Turk Toraks Derg 2014; 15: 9-17 DOI: 10.5152/ttd.2013.34

ORIGINAL INVESTIGATION

The Efficacy of Long Term Oxygen Therapy in COPD

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Abstract

OBJECTIVE: The effects of long term oxygen therapy (LTOT) on the quality of life and survival of chronic obstructive pulmonary disease (COPD) patients with respiratory failure, and the compliance to LTOT were investigated in this prospective cohort study.

MATERIAL AND METHODS: Fifty-four COPD patients, in whom LTOT was indicated, were recruited to the study between February 2006 and July 2007. Patients received two follow-up visits at 5 and 10 months, and were followed for approximately 19 months. Echocardiography was performed and the dyspnoea score (Medical Research Council, MRC) and St. George Respiratory Questionnaire (SGRQ) were applied at the initial and follow-up visits. In addition, the duration of oxygen treatment and indication for maintenance of LTOT was evaluated.

RESULTS: The mean age of the patients was 64 years; 7 were female and 47 were male. The mean duration of oxygen treatment prior to the first and second follow-up visits were 9.8 and 10.6 hours, respectively. The percentage of effective LTOT use (15 hours or more) at the first and second follow-up visits was 31% and 46%, respectively. There was no statistically significant difference in the survival of patients who were using effective and ineffective oxygen treatment. The mean baseline pulmonary arterial pressure showed a significant decrease from 50 mmHg at baseline to 40mmHg at the second follow-up visit in patients using effective LTOT (p=0.01). The symptom scores of SGRQ at the second follow-up visit were higher than the baseline values (p=0.005).

CONCLUSION: In the present study, patient compliance to LTOT was low. Although there was a decrease in pulmonary artery pressure, and an improvement in the life quality of patients as a result of LTOT use, LTOT had no effect on the survival of patients.

KEY WORDS: COPD, long term oxygen therapy, survival, pulmonary hypertension

Received: *04.04.2013* ***Accepted:*** *20.04.2013* ***Available Online Date:*** *14.06.2013*

INTRODUCTION

Chronic Obstructive Pulmonary disease (COPD) is an increasing cause of significant morbidity and mortality, worldwide. It is the fourth leading cause of death in the world and along with the increase in smoking, is expected to rise to the third leading cause of death in 2020. Similar to the other countries in the world, COPD is becoming an important problem in Turkey. Long-term oxygen treatment (LTOT) reverses secondary polycythemia due to hypoxemia, decreases pulmonary hypertension, improves right heart failure and strengthens cardiac functions. In addition, it increases effort capacity, improves quality of life and prolongs survival [1,2].

In this present study, COPD patients having respiratory failure in whom LTOT was indicated were informed in details about the benefits, use and the problems that may arise because of misuse of LTOT, and were scheduled for follow-up. Our aim was to evaluate the compliance to the long-term oxygen therapy, to determine whether indication for LTOT maintained in patient follow-ups, to examine the effects of LTOT to physiological parameters, and to evaluate the effects on the quality of life and survival. Slightly different from the existing national literature, this cohort group was prospectively followed-up, and were tried to be evaluated using echocardiography and especially with regard to pulmonary artery pressure. Beginning from the third month, the indication for maintenance of LTOT was evaluated. The results were tried to be evaluated within the scope of daily practice and especially, in the light of existing national literature.

MATERIAL AND METHODS

The study was approved by the Scientific Committee of İzmir Dr. Suat Seren Chest Disease and Surgery Education and Research Hospital (Date: 22.03.2006 document number: 108). Fifty-four patients treated with a diagnosis of COPD and

This study was presented at the Turkish Thoracic Society 12th Annual Congress, 8-12 April 2009, Kemer, Antalya, Turkey.

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respiratory failure between February 2006 and July 2007 Chest Diseases Clinic who had indication for LTOT according to 2001 COPD guidelines of the Turkish Thoracic Society (TTS) were prospectively included in the study. Complete blood count (CBC), routine biochemical tests, arterial blood gas analysis, respiratory function tests were performed in all patients. Body mass index (BMI) was calculated. The patients were divided into 3 groups according to the BMI. There were 16 subjects with a BMI between 20 and 26 kg/m² (Normal weight), 19 subjects with a BMI>26 kg/ m² (obese), and 17 subjects with a BMI<20 kg/m² (under-weight). The St. George's Respiratory Questionnaire (SGRQ) and Medical Research Council dyspnoea scale was completed. All patients underwent echocardiography (ECHO) in the Cardiology department and their pulmonary artery pressure (PAP) was measured. If the mean PAP>25 mmHg, the patient was considered to have pulmonary hypertension (PHT). All patients included in the study were given detailed information on LTOT. Patients were advised to use at least 15 hours/day oxygen keeping PaO_2 at 60-65 mmHg, and oxygen saturation above 90% and not to smoke cigarettes. At least 2 follow-ups were planned to be performed in the first year (one in the first 6 months and one in the second 6 months). Regarding the acute exacerbations of COPD, Anthonisen criteria were questioned at each follow-up visit. The patients were evaluated regarding if the indication for LTOT still exists at the follow-up visits. At each follow-up, the patients were given detailed information about the benefits and proper use of LTOT and their smoking habits were questioned.

In the follow-up visits, the patients were divided into two groups according to the duration of oxygen use: Group 1: Patients with ≥15 hours oxygen use (effective LTOT use) and Group 2: Patients with <15 hours oxygen use. Besides clinical follow-up, patient survival was followed up by phone interviews.

Statistical Analysis

SPSS 13.0 for Windows was used in the statistical analysis. Besides descriptive statistics, Independent Samples T Test and Paired sample t test were used in the comparison of groups. A confidence interval of 95% was used. A p value <0.05 was considered to be statistically significant. Kaplan-Meier Survival analysis was used in estimating survival.

RESULTS

The present study included a total of 54 subjects; 7 (13%) were female and 47 (87%) were male. The ages of the subjects ranged from 45 to 86 years, and the mean age was 64.56±9.13 years. The mean smoking history was 55±24.92 pack-years, (5 of the subjects (9.3%) had never ever smoked, 16 subjects (29.6%) were current smokers and 33 of them (61.1%) had quitted smoking. Overall, 14 subjects (25.9%) were found to have concomitant diseases including hypertension, diabetes mellitus, atherosclerotic heart disease, heart failure and bronchiectasis, 7 subjects (13%) had more than one concomitant disease. One subject was found to have obstructive sleep apnoea (OSA) as a concomitant disease.

The subjects were followed-up for a mean duration of 19 months (range, 2-31 months), and clinical follow-up was performed at a mean of 5 and 10 months; therefore, 47 patients had one follow-up visit, while 30 patients had two follow-ups. In the follow-up duration, 17 patients died, and no follow-up was available in 3 patients and their outcome could not be determined (drop-outs). Flow chart of the study is presented in Figure 1.

The results of the arterial blood gas analysis were as follows: the mean PO_2 49.19±5.75 mmHg, PCO_2 57.57±10.48 mmHg, O_2 saturation 82.17%±5.56, and pH 7.38±0.04. At the beginning of the study, PO_2 was below 55 mmHg in 46 subjects, between 55 and 59 mmHg in 8 subjects and these patients had concomitant cor pulmonale. The laboratory values were as follows: mean AST 32.94±69.40 U/L, ALT 42.56±122.00 U/L, Haemoglobin 14.43±2.14 (g/dL), and Hematocrit 42.83±6.68 (%). The results of the respiratory function tests were: Mean FVC 1.49±0.63 litres; FEV_1 0.87±0.37 litres, and FEV_1/FVC 62±21%.

The baseline mean symptom score of SGRQ was 72.55±12.36, impact score was 67.13±15.75, activity score was 88.11±13.80, and SGRQ total score was 74.00±12.65. The mean dyspnoea score was 4.26±0.93. The mean BMI of the subjects was 24.49±6.65 (14.53-41.01) kg/m². There was no statistically significant difference between the three BMI groups regarding survival (p=0.98). PHT was identified in 51 subjects using echocardiography and the mean PAP was 46.37±11.86 mmHg. In addition, there was dilatation in right heart structures in 23 subjects, interventricular septum discordance in 12 subjects, concentric left ventricular hypertrophy in 4 subjects, left ventricular global hypokinesia in 3 subjects and congestive heart failure in 2 subjects.

The mean exacerbation frequency until the first follow-up visit was 1.74±2.35 (range, 0-8) and the mean exacerbation frequency until the second follow-up visit was 1.00±1.48 (range, 0-5). The mean number of hospitalizations until the first and second follow-up visits was 0.72±1.47 (range, 0-6) and 0.23±0.77, respectively. There was a decrease in exacer-

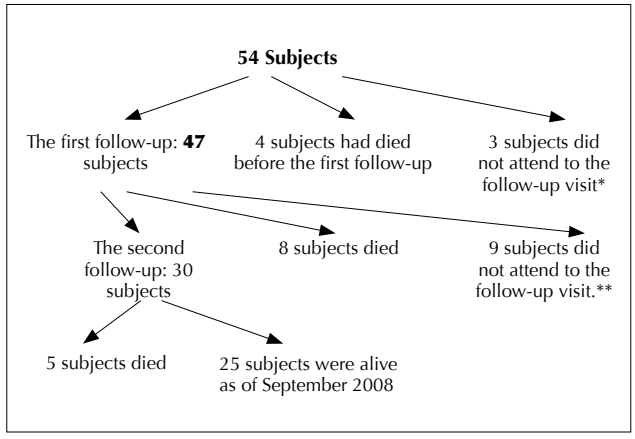

Figure 1. Patient flow chart

*Drop-outs
*Subjects who did not come to the second follow-up visit; their survival was learned by phone interviews

bation frequency and the number of hospitalizations, but the difference was not statistically significant. Although, at the beginning of the study and during follow-up visits the patients had been informed not to smoke, 12 subjects (25.5%) at the first follow-up and 5 subjects (16.6%) at the second follow-up, reported that they continued smoking while using LTOT.

During follow-up visits, it was determined that respiratory failure improved and LTOT was not indicated any more in 3 (5.5%) subjects. The mean duration of oxygen use until the first follow-up visit was 9.8±5.56 hours. In patients receiving oxygen for less than15 hours per day, the mean daily duration of oxygen use until the first follow-up visit was 7.0±4.46 hours. The rate of effective LTOT use until the first follow-up visit was 31%. The most common reasons for not using effective oxygen therapy were not feeling the need for oxygen treatment and the requirement for immobilization. Several baseline and first follow-up laboratory parameters of 47 subjects, who had one follow-up, were compared; the increase in PO_2 and O_2 saturation, and the decrease in PCO_2, PAP, SGRQ and dyspnoea scores was statistically significant (Table 1). Comparison of the characteristics of Group 1 and Group 2 at the first follow-up visit is presented in Table 2. The AST, ALT, Hgb and Hct values of Group 2 were statistically significantly higher than that of Group 1. Dyspnoea score of Group 1 was significantly higher than that of Group 2. Exacerbation frequency and the number of hospitalizations were higher in Group 1, but the difference was not statistically significant.

The duration of oxygen use of the thirty patients who had two follow-up visits until the first and second follow-up visit was 10.36±5.45 and 10.65±6.02 hours, respectively. Among the patients that had less than 15 hours oxygen use, the mean daily duration of oxygen use until the second follow-up visit was 6.09±4.75 hours. The rate of effective oxygen use until the second follow-up was 46%. The comparison of the parameters at baseline and at the first and second follow-up visits is presented in Table 3. The laboratory parameters, quality of life, exacerbation frequencies and the number of hospitalizations of Group 1 and Group 2 was compared at the second follow-up visit; except the impact score and SGRQ total score, no significant difference was found between the groups (Table 4). Among the 30 subjects who had two follow-ups, the parameters of 14 subjects with effec-

Table 1. Comparison of the parameters obtained at baseline and the first follow-up visit. P<0.05 significant

Parameters	Baseline (Mean-Std)	First follow-up (Mean-Std)	P
PO_2 (mmHg)	49.24±5.86	54.29±9.43	0.00
PCO_2 (mmHg)	57.32±10.24	52.85±10.69	0.01
O_2 saturation (%)	82.37±5.51	86.62±5.66	0.00
PH	7.38±0.04	7.38±0.04	0.86
AST (U/L)	24.62±15.56	20.11±9.89	0.09
ALT (U/L)	28.30±52.21	17.62±10.72	0.18
Hgb (g/dL)	14.35±2.03	14.28±1.76	0.78
Hct (%)	42.71±6.55	42.12±6.07	0.43
FEV_1 (litres)	0.90±0.38	0.78±0.29	0.00
FVC (litres)	1.53±0.65	1.39±0.55	0.17
PAP (mmHg)	45.38±9.89	41.23±8.82	0.02
Symptom score	72.07±12.42	59.14±20.78	0.00
Impact score	67.09±15.42	56.72±22.50	0.00
Activity score	87.87±13.43	81.44±19.70	0.00
SGRQ total score	73.82±12.17	64.39±19.53	0.00
Dyspnoea score (MRC)	4.23±0.91	3.74±1.25	0.00

$P0_2$: partial oxygen pressure; $PC0_2$: partial carbon-dioxide pressure; O_2: oxygen; pH: hydrogen ion concentration; AST: aspartate aminotransferase; ALT: alanine aminotransferase; Hgb: haemoglobin; Hct: hematocrit; FVC: forced vital capacity; FEV_1: forced expiratory volume in 1 second; PAP: pulmonary artery pressure; SGRQ: St. George's respiratory questionnaire

Table 2. Comparison of the first follow-up parameters of the groups. Group 1: Patients with effective LTOT use; Group 2: Patients with ineffective LTOT use. p<0.05 significant

Parameters	Group 1 (n=15)	Group 2 (n=35)	P
PO_2 (mmHg)	54.82±9.44	54.04±9.56	0.79
PCO_2 (mmHg)	55.22±12.57	51.74±9.71	0.30
O_2 saturation (%)	86.12±5.29	86.85±5.89	0.68
PH	7.38±0.04	7.38±0.04	0.96
AST (U/L)	15.80±6.20	22.12±10.71	0.04
ALT (U/L)	11.40±4.91	20.53±11.50	0.00
Hgb (g/dL)	13.54±1.38	14.63±1.83	0.04
Hct (%)	39.54±4.48	43.33±6.40	0.04
FEV_1 (litres)	0.74±0.23	0.80±0.32	0.57
FVC (litres)	1.22±0.47	1.47±0.58	0.16
PAP (mmHg)	42.73±8.97	40.53±8.80	0.43
Symptom score	63.61±15.49	57.05±22.76	0.16
Impact score	61.24±21.44	54.60±22.99	0.35
Activity score	86.85±15.36	78.90±21.17	0.20
SGRQ total score	69.38±17.15	62.05±20.38	0.23
Dyspnoea score (MRC)	4.2±1.03	3.5±1.29	0.05
Exacerbation frequency	2.2±2.42	1.5±2.32	0.37
Number of hospitalizations	1.2±1.93	0.5±1.16	0.12
Education status (years)	3.93±2.73	2.78±3.04	0.16

$P0_2$: partial oxygen pressure; $PC0_2$: partial carbon-dioxide pressure; O_2: oxygen; pH: hydrogen ion concentration; AST: aspartate aminotransferase; ALT: alanine aminotransferase; Hgb: haemoglobin; Hct: hematocrit; FVC: forced vital capacity; FEV_1: forced expiratory volume in 1 second; PAP: pulmonary artery pressure; SGRQ: St. George's respiratory questionnaire

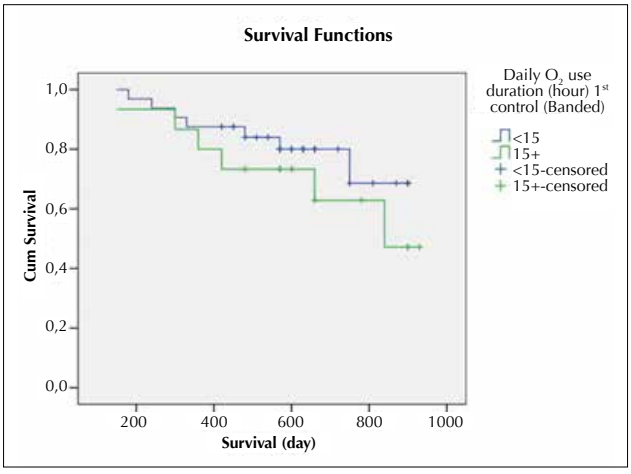

Figure 2. Survival analysis of patients with effective LTOT use and those with <15 hours oxygen use

tive LTOT use measured at baseline and at the first and second follow-up visits were compared and it was observed that the mean baseline pulmonary artery pressure (PAP) decreased from 50 mmHg to 40 mmHg at the second follow-up (p=0.01). The symptom scores of SGRQ were significantly improved from baseline to the second follow-up (p=0.005).

During the study period, 17 subjects (31.5%) died. Among the 47 patients who had one follow-up visit, the survival rates of those who had <15 hours and >15 hours oxygen use were 78% and 60%, respectively. There was no statistically significant difference between patients with effective LTOT use and those with <15 hours oxygen use regarding survival (p=0.081, p=0.100) (Figure 2). Among the 47 patients who had one follow-up, the mean time to death was 455±252 days in those with effective LTOT use, and 407±202 days in those with <15 hours oxygen use.

The subjects with a FEV_1>1 litres and those with a FEV_1<1 litres were compared in terms of survival. There were 40 subjects with a FEV_1>1 litres and 11 subjects with a FEV_1<1 litres and there was no statistically significant difference between the two groups regarding survival (p=0.863).

Table 3. The comparison of the parameters measured at baseline values, and at the first and second follow-up visits. P value <0.05 significant

	Baseline	First follow-up	Second follow-up	P
PO_2 (mmHg)	50.24±5.60	55.71±9.42	51.63±11.18	0.00 *-0.05***
PCO_2 (mmHg)	57.43±11.04	52.82±11.45	53.59±10.10	0.04*
O_2 saturation (%)	83.05±4.92	87.48±5.57	81.66±10.95	0.00*-0.00***
PH	7.38±0.03	7.38±0.04	7.37±0.03	NS
AST (U/L)	25.70±17.25	22.37±11.31	22.0±13.69	NS
ALT (U/L)	31.26±64.70	18.83±11.45	17.23±14.41	NS
Hgb (g/dL)	14.81±1.87	14.58±1.64	14.61±1.61	NS
Hct (%)	44.11±6.46	42.95±6.13	44.00±5.49	NS
FEV_1 (Litres)	0.87±0.35	0.78±0.30	0.75±0.23	0.01**
FVC (Litres)	1.45±0.55	1.42±0.61	1.50±0.60	NS
PAP (mmHg)	45.96±9.68	40.13±8.57	41.07±11.44	0.00*
Symptom score	72.67±13.60	58.63±20.17	60.00±19.55	0.00*-0.00**
Impact score	68.43±16.03	58.49±21.25	58.76±20.46	0.00*-0.02**
Activity score	87.77±13.46	80.77±18.55	84.92±13.63	0.01*
SGRQ total score	74.43±12.79	65.17±18.76	66.21±15.31	0.00*-0.00**
Dyspnoea score (MRC)	4.23±0.93	3.73±1.33	3.93±1.23	0.01*

*: comparison between the baseline and first follow-up visit is significant. **: comparison between the baseline and second follow-up visit is significant. ***: comparison between the first follow-up visit and the second follow-up visit is significant.

$P0_2$: partial oxygen pressure; $PC0_2$: partial carbon-dioxide pressure; O_2: oxygen; pH: hydrogen ion concentration; AST: aspartate aminotransferase; ALT: alanine aminotransferase; Hgb: haemoglobin; Hct: hematocrit; FVC: forced vital capacity; FEV_1: forced expiratory volume in 1 second; PAP: pulmonary artery pressure; SGRQ: St. George's respiratory questionnaire

DISCUSSION

Long-term oxygen therapy with a daily oxygen use of at least 15 hours has been demonstrated to be effective using dyspnoea scores and nocturnal oxygen treatment, and the international guidelines recommend a LTOT duration of at least 15 hours/day [3-6]. In this present study, patients were also advised to use at least 15 hours/day oxygen and training on this subject was provided at each follow-up period. However, the most important problem in LTOT is the non-compliance of patients to treatment [7]. In Turkey, the compliance to LTOT was reported to be between 20% and 31% [8-12]. In the present study, the compliance to LTOT at the first and second follow-up visits was 31% and 46%, respectively. It was suggested that inviting patients for follow-up would enhance compliance to LTOT. In addition, subjects with a poorer quality of life, higher dyspnoea scores, and higher number of exacerbations and hospitalizations were found to have higher compliance to LTOT. Patient compliance seems to be lower in studies performed in Turkey than that of studies performed in the European countries and as they are based on patient-reporting, the true rates can be much lower. In studies performed in Turkey, no significant relationship was found between treatment compliance and factors such as age, gender, smoking, educational level of the patient or social status; however, compliance to treatment was found to be increased with patient follow-up and informing and training of the patients by the physician in terms of LTOT use [9,12].

In studies performed in Turkey, the duration of daily oxygen use ranges between 6.17±5.56 and 16.2±4.4 hours [11-14]. In this present study, the mean duration of oxygen use until the first follow-up was 9.8±5.56 hours, and 10.6±6.02 hours until the second follow-up, and it was observed that daily oxygen use was increased with monitoring of the patients using LTOT.

Table 4. Comparison of the groups regarding the parameters measured at the second follow-up visit. Group 1: patients with effective LTOT use. Group 2: patients with ineffective LTOT use. P<0.05 significant

Parameters	Group 1 (n:14)	Group 2 (n:16)	p
PO_2 (mmHg)	54.02±10.41	49.54±11.74	0.28
PCO_2 (mmHg)	53.50±11.30	53.66±9.31	0.96
O_2 saturation (%)	83.71±8.65	79.86±12.62	0.34
PH	7.37±0.03	7.37±0.03	0.67
AST (U/L)	21.50±13.80	22.44±14.03	0.85
ALT (U/L)	15.07±10.34	19.13±17.33	0.45
Hgb (g/dL)	14.05±1.58	15.10±1.52	0.07
Hct (%)	42.68±6.08	45.15±4.83	0.22
FEV_1 (Litres)	0.71±0.24	0.79±0.22	0.37
FVC (Litres)	1.44±0.74	1.56±0.46	0.61
PAP (mmHg)	40.54±8.98	41.53±13.52	0.82
Symptom score	60.20±15.57	59.83±23.00	0.96
Impact score	69.67±15.10	49.22±20.08	0.00
Activity score	88.60±11.28	81.69±15.01	0.17
SGRQ total score	73.45±10.40	59.87±16.37	0.01
Dyspnoea score (MRC)	4.07±1.43	3.81±1.04	0.57
Exacerbation frequency	1.29±1.77	0.75±1.18	0.33
The number of hospitalizations	0.43±1.08	0.06±0.25	0.20
Level of education	1.86±2.77	3.69±3.34	0.50

$P0_2$: partial oxygen pressure; $PC0_2$: partial carbon-dioxide pressure; O_2: oxygen; pH: hydrogen ion concentration; AST: aspartate aminotransferase; ALT: alanine aminotransferase; Hgb: haemoglobin; Hct: hematocrit; FVC: forced vital capacity; FEV_1: forced expiratory volume in 1 second; PAP: pulmonary artery pressure; SGRQ: St. George's respiratory questionnaire

Technical service support is mandatory for the periodic maintenance of oxygen concentrators. In order to check the flow rate and oxygen concentration, maintenance services should ideally be performed once a month [15]. In countries such as USA, Switzerland and France, national registries are established for these patients [16]. However, in Turkey, there is no national registry for patients using LTOT and technical service support for oxygen concentrators is not sufficient. In this present study, among 48 patients who provided oxygen concentrators, it was determined that only 5 of them received technical service support.

One of the essential criteria for long term oxygen treatment is quitting smoking [6]. Smoking along with LTOT use may result in life threatening incidents [3,12]. In this study, although the patients were advised to quit smoking and informed about the problems that could arise by using LTOT along with smoking, at baseline and at the follow-up visits, it was determined that 29.6% of the patients had been smoking cigarettes at the time of oxygen concentrator prescription, and 25.5% and 16.6% of them continued smoking at the first and second follow-up visits, respectively. Questioning patients about their smoking history at the follow-ups and advising them not to smoke may provide them courage to quit smoking.

In the nocturnal oxygen therapy trial, it was reported that the patients receiving continuous oxygen treatment had lower rates of hospitalization and their hospital stay was shorter than that of patients receiving nocturnal oxygen therapy. [4]. In studies performed in Turkey, exacerbation frequency and hospitalization rates were determined to be decreased by LTOT use [10,11,17]. In this study, the mean exacerbation frequency in patients using effective LTOT until the first follow-up visit was 2.2±2.42, and the mean number of hospitalizations was 1.2±1.93; on the other hand, the mean

exacerbation frequency in patients with ineffective LTOT use was 1.5±2.32, and the number of hospitalizations was 0.5±1.16. The patients with effective LTOT use had higher frequency of exacerbations and higher number of hospitalizations in comparison to patients with <15 hours oxygen use, though the difference was not statistically significant. These results may be attributed to the poorer quality of life, higher dyspnoea scores, reduced pulmonary reserves and higher prevalence of symptoms of patients showing greater compliance with oxygen treatment compared to patients who used less oxygen.

Taskar and colleagues [18] applied at least 18 hours/day oxygen treatment for 3 weeks to COPD patients and determined a significant increase in PaO_2, and a significant decrease in PCO_2 values. The studies performed in Turkey reported a significant increase in PaO_2, and a significant decrease in PCO_2 values with LTOT use [10,13,14]. Similarly, in this present study, the first follow-up visit was done at a mean of 5 months and it was determined that there was a statistically significant increase in PaO_2 values, and a statistically significant decrease in $PaCO_2$ values.

In the studies performed, it was demonstrated that oxygen treatment was not indicated anymore in 45% of the patients, if their use of LTOT was re-evaluated after 1-3 months, m [4,19]. Similar to the previous studies, among 54 patients with LTOT indication at baseline, LTOT indication was not present in 3 (5.5%) of them at the two follow-up visits. In this context, it is clear that it will be appropriate to re-assess LTOT indication after 3 months of use and more cost-effective results can be obtained, if the social security organizations in Turkey make arrangements that take into consideration the obtained knowledge.

A significant relationship was found between survival and FEV_1 values in some studies [20-22]. Tutluoğlu and colleagues [14] reported that mean FEV_1 loss/year was lower in patients using LTOT than that of patients not using LTOT. In the present study, there was no statistically significant difference between the survival rates of patients with a FEV_1 value >1 litres and those with FEV_1 <1 litres.

FEV_1 loss was significant at the follow-ups; however, there was no significant difference in the FEV_1 loss of patients with >15 hours and <15 hours oxygen use.

In the nocturnal oxygen therapy trial, the hematocrit value of patients receiving continuous oxygen treatment, was found to be lower at the end of 6 months, when compared to that of patients receiving nocturnal oxygen treatment, and the decrease in Htc was significant at 12 and 18. months [4]. However, there are studies reporting no significant decrease in Htc values [5,14]. Similarly, no decrease was observed in the Htc and Hgb values of the patients at the first and second follow-up visits in the present study.

Kurtar et al. [9] determined that 70% of the subjects had PHT at baseline and mortality rate was 5 fold higher in patients with PHT. In this study, 51 subjects (94%) were diagnosed to have PHT. As there was only 3 cases without PHT, the effects of PHT to mortality could not be evaluated. PAP showed a statistically significant decrease at the follow-up visits (p=0.02, p=0.00).

O'Dannel and colleagues [23] observed that dyspnoea scores decreased with oxygen treatment in patients with COPD and respiratory failure. In this study, a statistically significant decrease was found in the dyspnoea scores of patients receiving LTOT at each follow-up visit compared to baseline.

There are studies reporting a relationship between BMI and survival in chronic respiratory failure patients receiving LTOT [24-26]. However, in the present study, in which the subjects were divided into 3 groups according to BMI as normal weight, obese and under-weight, no statistically significant difference was found between the groups in terms of survival (p=0.98).

In the nocturnal oxygen therapy trial, survival rates of patients receiving continuous oxygen treatment and patients receiving nocturnal oxygen treatment, was compared. The mortality rate of the group receiving continuous oxygen treatment was lower than that of the group receiving nocturnal oxygen treatment [4]. In the present study, patients receiving nocturnal oxygen and continuous oxygen were not compared; survival analysis was performed in patients with effective and ineffective LTOT use. In the MRC trial, survival rates of patients receiving oxygen (at least 15 hours daily) and subjects not receiving oxygen (follow-up group) were compared. In the event that survival was 180-500 days, there was no difference between the group receiving oxygen and control group; however, among patients who survived for more than 500 days, patients receiving oxygen had a significantly longer survival in comparison to the control group at 5 year follow-up [5]. In this study, the mean patient follow up was 19 months, and the patients were followed up for a maximum of 31 months. There was no survival difference between the group with effective LTOT use and the group with <15 hours oxygen use; however, it was suggested that longer follow-up periods are much more reliable in showing the effects of oxygen treatment on mortality. Karakurt et al. [27] reported that the mean survival duration of COPD patients with effective LTOT use and the patients with <15 hours LTOT use was 5.6±5.1 months and 5.2±4.9 months, respectively, and the difference between the groups was not statistically significant.

It has been shown in multiple studies that long-term oxygen treatment, with its positive contribution to the pulmonary hemodynamics and exercise capacity, increases the survival duration and improves the quality of life; however, there are studies that do not support this opinion. Janssens and colleagues [28] found an improvement in the quality of life of 79 subjects by the SGRQ they applied at the beginning and end of the first year. In the NOTT study, there was an improvement in the neuropsychological functions and qual-

ity of life of the group receiving continuous oxygen treatment; however quality of life was not evaluated by the SGRQ [4]. In the present study, there was a statistically significant decrease in the symptom score, impact score, activity score, and total SGRQ score and an improvement in the quality of life of patients receiving LTOT at the first and second controls compared to baseline values.

In conclusion, although patients were provided with detailed training on LTOT, compliance to treatment was low and almost one fourth of the patients continued smoking while they were receiving LTOT. LTOT application improves the quality of life and decreases the dyspnoea scores. According to data obtained from this cohort analysis; patients who are prescribed LTOT should be given detailed information about the treatment, and should be encouraged to quit smoking. They should be followed-up at definite intervals and regular maintenance of the oxygen concentrators should be carried out.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

Peer-review: Externally peer-reviewed.

Study Approval: This study was approved by the the Scientific Council of İzmir Dr. Suat Seren Chest Diseases and Thoracic Surgery Training and Research Hospital (22 March 2006, Document Number: 108).

Informed Consent: This study was conducted between 2006 and 2007. Informed consent was obtained from the participants.

Author Contributions: Concept - S.Ö., P.D.Ç.; Design - S.Ö., P.D.Ç., O.F.E.; Supervision - S.Ö., O.F.E., E.Y.; Funding - S.Ö., P.D.Ç., E.Y.; Materials - S.Ö., P.D.Ç., E.Y.; Data Collection and/or Processing - P.D.Ç., S.Ö., H.H.; Analysis and/or Interpretation - S.Ö., P.D.Ç., O.F.E., H.H., E.Y.; Literature Review - P.D.Ç., S.Ö.; Writer - P.D.Ç., S.Ö.; Critical Review - S.Ö., P.D.Ç., O.F.E., E.Y.

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