group, while it was 6.13±7.24 in the control group. In addition to these it was obtained those Symptoms score was 57.60±20.28. Activity score was 54.95±23.07 and Impact score was 32.71±19.20 in the study group. It was seen that all these scores were lower in the control group [Symptom score (10.45±10.13), Activity score (9.97±16.25), Impact score (1.95±3.63)]. As a result, it was observed that life-quality of individuals with COPD was affected more negatively than that of healthy ones. Statistically, there was a significant difference between the groups (p = 0.0001) (Table 4).

Comparison of the Groups in Terms of Physical Function, Depressive Symptoms and Cognitive Abilities: The physical functions of the subjects in the study were evaluated with Physical Performance Test (PPT), while

Table 4: Comparison of SGRQ scores between groups

	Study group (n = 50)			Control group (n = 50)			
Variables	Min.	Max.	X±SD	Min.	Max.	X±SD	p-value
Total score	6.74	91.34	43.81±18.46	0	29.35	6.13±7.24	0.0001
Symptom score	13.56	100	57.60±20.28	0	48.41	10.45±10.13	0.0001
Activity score	0	100	54.95±23.07	0	61.92	9.97±16.25	0.0001
Impact score	1.71	87.96	32.71±19.20	0	12.97	1.95±3.63	0.0001

SGRQ: Saint george respiratory questionnaire

Table 5: Comparison of PPT, BDI and MMSE scores between the groups

	Study group (n = 50)			Control group (n = 50)			
Variables	Min.	Max.	X±SD	Min.	Max.	X±SD	p-value
PPT score	14	23	19.88±2.02	19	25	22.82±1.36	0.0001
BDI score	0	40	10.04±7.57	0	24	4.42±4.71	0.0001
MMT score	20	30	26.06±2.47	22	30	28.42±1.55	0.0001

PPT: Physical performance test, BDI: Beck depression inventory, MMSE: Mini mental state examination

their depression was evaluated with Beck Depression Inventory and their cognitive abilities were evaluated with Mini Mental State Examination (MMSE). The mean score of PPT, BDI and MMT were 19.88±2.02, 10.04±7.57, 26.06±2.47 in control group and 22.82±1.36, 4.42±4.71, 28.42±1.55 in study group, respectively. According to the data, decrease in physical performance, increase in depressive symptoms and decrease in cognitive abilities were observed in COPD patients. When compared with healthy subjects, the difference was found to be significant statistically ($p = 0.0001$) (Table 5).

DISCUSSION

This study was carried out in order to compare the pulmonary function, physical function, quality of life, depressive symptoms and cognitive abilities of healthy individuals with those of individuals with COPD and thus to lay the groundwork for suitable treatment programs by determining the difference between the impact level of healthy and COPD patients. Clinical and physiological measurements are needed to determine the efficiency of the treatment. FEV_1 is a good criterion to determine the air passage limitations; however, other parameters to be measured to evaluate the patient accurately are dyspnea, functional state, health state and quality of life. In this study all of these functions of the patient were evaluated. For this purpose, pulmonary function test, SGRQ, Beck Depression Inventory, MMT and PPT were conducted for pulmonary function, quality of life, psychological state, cognitive abilities and physical function respectively. In order to compare the study group with the control and to achieve accurate results, the mean ages of the groups were kept as close as possible. The mean ages of the groups were thus compared and no difference was found statistically ($p>0.05$). Peruzza *et al.* (2003) conducted pulmonary function tests, 6 min walking test, Barthel index, MMT, Geriatric Depression Scale (GDS) and SGRQ on the subjects during their studies on 60 COPD patients over 65 years old and 58 healthy control individuals. FEV_1 and PaO2 were found to be low in COPD patients. Also, the 6 min walking test distance was kept shorter than that of the control group. Moreover, it was found that Barthel index, GDS and SGRQ results of COPD patients were rather bad. These results were support our study. However, when MMT results were compared, it was found statistically insignificant. This result was in contradiction of our results. As a result, it was decided that emotional state is a factor affecting quality of life. They also concluded that the old COPD patients showed crucial deterioration in quality of life depending on the severity of air passage obstruction and symptoms were related to the emotional state of the patients. Marco *et al.* (2006) included 202 COPD patients and 114 healthy subjects in the control group whose gender and ages were uniform into their studies in which they analysed anxiety and depression in COPD patients. The anxiety, depression, dyspnea and quality of life levels were evaluated with specific surveys. FEV_1 values of the patients were divided into four through GOLD classification. As a result of the evaluations, it was found that although the severity and pulmonary symptoms were mild according to FEV_1, anxiety and depression symptoms in COPD patients were prevalent and there was a correlation between life-quality and anxiety and depression.

In order to determine the factors affecting quality of life, Atasever *et al.* (2005) looked into the relation quality of life measurement and dyspnea and the stage of the disease. They found a positive correlation between the activity, impact and total scores of SGRQ and the stage of the disease, VAS and cigarette (pack/year) ($p<0.05$). They also found a negative correlation between the % of FVC and FEV_1 expected ($p<0.01$ and $p<0.05$, respectively).

Gudmundsson *et al.* (2006), in their studies on 416 COPD patients, noted that especially those with anxiety and depression but still continuing smoking had worse health conditions. They also found that psychological state was related to SGRQ and that the more PFT classification advanced according to GOLD, the worse the health conditions became. In our study, it was determined in line with the literature that, depending on the data, quality of life and PFT results of COPD patients were much worse than those of the healthy group and that there was a statistically significant result ($p = 0.0001$). Physical performance of COPD individuals also decreased as a result of symptoms. The World Healthy Organization has defined respiratory disability as a reduction in exercise capacity due to impaired lung function (Ghasemkhani *et al.*, 2006). Among other studies about physical performance test that was used in this study are analysed, Rozzini *et al.* (2002) carried out a study that analysed age, gender, cognitive state, depressive symptoms, functional state, body health and diet of 493 geriatrics and made comparisons according to accompanying diseases. They found that the old subjects stated that they frequently became incompetent in daily life due to their multiple diseases with varying severity. This study helped them to understand the way from the disease to disability better. In old patients with arthritis, group exercise and training programs were given accompanied by a physiotherapist and SF36 (Short Form 36) and PPT were conducted before and after training. It was observed that PPT total score and SF36 score increased significantly after training (Gunther *et al.*, 2003).

Lusardi *et al.* (2003) evaluated the functional performance of the old and proved that physical performance decreases with aging. Beissner *et al.* (2000) stated in their study carried out on the old that there is a strong relation between musculoskeletal deformation and function. In another study in which PPT was used, functional limitation of the old was evaluated and it was found that as one got aged, a decrease in the score of PPT was recorded; more in female than in male (Barbosa *et al.*, 2005). King *et al.* (2000), in their study that compared PPT with 6 min walking test, found out that these tests are highly reliable and PPT is more sensitive than 6 min walking test. No study, in which PPT was used in COPD patients, has been encountered in the literature. Physical functions of COPD patients are generally evaluated by performing 6 or 12 min walking tests. The fact that PPT is complex requires cognitive function and musculoskeletal integration. Thanks to this advantage and in the light of previous studies, it is thought that PPT can be used to determine physical performance, but more studies are required in this subject. Therefore, PPT was used in our study. In fact, as one gets aged, decrease in physical functions is expected; however, accompanied with such a disease as COPD, this decrease will be much more. As a matter of fact, when compared statistically, the groups had significant difference between themselves ($p = 0.0001$).

Several studies have been carried out about depression in COPD and they showed that emotional state is an important factor in the efficiency of pulmonary rehabilitation. Among these studies is Godoy and Godoy (2003), who studied the effect of physiotherapy on depression and anxiety in COPD patients and found important amount of decrease in the anxiety and depression levels of the study group. Borak *et al.* (1991) stated in their study in which they evaluated the psychological state of 48 COPD patients who had been exposed to oxygen treatment for a long time that these patients showed significant levels of depressive symptoms and thus they revealed that they didn't believe in the efficiency of the treatment. In another study conducted on the prevalence of anxiety and depression in COPD patients, it was found that depression prevalence was higher than anxiety prevalence (Light *et al.*, 1985). Beck Depression Scale was used in the study to determine depression and, parallel to the literature, when COPD patients were compared with healthy individuals, it was established that COPD patients had more depressive symptoms and that the difference between the groups was statistically significant ($p = 0.0001$).

Analysing the studies that evaluate cognitive functions, Ambrosino *et al.* (2002) stated that cognitive functions declined in COPD patients. Incalzi *et al.* (1998), who studied cognitive functions accompanied with severe bronchial obstruction, also stated that this decline was rapid and depression posed a risk factor for cognitive functions. Anstey *et al.* (2004) pointed out that as the individual aged, FEV_1 decreased and there was a positive relation between FEV_1 and cognitive performance. However, in another study, they found that although the life-quality of COPD patients with mild hypoxemia was bad, this wouldn't affect cognitive functions (Salik *et al.*, 2007). Since the study was mainly composed of individuals with mild and severe COPD, it was stated that the cognitive functions of COPD patients were affected. Moreover, a relation between quality of life and cognitive functions was determined. Therefore, it is thought that the higher the life-quality of the patients are kept, the slower the deterioration in cognitive functions will be. Peruzza *et al.* (2003) compared the MMT scores of COPD patients with those of healthy ones and stated that the

difference between the groups was statistically insignificant. This result was in contradiction of our study. Liesker *et al.* (2004) evaluated the cognitive performance of COPD patients in one of their studies and determined more deterioration in cognitive functions of COPD patients than of healthy ones. It is supposed that contradictions in these studies had a lot to do with the individual characteristics and cultural levels of each person in the population. When compared with the cognitive functions of the healthy individuals in the study, those of the COPD patients are found to have been affected more, which is supposed to have stemmed from hypoxia. When compared statistically, significant difference was found between the groups ($p = 0.0001$). According to the results of the study, when smoking (pack per year) is compared between the groups, it is noticed that average smoking of the study group is higher than that of the control group. As set in the literature, smoking plays an important role in the occurrence and development of the disease. Furthermore, using medication is also thought to have affected the results of the study. According to the results of the study and the literature, matching the right patient with the right pulmonary rehabilitation is crucial. The severity of the disease, age, intelligence and education level, profession, family support and motivation of the patient are all factors that affect the success of the rehabilitation. Besides these, whether the disease affect quality of life, physical activity level and psycho-social level of the patient, existence of anxiety and depression, the patient's lung functions and smoking history, adaptation of the patient to the treatment and his personal history are all crucial factors. Depending on all these variables, while conducting a treatment program, the patient should be informed about his illness appropriately by explaining with clear, simple and repetitive directions which application is carried out why. These should be supported by constant feedbacks. The frequency, duration and intensity of the rehabilitation should be adjusted to every individual patient. Evaluations should be repeated frequently and the data about the change in the condition of the patient should be recorded properly. The modifications in the treatment program should be done depending on the data. Moreover, taking the psychological condition of the patient in mind, communication with the patient should be effective; that is, boring applications should be avoided and the treatment should be made as enjoyable for the patient as possible. It should be kept in mind that rehabilitation is a long process, so programs should be set to carry out at home and the daily life of the patient should be organized so as to raise the life-quality of the patient.

CONCLUSION

The results of present study proved again that quality of life, physical functions, emotional state and cognitive functions, as well as pulmonary functions, are affected negatively in patients with COPD. As seen above, COPD comes with many other problems. Therefore, patients should be evaluated with a wide perspective and treatment programs should be planned accordingly. Especially when patients are to be accepted for a certain physiotherapy program for pulmonary rehabilitation, physiotherapists should evaluate their patients keeping all these functions in mind and schedule the rehabilitation process accordingly so that patients can react well to the treatment and the treatment will be effective. During the disease, evident symptoms do not appear clinically until lung functions show 50% loss. Parallel to this, during the study, many COPD subjects showing, in fact, no symptoms of COPD were determined. As a result, statistics in our country and in the whole world do not reflect the reality. Therefore, early diagnosis is critical and the society should be informed and made conscious about the subject.

REFERENCES

Ambrosino, N., G. Bruletti, V. Scala, R. Porta and M. Vitacca, 2002. Cognitive and perceived health status in patient with chronic obstructive pulmonary disease surviving acute on chronic respiratory failure: A controlled study. Intensive Care Med., 28: 170-177.

Anstey, K.J., T.D. Windsor, A.F. Jorm, H. Christensen and B. Rodgers, 2004. Association of pulmonary function with cognitive performance in early, middle and late adulthood. Gerontology, 50: 230-234.

Atasever, A., Ö.K. Baþoğlu and F. Bacakoğlu, 2005. Stabil kronik obstrüktif akciğer hastaliği olgularinda yaþam kalitesini etkileyen faktörler. Turk Toraks Dergisi, 6: 25-30.

Barbosa, A.R., J.M.P. Souza, M.L. Lebrão, R. Laurenti and M.F.N. Marucci, 2005. Functional limitations of Brazilian elderly by age and gender differences: Data from SABE Survey. Cad Saude Publica, 21: 1177-1185.

Beck, A.T., C.H. Ward, M. Mendelson, J. Mock and J. Erbaugh, 1961. An inventory for measuring depression. Arch Gen Psychiatry, 4: 561-571.

Beissner, K.L., J.E. Collins and H. Holmes, 2000. Muscle force and range of motion as predictors of function in older adults. Phys. Ther., 80: 556-563.

Beydemir, F., U. Cavlak, S. Yolacan and G. Ekici, 2009. Reliability and validity of turkish version of the impact on family scale: Assessment of depressive symptoms and quality of life in mothers with cerebral palsied children. J. Med. Sci., 9: 175-184.

Borak, J., P. Sliwinski, Z. Piasecki and J. Zielinski, 1991. Psychological status of COPD patients on long term oxygen therapy. Eur. Respiratory J., 4: 59-62.

Dustman, R.E., R. Emmerson and D. Shearer, 1994. Physical activity, age and cognitive-neuropsychological function. J. Aging Phys. Activity, 2: 143-181.

Folstein, M.F., S.E. Folstein and P.R. Mc Hugh, 1975. Mini mental state. A practical method for grading the cognitive state of patients for the clinician. J. Psychiatric Res., 12: 189-198.

Ghasemkhani, M., S. Firouzbakhsh, M. Rezaei and H.R. Sadeghipour, 2006. Pulmonary function status among workers in industries of South Tehran. J. Med. Sci., 6: 63-67.

Global Initiative for Chronic Obstructive Lung Disease, 2003. Pocket guide to COPD diagnosis, management and prevention. USA7 National Institute of Health, National Heart, Lung and Blood Institute. http://www.goldcopd.com/Guidelineitem.asp?l1=2 and l2=1 and intId=1116.

Godoy, D.V. and R.F. Godoy, 2003. A randomized controlled trial of the effect of psychotherapy on anxiety and depression in chronic obstructive pulmonary disease. Arch. Phys. Med. Rehabil., 84: 1154-1157.

Goldracre, M. and J. Ferguson, 1995. In-patients workload in medical specializes. I. Demographic profiles and time trends from linked statistics. Q. J. Med., 88: 649-660.

Gudmundsson, G., T. Gislason, C. Janson, E. Lindberg and C.S. Ulrik *et al*., 2006. Depression, anxiety and health status after hospitalisation for COPD: A multicentre study in the Nordic countries. Respirrtory Med., 100: 87-93.

Gunther, J.S., M.J. Taylor, J. Karuza and E. Calkins, 2003. Physical therapist-based group exercise/education program to ýmprove functional health in older health maintenance organization members with arthritis. J. Geriatric Phys. Ther., 26: 12-17.

Hagstadius, S. and J. Risberg, 1989. Regional cerebral blood flow characteristics and variations with age in resting normal subjects. Brain Cognition, 10: 28-43.

Hansen, P., 1993. Pathophysiology of Chronic Diseases and Exercise Training. In: Resource Manual for Guidelines for Exercise Testing and Prescription, Durstine, J.L. (Eds.). 2nd Edn., Lea and Febiger, Philiadelphia, PA., pp: 187-197.

Incalzi, R.A., F. Chiappini, L. Fuso, M.P. Torrice, A. Gemma and R. Pistelli, 1998. Predicting cognitive decline in patients with hypoxaemic COPD. Respirrtiory Med., 92: 527-533.

Jacewicz, M.M. and A.A. Hartley, 1987. Age differences in the speed of cognitive operations: Resolution of inconsistent findings. J. Gerontol., 42: 86-88.

Jones, P.W., 2001. Health status measurement in chronic obstructive pulmonary disease. Thorax, 56: 880-887.

Jones, P.W., 2002. Interpreting thresholds for a clinically significant change in health status in asthma and COPD. Eur. Respiratory J., 19: 398-404.

Jones, P.W., F.H. Quirk and C.M. Baveystock, 1991. The St Georges respiratory questionnaire. Respiratory Med., 85: 33-37.

Jones, P.W., F.H. Quirk, C.M. Baveystock and P. Littlejohns, 1992. A self-complete measure of health status for chronic airflow limitation. The St. Georges Respiratory Questionnaire. Am. Rev. Respiratory Dis., 145: 1321-1327.

Kim, H.F.S., M.E. Kunik, V.A. Molinari, S.L. Hillman and S. Lalani *et al*., 2000. Functional impairment in COPD patients: The impact of anxiety and depression. Psychosomatics, 41: 465-471.

King, M.B., J.O. Judge, R. Whipple and L. Wolfson, 2000. Reliability and responsiveness of two physical performance measures examined in the context of a functional training ýntervention. Phys. Ther., 80: 8-16.

Liesker, J.J.W., D.S. Postma, R.J. Beukema, N.H.T. Hacken and T. Molen *et al*., 2004. Cognitive performance in patients with COPD. Respiratory Med., 98: 351-356.

Light, R.W., E.J. Merrill, J.A. Despars, G.H. Gordon and L.R. Mutalipassi, 1985. Prevalence of depression and anxiety in patients with COPD Relationship to functional capacity. Chest, 87: 35-38.

Lusardi, M.M., G.L. Pellecchia and M. Schulman, 2003. Functional performance in community living older adults. J. Geriatric Phys. Ther., 26: 14-22.

Marchal, G., P. Rioux, M.C. Petit-Taboue, G. Sette and J.M. Travere *et al*., 1992. Regional cerebral oxygen consumption, blood flow and blood volume in healthy human aging. Arch. Neurol., 49: 1013-1020.

Marco, F.D., M. Verga, M. Reggente, F.M. Casanova and P. Santus *et al*., 2006. Anxiety and depression in COPD patients: The roles of gender and disease severity. Respiratory Med., 100: 1767-1774.

Mikkelsen, R.L., T. Middelboe, C. Pisinger and K.B. Stage, 2004. Anxiety and depression in patients with chronic obstructive pulmonary disease (COPD). A review. Nordic J. Psychiatry, 58: 65-70.

Miller, M.R. and A.C. Pincock, 1988. Predicted values: How should we use them? Thorax, 43: 265-267.

Nielsen, A.C. and T.A. Williams, 1980. Depression in ambulatory medical patients: Prevalence by self-report questionnaire and recognition by non-psychiatric physicians. Arch. Gen. Psychiatry, 37: 999-1004.

Paul, J., L. Suzanne and D.A. Mahler, 2005. Measuring the effects of COPD on the patient. Respiratory Med., 99: S11-S18.

Pauwels, R., A. Buist, P. Ma, C.R. Jenkins and S.S. Hurd, 2001. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease: National Heart, Lung and Blood Institute and World Health Organization Global Initiative for Chronic Obstructive Lung Disease (GOLD)-executive summary. Respir. Care, 46: 798-825.

Peruzza, S., G. Sergi, A. Vianello, C.W. Pisent and F. Tiozzo *et al*., 2003. Chronic obstructive pulmonary disease (COPD) in elderly subjects: Ýmpact on functional status and quality of life. Respiratory Med., 97: 612-617.

Reuben, D.B. and A.L. Siu, 1990. An objective measure of physical function of elderly outpatients: The physical performance test. J. Am. Geriatrics Soc., 38: 1105-1112.

Rozzini, R., G.B. Frisoni, G. Ferrucci, P. Barbisoni and T. Sabatini *et al*., 2002. Geriatric index of comorbidity: Validation and comparison with other measures of comorbidity. Age and Aging, 31: 277-285.

Salik, Y., S. Özalevli and A.H. Cimrin, 2007. Cognitive function and its effects on the quality of life status in the patients with chronic obstructive pulmonary disease (COPD). Arch. Gerontol. Geriatrics, 45: 273-280.

Schaie, K.W., 1994. The course of adult intellectual development. Am. Psychol., 49: 304-313.

Yohannes, A.M., J. Roomi, K. Waters and M.J. Connolly, 1998. Quality of life in elderly patients COPD: Measurement and predictive factors. Respiratory Med., 92: 1231-1236.