

ORIGINAL INVESTIGATION

The Effect of Training of Elderly COPD Patients on Their Skills in Using an Inhaler

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Abstract

OBJECTIVES: The purpose of this study was to determine the effects of education on inhaler using skills of elderly patients with COPD.**MATERIAL AND METHODS:** This pre-test- post-test quasi-experimental study including a control group was conducted with 80 patients. The study was performed in a chest and occupational diseases hospital in the Western Black Sea Region of Turkey between 01 January and 30 June 2011. Data were collected using a "Patient Information Form", a "Skill Chart for Inhaler Device Use". Official and ethical permissions were obtained from the relative institutions., and written informed consent was obtained from the patients. Descriptive statistical methods and chi-square test were used to evaluate the data.**RESULTS:** It was found that inhaler using skills of the patients in the experimental group showed a greater improvement after education as compared pre-education values and those values in the control group.**CONCLUSION:** It was concluded that education on inhaler usage techniques improved patients' skills on using inhaler devices correctly in the experimental group.**KEY WORDS:** COPD, elderly patient, inhaler using skills, patient education**Received:** 25.03.2013**Accepted:** 04.06.2013**Available Online Date:** 31.06.2013

INTRODUCTION

Increase in the number of elderly in the population along with the prolongation of lifespan is one of the most important facts of the 20th century [1,2]. Such an increase in the elderly population brings forward significant health problems [3].

Chronic obstructive pulmonary disease (COPD) is one of the important diseases that lead to restrictions, disability, and an increase in mortality rates among elder population [4,5]. Inhaled medications are used in respiratory diseases, primarily in chronic obstructive pulmonary disease and asthma, for bronchodilation and anti-inflammation. Inhaled drugs are used in lower doses, act faster, and have lower side effects as compared to systemic medications [6,7]. Inhalation devices used for inhaled drugs allow the drug to be released rapidly, economically, and safely into the lungs. Although some effects may be seen due to deposition in the oropharynx and subsequent absorption, a successful treatment depends on appropriate deposition of drug in the lungs [8,9]. The amount of drug deposited in the lungs is influenced by inhalation techniques and instructions for use [10]. Most patients make various mistakes while using inhaled drugs [11,12]. Errors in inhaled drug usage influence the success of treatment. Mistakes while using inhaled medications have an important role particularly in the development of asthma and COPD attacks and in the failure to control these diseases [13,14]. Advanced age is an important factor in the use of inhalation devices. Nonadherence to inhaler device use is one of the problems encountered in the treatment of COPD in elder patients [15]. The reasons for this include frequent use of multiple-drug therapies in elderly; need for additional medications due to increase in comorbidities in addition to COPD; aging-related problems such as decrease in cognitive-mental processes and in physical functions such as hearing, vision and mobility, social problems such as loneliness, and psychological problems; lack of education on inhaler device use, or not using the appropriate education methods [15-20]. It has been demonstrated that patients over the age of 65 years are less likely to adhere to hand-held inhalers than the patients under the age of 65 years. Age is not the only factor in terms of adherence to inhaler techniques. Comprehension and intellectual skills of the patient are of great importance. Comprehension ability is impaired in approximately 20% of the patients aged over 80 years [15]. Therefore, education that is given to elder patients should be accurately planned and it must be aimed at gaining skill with repeated practices. The present study was conducted to investigate the effect of education given to elder patients with chronic obstructive pulmonary disease on their inhaler use skills.

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MATERIAL AND METHODS

Universe and Sample Size

The universe of this pretest-posttest quasi-experimental study, comprised 155 patients aged over 65 years, who have been staying in a chest and occupational diseases hospital in the Western Karadeniz Region of Turkey between 01 January and 30 June 2011, and have been diagnosed with COPD and received inhaled medication for at least one year. Eighty eight COPD patients that fulfilled the eligibility criteria constituted the sample size of the study. A total of eight patients were excluded from the study, of which four refused to participate in the study and four were discharged from the study while the study was on going. The study was performed in 80 patients, with 36 patients in the experimental group and 44 patients in the control group.

Eligibility Criteria for the Study Group

Patients at or over the age of 65 years who have been diagnosed with COPD for at least one year, who

- Have used at least one of the inhaler devices, including handihaler, discus, metered-dose inhaler, turbuhaler, and aerolizer inhaler for at least one year;
- Had no additional respiratory system problems such as respiratory system cancer or tuberculosis;
- Were on stable medical treatment;
- Were capable of using the inhaler device on their own without help of a caregiver;
- Had no physical disease, cognitive failure or had not been diagnosed with psychiatric disease that could hinder understanding the scales used to collect data or the education given;
- Were literate and voluntary to participate, were included in the study.

Ethical Aspects of The Study

Official permission of relevant institutions and approval of Abant İzzet Baysal University Clinical Researches Ethics Committee (Dated: 13.04.2011, No. 53) were obtained to conduct the study. Moreover, on the basis of voluntary participation, patients were included in the study after their informed consents were obtained.

Data Collection Tools

Study data were obtained via a "Questionnaire Form" consisting of informative questions about the patient and disease-related characteristics and the "Skill Chart for Inhaler Device Use", which was prepared by the Turkish Thoracic Society and was included in the Educational Book Series. In these scales, the use of various forms of inhalers (metered-dose inhaler (MDI), turbuhaler, discus, handihaler, aerolizer) is described in stepwise fashion [21,22]. Data were collected by the researcher via face-to-face interview.

Implementation

Patients included in the study were divided into two groups as experimental and control groups. In order to avoid the control group to be influenced by the experimental group, the control group was investigated first.

Control Group

In the control group (n=44), skills of the patients were assessed by the "Skill Chart for Inhaler Device Use" on the first day of hospitalization as the pre-test and on the 7th day of hospitalization as the post-test. In line with the ethical principles, an education session on inhaler device use was given to the patients in the control group after post-test applications were completed.

Experimental Group

In the experimental group (n=36), skills of the patients were assessed by the "Skill Chart for Inhaler Device Use" on the first day of hospitalization as the pre-test. Thereafter, education sessions on inhaler device use were held for three times at every other day. Skills of the patients were reassessed on the 7th day of hospitalization again by the "Skill Chart for Inhaler Device Use" as the post-test.

Education on inhaler device use: Patient education materials included information on disease process, treatment type, and regular and effective use of inhaler devices. Education materials were prepared in reference to the Educational Book Series of the Turkish Thoracic Society based on the needs of COPD patients [21,22]. Plain expression, question-answer, discussion, power point presentation and demonstration techniques were used in the education. Educational books on the subject were given to the patients. The patients in the experimental group received patient education within a mean of 20 minutes in the education room every other day for three times.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) 13.0 package program was used for data analysis. Data were evaluated using descriptive statistical methods (distribution of frequency, mean, standard deviation) and chi-square test. Results of the analyses were evaluated within 95% confidence interval and at a significance level of $p < 0.05$.

RESULTS

Results on Demographic and Disease-Related Characteristics of the Patients

Of the patients in the experimental group, 69.4% were male, 66.7% were in the 65-75 year-age group, and 97.2% were literate. Of the patients in the control group, 25% were female, 72.7% were in the 65-75 year-age group and 97.7% were literate. There was no difference between the experimental and control groups in terms of gender, age, education status, duration of being diagnosed with COPD, hospitalization for COPD, smoking status, having information about COPD, and duration of inhaler device use ($p > 0.05$, Table 1). Of the patients in the experimental group, 22.2% were using handihaler, 22.2% were using discus, 47.2% were using aerolizer, 27.8% were using MDI, and 13.9% were using turbuhaler. Of the patients in the control group, 22.7% were using handihaler, 20.5% were using discus, 40.9% were using aerolizer, 38.6% were using MDI and 9.1% were using turbuhaler.

Results on the Skills of Patients in Using Inhaler Devices

In the experimental group, among the steps of handihaler use, the step "Press the green button all the way down, and then release" was performed correctly in the pre-test by 37.5% and

in the post-test by 87.5% of the patients; the step “*Exhale completely*” was performed correctly in the pre-test by 25.0% and in the post-test by 50.0% of the patients; the step “*Take a strong and deep breath*” was performed correctly in the pre-test by 50.0% and in the post-test by 87.5% of the patients; and the step “*Hold your breath for 10 seconds*” was performed correctly in the pre-test by 12.5% and in the post-test by 62.5% of the patients. It was observed that there was less improvement in the pretest-posttest results of aerolizer use in the control group as compared to the experimental group (Table 2).

In the experimental group, among the steps of discus use, the step “*Exhale*” was performed correctly in the pre-test by 0% and in the post-test by 75.0% of the patients; the step “*Take a strong and deep breath*” was performed correctly in the pre-test by 62.5% and in the post-test by 100% of the patients; the step “*Take the inhaler out of your mouth before exhaling, and hold*

your breath for 5-10 seconds” was performed correctly in the pre-test by 12.5% and in the post-test by 87.5% of the patients; the step “*Exhale and wait for 20-30 seconds before the second inhalation*” was performed correctly in the pre-test by 0% and in the post-test by 87.5% of the patients; and the step “*Make it ready to use again by pushing the lever back before the second application*” was performed correctly in the pre-test by 50.0% and in the post-test by 87.5% of the patients. It was determined that there was no difference in the pretest-posttest results of the steps of discus use in the control group (Table 3).

In the experimental group, among the steps of aerolizer use, the step; “*Push the buttons on both sides of the inhaler for once and then release*” was performed correctly in the pre-test by 64.7% and in the post-test by 88.2% of the patients; the step “*Exhale before inhalation*” was performed correctly in the pre-test by 5.9% and in the post-test by 70.6% of the patients;

Table 1. Comparison of the patients in the experimental and control groups in terms of demographic and disease-related characteristics

Characteristics	Experimental (n=36)		Control (n=44)		Total (n=80)		Test and p
	n	%	n	%	n	%	
Gender							
Male	25	69.4	33	75.0	58	72.5	X ² =0.307
Female	11	30.6	11	25.0	22	27.5	p=0.580
Age (years)							
65-75	24	66.7	32	72.7	56	70.0	X ² =0.346
≥76	12	33.3	12	27.3	24	30.0	p=0.556
Education Status							
Literate	35	97.2	43	97.7	78	97.4	X ² =2.041
Primary school	1	2.8	0	0	1	1.3	p=0.360
High school	0	0	1	2.3	1	1.3	
Duration of COPD diagnosis							
1-5 years	9	25.0	11	25.0	20	25.0	X ² =1.047
6-15 years	8	22.2	14	31.8	22	27.5	p=0.592
≥16 years	19	52.8	19	43.2	38	47.5	
Number of hospitalizations for COPD							
1	4	11.1	4	9.1	8	10.0	X ² =0.485
2	11	30.6	11	25.0	22	27.5	p=0.785
≥3	21	58.3	29	65.9	50	62.5	
Smoking status							
Never smoked	13	36.1	10	22.7	23	28.8	X ² =1.809
Quitted	22	61.1	33	75.0	55	68.8	p=0.405
Current smoker	1	2.8	1	2.3	2	2.5	
Have information on COPD							
Yes	14	38.9	13	29.5	27	33.8	X ² =0.773
No	22	61.1	31	70.5	53	66.3	p=0.379
Duration of inhaler use							
1-5 years	20	55.6	27	61.4	47	58.8	X ² =0.298
6-10 years	7	19.4	7	15.9	14	17.5	p=0.861
≥11 years	9	25.0	10	22.7	19	23.8	
Total	36	100.0	44	100.0	80	100.0	

the step “Place the inhaler into your mouth and take a strong and deep breath” was performed correctly in the pre-test by 47.1% and in the post-test by 88.2% of the patients; the step “Hold your breath for 10 seconds” was performed correctly in the pre-test by 11.8% and in the post-test by 88.2% of the patients; and the step “Exhale after inhalation” was performed correctly in the pre-test by 82.4% and in the post-test by 100.0% of the patients. There was less improvement in the pretest-posttest results of aerolizer use in the control group as compared to the experimental group (Table 4).

In the experimental group, among the steps of MDI use, the step “Shake the inhaler” was performed correctly in the pre-test by 40.0% and in the post-test by 70.0% of the patients; the step “Hold the inhaler and your head in the upright position, take the inhaler to the same level” was performed cor-

rectly in the pre-test by 80.0% and in the post-test by 100.0% of the patients; the step “Exhale” was performed correctly in the pre-test by 10.0% and in the post-test by 60.0% of the patients; the step “Place the mouthpiece between your lips” was performed correctly in the pre-test by 90.0% and in the post-test by 100.0% of the patients; the step “Start inhaling and press the metal tube down” was performed correctly in the pre-test by 90.0% and in the post-test by 100.0% of the patients; the step “Hold your breath for 5-10 seconds” was performed correctly in the pre-test by 40.0% and in the post-test by 80.0% of the patients; the step “Exhale, wait for 20-30 seconds before the second dose” was performed correctly in the pre-test by 10.0% and in the post-test by 50.0% of the patients; and the step “Shake the inhaler again before the second dose” was performed correctly in the pre-test by 0%

Table 2. Comparison of the patients in the experimental and control groups according to the steps of handihaler use

Steps of handihaler use	Experimental (n=8)				Control (n=10)			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Open the lid	8	100.0	8	100.0	10	100.0	10	100.0
Place the capsule into the space in handihaler	8	100.0	8	100.0	10	100.0	10	100.0
Close the mouthpiece	8	100.0	8	100.0	10	100.0	10	100.0
Press the green button all the way down, and then release	3	37.5	7	87.5	9	90	9	90
Exhale completely	2	25.0	4	50.0	1	10.0	2	20.0
Place the handihaler in your mouth	8	100.0	8	100.0	10	100.0	10	100.0
Take a strong and deep breath	4	50.0	7	87.5	7	70.0	7	70.0
Hold your breath for 10 seconds	1	12.5	5	62.5	2	20.0	3	30.0
Exhale	7	87.5	7	87.5	7	70.0	7	70.0
Close the lid after use	8	100.0	8	100.0	10	100.0	10	100.0

Table 3. Comparison of the patients in the experimental and control groups according to the steps of discus use

Steps of discus use	Experimental (n=8)				Control (n=19)			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Remove the mouthpiece cover	8	100.0	8	100.0	9	100.0	9	100.0
Push the lever back and prick the capsule	8	100.0	8	100.0	9	100.0	9	100.0
Hold the discus in horizontal position	8	100.0	8	100.0	9	100.0	9	100.0
Exhale	0	0	6	75.0	2	22.2	2	22.2
Place the mouthpiece between your lips	8	100.0	8	100.0	9	100.0	9	100.0
Take a strong and deep breath	5	62.5	8	100.0	7	77.8	7	77.8
Take the inhaler out of your mouth before exhaling, hold your breath for 5-10 seconds	1	12.5	7	87.5	4	44.4	4	44.4
Exhale, and wait for 20-30 seconds before the second inhalation	0	0	7	87.5	3	33.3	4	44.4
Make it ready to use again by pushing the lever back before the second application	4	50.0	7	87.5	5	55.6	5	55.6
Hold the discus in horizontal position, close the cover after use	8	100.0	8	100.0	9	100.0	9	100.0

Table 4. Comparison of the patients in the experimental and control groups according to the steps of aerolizer use

Steps of Aerolizer use	Experimental (n=17)				Control (n=18)			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Pull off the cover	17	100.0	17	100.0	18	100.0	18	100.0
Twist the mouthpiece in the direction of the arrow to open	17	100.0	17	100.0	18	100.0	18	100.0
Place the capsule into the space in the aerolizer	17	100.0	17	100.0	18	100.0	18	100.0
Close the mouthpiece	17	100.0	17	100.0	18	100.0	18	100.0
Push the buttons on both sides of the inhaler for once and then release	11	64.7	15	88.2	14	77.8	14	77.8
Exhale	1	5.9	12	70.6	4	22.2	6	33.3
Place the inhaler in your mouth and take a strong and deep breath	8	47.1	15	88.2	14	77.8	16	88.9
Hold your breath for 10 seconds	2	11.8	15	88.2	4	22.2	7	38.9
Exhale	14	82.4	17	100.0	12	66.7	15	83.3
Close the cover after use	17	100.0	17	100.0	18	100.0	18	100.0

Table 5. Comparison of the patients in the experimental and control groups according to the steps of metered-dose inhaler (MDI) use

Steps of MDI use	Experimental (n=10)				Control (n=17)			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Remove the cap on the mouthpiece	10	100.0	10	100.0	17	100.0	17	100.0
Shake the inhaler	4	40.0	7	70.0	6	35.3	6	35.3
Hold your head and inhaler in the upright position, take the inhaler to the same level	8	80.0	10	100.0	9	52.9	10	58.8
Exhale	1	10.0	6	60.0	4	23.5	4	23.5
Place the mouthpiece between your lips	9	90.0	10	100.0	16	94.1	17	100.0
Start inhaling and press the metal tube down	9	90.0	10	100.0	17	100.0	16	94.1
Hold your breath for 10 seconds	4	40.0	8	80.0	8	47.1	9	52.9
Exhale, wait for at least 30 seconds, preferably 3-5 minutes, before the second dose	1	10.0	5	50.0	4	23.5	5	29.4
Shake the inhaler again before the second dose	0	0	5	50.0	4	23.5	4	23.5
Close the cap after use	10	100.0	10	100.0	16	94.1	17	100.0

and in the post-test by 50.0% of the patients. Less improvement was observed in the pretest-posttest results of the steps of MDI use in the control group as compared to the experimental group (Table 5).

In the experimental group, among the steps of turbuhaler use, the step "Rotate the lower base clockwise and then counter clockwise and hear click sound" was performed correctly in the pre-test by 80.0% and in the post-test by 100.0% of the patients; the step "Exhale" was performed correctly in the pre-test by 40.0% and in the post-test by 80.0% of the patients; the step "Take a strong and deep breath" was performed correctly in the pre-test by 60.0% and in the post-test by 100.0% of the patients; the step "Take the inhaler out of your mouth before exhaling, hold your breath for 5-10 seconds" was performed correctly in the pre-test by 20.0% and in the post-test by 60.0% of the patients; the step "Exhale, wait for 20-30 seconds

before the second inhalation" was performed correctly in the pre-test by 0% and in the post-test by 60.0% of the patients; and the step "Hold the turbuhaler in the upright position, and make it ready for the second inhalation by rotating its lower base again" was performed correctly in the pre-test by 60.0% and in the post-test by 80.0% of the patients. Less improvement was observed in the pretest-posttest results of the steps of turbuhaler use in the control group as compared to the experimental group (Table 6).

DISCUSSION

Upon reviewing the literature, it was determined that COPD is prevalent among males and its prevalence increases with age. This gender difference is explained by the facts that smoking is more prevalent among males and males are exposed to toxic substances more commonly than females because of occupational reasons [23]. Consistent with the literature infor-

Table 6. Comparison of the patients in the experimental and control groups according to the steps of turbuhaler use

Steps of Turbuhaler use	Experimental (n=5)				Control (n=4)			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Remove the cap of the turbuhaler	5	100.0	5	100.0	4	100.0	4	100.0
Hold the turbuhaler in the upright position	5	100.0	5	100.0	3	75.0	3	75.0
Rotate the lower base clockwise and then counter clockwise, hear the click sound	4	80.0	5	100.0	4	100.0	4	100.0
Exhale	2	40.0	4	80.0	2	50.0	2	50.0
Place the mouthpiece between your lips	5	100.0	5	100.0	4	100.0	4	100.0
Take a strong and deep breath	3	60.0	5	100.0	3	75.0	3	75.0
Take the inhaler out of your mouth before exhaling, hold your breath for 5-10 seconds	1	20.0	3	60.0	2	50.0	3	75.0
Exhale, wait for 20-30 seconds before the second inhalation	0	0	3	60.0	2	50.0	2	50.0
Hold the turbuhaler in the upright position, rotate the lower base again and make it ready for second inhalation	3	60.0	4	80.0	4	100.0	4	100.0
Close the cap after use	5	100.0	5	100.0	4	100.0	4	100.0

mation, the majority of the patients included in the present study were males [24-26]. Chronic obstructive pulmonary disease is considered a disease of advanced age that is encountered between the ages of 35 and 70 years [27]. In the present study, it was determined that the majority of the patients in the control and experimental groups were in the advanced age group. In the study conducted by Acar, it was expressed that the majority of COPD patients were at or over the age of 55 years [28].

Cigarette smoking is the most important risk factor in the development of chronic obstructive pulmonary disease [29]. In the developed countries, smoking accounts for 90% of the risk of COPD [30]. Most of the patients in the control and experimental groups in the present study have smoked or were current smokers. Tzanakis et al. [25] expressed that intensity of smoking and age are associated with the prevalence of COPD in both genders. Many studies determined that a part of the patients continue to smoke although they have been diagnosed with COPD [24,31,32]. The results of this study are in line with the results of previous studies. In the present study, it was found that 91.7% of the patients in the experimental group and 70.5% of the patients in the control group have not had information on COPD. Likewise, Esen [31] and Görgülü [33] as well determined in their studies that most of the patients have not had information on COPD. In the present study, no statistically significant difference was found between the groups when they were compared in terms of variables such as gender, age, education status, duration of being diagnosed with COPD, hospitalization due to COPD, smoking status, duration of inhaler device use, and having information on COPD. This indicates that the experimental and control groups are similar to each other in terms of the variables listed above.

istered via inhalation [34]. Patients receiving inhaled medications make considerable mistakes in various stages while using these drugs. Mistakes in the use of inhaled medications lead the patients to receive lower doses of drug than recommended and even to discontinue the drug in time [11,14]. Patient education is a critical factor for accurate use and not to abuse inhaled medications [35]. Health professionals have important responsibilities in the correct use of inhalers. These professionals might make substantial contribution to an effective treatment through correcting the mistakes by providing elder COPD patients with knowledge on the use of inhalation device by means of education that they would give. Based on this information, the present study evaluated the effect of education about the use of inhaler devices on the inhaler using skills of elder patients with chronic obstructive pulmonary. In all forms of inhalers, the most common mistake was made at the step that expresses the necessity of exhaling before using the drug in the experimental group before education. It was observed that patients who received education for the use of inhaler device made fewer mistakes as compared both to pre-education period and to the control group.

In the experimental and control groups, a significant difference was observed between pretest-posttest results in terms of handihaler, discus, aerolizer, MDI and turbuhaler device using skills. Education has contributed to the inhaler device using skills of patients in the experimental group. Şirinoğlu [36] determined that patient education about inhaler use improved patients' skills in using all forms of inhalers. Çam and Göçemen [10] determined that the step of exhaling before inhaling was performed correctly before education by 35.0% and after education by 97.5% of the patients using discus. Şirinoğlu [36] determined that the step "Exhale slowly and wait for 1 minute before the second application" was performed correctly by 7.7% of the patients in the first application and by 53.8% of the patients after education. Moreover, the same study reported that patients most fre-

quently made mistakes in the steps “*Exhale*”, “*Hold your breath for 10 seconds*” and “*Exhale slowly and wait for one minute before the second application*”. Çam and Göçemen [10] determined that the majority of patients using discus exhaled into the device. Mirici et al. [8] found that patients using discus most frequently made mistakes in the steps holding breath for 5-10 seconds, exhaling and waiting for 20-30 seconds, and inhaling again. In the present study, whilst the step “*Exhale and wait for 20-30 seconds before the second inhalation*” was performed correctly in the pre-test by 0% of the patients that was using discus in the experimental group, this rate increased to 87.5% in the post-test. The present study has similar results with previous studies.

Similar with the present study, Şirinoğlu [36] determined that the steps “*Exhale before inhalation*” and “*Take a strong and deep breath*” were performed correctly by the majority of patients that were using an aerolizer. In the present study, it was observed that the step “*Exhale*” was performed correctly in the pre-test only by 10% and in the post-test by 60.0% of the patients in the experimental group that were using a MDI. Çam and Göçemen [10] determined that the majority of patients that were using a MDI performed the manoeuvre of exhaling before inhalation incorrectly. Whilst this rate was 30.0% before education, it was found to be 91.0% after education. Van Beerendonk et al. [37] determined that the step exhaling before inhaling the drug was not performed by 65.8% of the patients. Şirinoğlu [36] found that none of the patients performed the step exhaling before inhaling the drug. These results are in line with the results of the present study. Liard et al. [38] found that 22.1% of the patients shook the MDI before using, whereas, Hacıevliyagil et al. [39] found this rate as 18.8%. In the present study, the rate of shaking the MDI before the education showed similarity with the above-mentioned studies; however, it can be concluded that patients made less mistakes in this step with education. Çam and Göçemen [10] determined that the step “*holding the breath after inhalation*” was performed correctly by 47.3% of the patients before education and by 30.3% of the patients after education, among those using a MDI. In the present study, whilst the step “*Hold your breath for 10 seconds*” was performed correctly by 40.0% of the patients using a MDI in the pre-test, the rate increased to 80.0% in the post-test. It is observed that the results of the present study are in line with the literature. The most important problems encountered during MDI use were the mistakes that were made in timing between pressing the device and inhalation and not holding the breath for an adequate time after inhaling [33,34]. Hacıevliyagil et al. [39] determined that 68.7% of the patients using a MDI made timing mistakes between pressing the MDI and inhaling. In the present study, the same step was performed correctly before education by 90.0% of the patients in the experimental group.

Mirici et al. [8] determined that patients using a turbuhaler most frequently made mistakes in the steps “*taking the inhaler out of mouth before exhaling*”, “*holding breath for 5-10 seconds*”, and “*exhaling and waiting for 20-30 seconds*”. In the present study, it was found that the step “*Take the inhaler out of your mouth before exhaling, hold your breath for 5-10 seconds*” was performed correctly in the pre-test by 20.0% and

in the post-test by 60.0% of the patients using a turbuhaler in the experimental group. This result is consistent with the results found by Mirici et al. [8]. It can be concluded that education on inhaler device use makes contribution to improving the mistakes made at this step. Şirinoğlu [36] observed improvements in all steps of turbuhaler use after education and determined that scores after education were significantly different from those before education. Baseti et al. [40] observed improvements in the steps of turbuhaler use after education. Rönmark et al. [41] determined that the turbuhaler was correctly used by 51% of the patients before education and by 81% of the patients after education. In the present study, improvement was observed in all steps of turbuhaler use after education. Results of the present study are in line with the above-mentioned studies.

Çam and Göçemen [10] conducted a study to investigate the inhaler device using skills of patients with COPD and asthma, and achieved almost 100% success with education using demonstration method. Tel and Akdemir [4] performed a planned patient education in 43 patients with COPD and determined an increase in the prevalence of regular use of medications at home and concluded that the number of recurrent hospitalizations was decreased. Erk [34] expressed that 90% of the patients made mistakes while using inhaler devices and that the prevalence of mistakes increased in uneducated patients with higher increase observed in elder patients. It was determined that frequency of making mistakes was decreased with planned patient education on medication use. The present study, which was performed using a planned education program with theoretical and practical education techniques, corroborates the previous studies.

In conclusion; in the present study, which was conducted to determine the effect of education on inhaler device using skills of elder patients with chronic obstructive pulmonary disease, it was found that education on inhaler device use improved the correct use of inhaler devices in the experimental group.

Based on the results of the present study, considering that health care professionals have substantial responsibilities on the patients’ correct use of inhaler devices and the education that would be given on this subject would enhance therapy success in COPD patients, it is suggested that continuation of education should be enabled and education that is supported by audio-visual, and practical education materials and given in related clinics on the use of inhaler devices should be performed routinely.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Abant İzzet Baysal University (13.04.2011, 53).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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