
**Manuscript Type:** Original Article

**Title:** Effect on Self-Care Agency and Self-Efficacy Level of Planned Inhaler Training in COPD Patients: A Randomized Controlled Trial

**Running Title:** Inhaler Training in COPD Patients

**Authors:** Çiğdem Ergin¹, Gamze Muz²*, Hanife Özcêlik³

**Institutions:**¹ Omer Halisdemir University Education And Research Hospital, Nigde

² Department of Internal Nursing, Nevsehir Haci Bektas Veli University, Nevsehir, Turkey

³ Department of Internal Nursing, Nursing, Omer Halisdemir University, Nigde, Turkey

**Address for Correspondence:** Gamze Muz. Department of Internal Nursing, Nevsehir Haci Bektas Veli University, Nevsehir, Turkey

**E-mail:** gamzeucakan@gmail.com

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ABSTRACT
Objective: The aim of this randomized controlled trial was to investigate the effect of training of inhaler technique on self-care agency and self-efficacy level in patients with COPD.
Methods: Sixty-seven patients were randomized and recruited. Thirty-four patients are in intervention group and thirty-three patients in control group. The data was collected questionnaire form, COPD self-efficacy scale, self-care agency scale, medical research council dyspnea scale and modified Borg dyspnea scale. Interim and final follow-up in both groups were conducted, respectively, about 1 month and 3 months after the initial follow-up.
Results: In the final follow-up, it was observed that the majority of the patients (91.2%) used their inhaler drugs correctly in the intervention group. At the final follow-up, the intervention group dyspnea scores show better results compared to the control group ($p<0.05$). In addition, the mean scores of all sub-dimensions of the COPD self-efficacy scale and the total score of the self-care power scale showed an increase in favor of the intervention group ($p<0.05$).
Conclusion: Our findings indicate that the planned inhaler training reduces the use of incorrect medication and dyspnea in patients with COPD as well as improves self-care agency and self-efficacy level.
Keywords: COPD; planned inhaler training; self-care agency; self-efficacy; randomized controlled trial

1. Introduction
The major symptom of Chronic Obstructive Pulmonary Disease (COPD) is dyspnea and leads to insufficient self-care ability among individuals [1]. In addition, as the self-care agency of a person decreases, the level of self-efficacy decreases due to the impact on self-confidence [2] and quality of life [3]. The respiratory difficulties associated with COPD causes the patients to lack confidence in their ability to perform certain activities, and this low self-efficacy leads to a limitation of activity [4,5]. Even if patients with COPD are physically capable, they have
difficulty performing activities of daily living as a result of low self-efficacy. In particular, individuals with COPD may develop a low self-efficacy expectation to manage breathing difficulties while performing certain activities. In this situation, in patients with COPD, low self-efficacy results in activity limitation [2,6,7].

Patients with high self-efficacy have higher treatment adherence levels and life satisfactions than patients with low self-efficacy [8]. For this reason, symptom management occupies an important place in increasing the self-care agency and self-efficacy level of individuals with COPD. Inhaler medication also has a significant effect on reducing COPD symptoms, and is often preferred owing to their effectiveness in small doses, the fact that they directly reach the airway, and their limited systemic side effects [9].

The proper use of medication technique is of paramount importance, since incorrect use of inhalers leads to failure in controlling the symptoms [1]. Recently, many studies proved that the rate of incorrect inhaler use varies in range of 21-91% and most patients use inhaler medications irregularly [10,11]. For individuals with COPD, nurses play a notable role in the individual management of the disease and in meeting the self-efficacy and self-care needs [12].

The training provided for controlling the symptoms, for reducing or preventing the complications, and for raising the level of self-efficacy should become a part of counseling and nursing practices [2,13,14]. In line with this observation, it can be said that planned inhaler medication training given to patients by nurses is of great importance. According to previous studies, it was found that 10 to 25% of patients using inhaler medications have not received any training from healthcare personnel [15]. It is reported that as a result of proper inhaler training given to the patients, errors in inhaler medication use improved, the medications began to show the desired level of effect, disease symptoms decreased, and treatment compliance increased [1]. As a result of these research, the patients’ self-care and self-efficacy levels are also expected to affect due to the alleviation of symptoms, in particular of dyspnea. Hence, the aim of this study is to evaluate the effect of planned inhaler medication use training on self-care and self-efficacy levels in patients diagnosed with COPD.

Research Hypotheses:

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H0₁: Planned inhaler medication training given to COPD patients does not improve self-care agency.
H1₁: Planned inhaler medication training given to COPD patients improves self-care agency.
H0₂: Planned inhaler medication training given to COPD patients does not improve the level of self-efficacy.
H1₂: Planned inhaler medication training given to COPD patients improves the level of self-efficacy.

2. Methods

Study Design
This study employed randomized clinical trial and followed the recommendations of the CONSORT Checklist [16] and the clinical trial registration number is NCT04052906. Since there are no other studies that are exactly similar in design to the present one the study sample was planned to include a total of 60 patients at the beginning based on a consideration of data from roughly similar studies, with 30 in the study group and 30 in the control group [17]. In the end, the study was completed with a total of 67 subjects, of which 34 were in the study group and 33 were in the control group. The power of the study was calculated over the G*Power package program [18]. Based on the study data, the effect size was calculated as 2.262, α=0.05, and the post power of the study was 99.9%. The study was carried out between 1.11.2017-1.05.2018 in Ömer Halisdemir University Training and Research Hospital in Niğde (See Figure 1).

Inclusion Criteria of the Study
- Literate
- Patients with COPD at least six months ago and using inhaler medication since three or more months,
- Moderate or severe COPD, according to GOLD criteria,
- Incorrect use inhaler medication uses according according to inhaler medication use skills chart,
- No mental confusion or any psychiatric problem and communication problems,
Exclusion criteria of the study

- Cognitive dysfunction,
- Severe pulmonary, cardiological or malignant illness,
- In a period of exacerbation,
- Correctly performs all steps for their inhaler medications, according to inhaler medication use skills chart

Study termination criteria

- The participation of subjects who want to leave the study,
- Are inaccessible in follow-up,
- Have moved out of the province during the study period,
- Have passed away during the study period was terminated

Here about Figure 1

Randomization Procedure

The patients with COPD were randomly distributed in two groups through simple random sampling and drawing of lots method was preferred to ensure randomization. The days of the month were divided into two as double and single days, and a lot was drawn by another nurse working at the chest diseases service. After drawing the lot, double days of the month were included in the control group, while single days of the month were included in the intervention group. In order to prevent the interaction of the patients in the intervention and control groups, the patients whose discharge plan was clarified in the chest service were included in the study.

Outcome Measures

Questionnaire Form

The questionnaire form consists of 25 questions based on a review of the literature [17]. The first part of the form consists of 7 questions about the socio-demographic characteristics of the patients (age, gender, education, etc.), and the second part consists of 18 questions about the characteristics of the disease (duration of diagnosis, duration of inhaler usage, type of inhaler medication, etc.).

COPD Self-Efficacy Scale (CSES)
The COPD Self-Efficacy Scale developed by Wigal et al. the scale consists of 34 items and 5 subscales [7]. It has been described by Kara and Mirici (2002) that it can be used as a sensitive tool for COPD patients and that it has validity and reliability for the Turkish society [2]. The scale consists of the 5 dimensions, which are negative affect, emotional arousal, physical exertion, weather/environment, and behavioral risk factors. Test-retest reliability of the scale was determined as r=0.89 and internal consistency as 0.94. The scores for each of the five sub-dimensions of the COPD Self-Efficacy Scale are obtained by summing the scores for the responses given to the sub-dimensions of the scale, while the scores for the sub-dimensions of the scale are determined by dividing the scores in each sub-dimension by the number of items in the sub-dimension. The overall score of the scale is obtained by summing the scores of the scale sub-dimensions. A higher score on the scale indicates an increased degree of confidence in managing respiratory distress [2].

**Self-Care Agency Scale**

Scale was developed by Kearney and Fleischer [19], and its validity and reliability study in Turkey was conducted by Nahcivan. A scale score below 82 is considered as low, a score of 82-120 is considered as medium, and a score above 120 is considered as high self-care agency. The self-care agency of patients increases as the score obtained from the scale increases [15].

**Medical Research Council (MRC) Dyspnea Scale**

The dyspnea scale was first introduced by Fletcher in 1952, and a more developed version was later introduced by the British Medical Research Council (MRC) to monitor the natural course of the disease. This scale based on various physical activities that produce a feeling of dyspnea. High scores from MRC indicate that the perception of breathlessness is more severe [20,21]. In similar studies conducted in our country, it was stated that the scale can be used safely in the evaluation of dyspnea [1,17]. Since it is a one-dimensional scale, Cronbach's alpha value could not be measured.

**Modified Borg Dyspnea Scale**

It was developed in 1982 by Gunnar Borg to describe the intensity of physical activity. The “American College of Sports Medicine” reorganized the scale in 1986 by defining a score range of 0-10. While the Modified Borg Scale is nowadays generally used to define the severity of
dyspnea in exercise, it can also be used to assess the severity of resting dyspnea [22]. In similar studies conducted in our country, it was stated that the scale can be used safely in the evaluation of dyspnea [17]. Since it is a one-dimensional scale, Cronbach's alpha value could not be measured.

**Inhaler Medication Use Skills Chart**
The chart was prepared by the researcher based on a review of the literature [17,23] on all types of inhalers (such as diskus, aerolizer, handihaier, turbuhaler, meter dose inhaler). Correct and incorrect options were marked by evaluating how the patient performed each step. After the list of skills was prepared, four experts were consulted to evaluate whether the questions in the forms and the procedural steps were appropriate for the purpose. A proportional approach was used in evaluating the expert opinions. It was decided that the data collection tools should remain in the measurement tools, as the experts’ opinion on appropriateness was above 50%. Based on the inhaler skills chart, the correct performance of all steps was considered as correct inhaler technique, while incorrect performance of one or more of the steps was considered as incorrect inhaler technique.

**Inhaler Medication Use Guide for COPD Patients**
The relevant literature [17,23,24] and the training booklet that was prepared include what must be done before using the inhaler types, how the devices should be used and the points to be considered during use. In this form, the step-by-step usage steps of inhaler drugs such as discus, aerolizer, handihaler, turbuhaler, meter dose inhaler has been prepared separately. In addition, images for drug use according to each inhaler drug type were also used. Official permission was obtained from the relevant institution for the use of the brochure.

**Data Collection**

**Procedures Applied to the Intervention Group**
In the first meeting with the intervention group; the questionnaire form, Modified Borg dyspnea scale, MRC dyspnea scale, self-care agency scale, COPD self-efficacy scale and inhaler medication use skills chart was administered. The mistakes made by the patients were determined according to the inhaler medication use skills chart. Patients in this group were

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explained by the researcher how to use inhaler medications through the use of the one-to-one and face-to-face oral presentation and demonstration method.

The training content prepared separately for each type of inhaler was taught to the patients with the demonstration method. Constant communication was maintained with the patients, and all of their questions were answered. When it was the patient’s turn to demonstrate inhaler use, the patient was encouraged to use his/her own inhaler medication(s) if it was time to use their medication, and if not, it was ensured that they used a placebo inhaler medication instead to prevent the intake of excessive doses. Patient’s inhaler use was monitored one-to-one by the researcher, and the training was continued until the incorrectly executed steps were performed correctly by the patient. The training was conducted one-to-one in a separate room where the meeting would not be interrupted, and the mean duration of training for each patient was 45 minutes. After the training, each patient was given an *Inhaler Medication Use Guide for COPD Patients* prepared by the researcher based on a review of the literature, and the patients were informed that they could use the guide to look at the steps that are applicable for the type of inhaler medication they use whenever they forget how to use it. In addition, each patient was given a telephone number and informed that they could call anytime they needed. In the interim follow-up performed one month later, the patients were again administered with the Modified Borg and MRC dyspnea scales, self-care agency scale, COPD self-efficacy scale and inhaler medication use skills chart. Steps that were implemented incorrectly during the inhaler medication use according to the skills chart were re-emphasized, and the training was continued until all steps were executed correctly. All of the forms were re-administered in the follow-up performed three months later, and the study was completed. All forms were filled face to face by the researcher in initial, interim and final follow-ups.

**Procedures Applied the Control Group**

In the first meeting with the control group; the questionnaire form, Modified Borg dyspnea scale, MRC dyspnea scale, self-care agency scale, COPD self-efficacy scale and inhaler medication use skills chart was administered.
The control group was not given any training. The patients were asked to come for follow-up one month later. In the interim follow-up carried out one month later, the Modified Borg and MRC dyspnea scales, self-care agency scale, COPD self-efficacy scale, and inhaler medication use skills chart were re-administered to the patients. All of the forms were re-administered in the follow-up performed three months later, and the study was completed. All forms were filled face to face by the researcher in initial, interim and final follow-ups. After the data collection process was completed, the Inhaler Medication Use Guide for COPD Patients was given to patients.

Evaluation of Data
Data was evaluated in a IBM SPSS V23 programs. The distribution of variables was using the Shapiro-Wilk normality test. The homogeneity of the variances was checked with the Levene test. The independent samples t-test and Mann Whitney U test were used in the comparison of two groups, the paired t-test was used for the evaluation of two consecutive and nonparametric measurements, and repeated measures analysis of variance and Friedman test were used to assess more than two measurements. The chi-square analysis and Fisher's exact test were used to compare categorical variables. In the study, a value of \( p<0.05 \) was considered statistically significant.

The Ethical Dimension of the Study
The study was started after obtaining approval from the Nevsehir Haci Bektas Veli University Ethics Committee (approval number no. 2017.08.06) and Ministry of Health reviewed and approved the study protocol. Written consents were obtained from the patients.

3. Results
In the intervention group, 79.4% were male, mean age was 66.24±10.41 years, 67.6% were primary school graduates, 76.5% were married, mean diagnosis time was 8.47±6.14, mean inhaler drug use was 7.94±5.91, 50.0% were inhaler drug education and 64.7% inhaler drug training was given by the doctor. In the control group, 78.8% were male, mean age was 63.26±10.70, 60.6% were primary school graduates, 87.9% were married, mean diagnosis time was 8.47±6.14, mean inhaler drug use was 7.39±6.05, 57.6% were inhaler drug education and 57.9% inhaler drug training was given by the doctor. There was no statistical difference
between the intervention and control groups according to sociodemographic and disease characteristics, and the groups were found to be similar. (Table 1).

Here about Table 1
The correct use of inhaler medications was statistically significantly higher in the intervention group compared to the control group in the last and interim follow-ups ($p<0.001$) (Table 2).

Here about Table 2

Compared with the initial follow-up, the sub-dimensions and total score averages of the COPD self-efficacy scale and self-care agency scale scores in intervention group increased in the interim and final follow-up. This increase is statistically significant ($p<0.05$). The results of multiple comparison tests show that statistically significant differences were found between all follow-up ($p<0.001$). Compared with the initial follow-up, the sub-dimensions and total score averages of the COPD self-efficacy scale and self-care agency scale scores in the control group, except the negative effect and behavioral risk factor sub-dimensions, decreased in the interim and final follow-up. This decrease is also statistically significant ($p<0.05$). All sub-dimensions and total scores of the COPD Self-Efficacy Scale and self-care agency scale scores at the interim and final follow-up in experimental group were higher than those in the control group. This increase is statistically significant. It was found that the MRC dyspnea scale interim and final follow-up dyspnea scores of intervention group patients had decreased significantly compared to initial follow-up ($p<0.01$). According to multiple comparison tests, it was determined that there was a statistically significant difference between the initial follow-up and the final follow-up. It was found that the interim and final follow-up scores of control group patients had increased compared to initial follow-up, and that this increase was statistically significant ($p<0.05$). It was determined that the MRC dyspnea scale scores of the experimental group were lower than the control group and this decrease was statistically significant at the final follow-up ($p<0.001$).

Modified Borg dyspnea scale scores of the intervention group patients were found to have decreased significantly at the interim and final follow-up compared to the initial follow-up ($p<0.01$). The results of multiple comparison tests show that statistically significant differences
were found between all follow-up ($p<0.001$). However, it was found in the control group that compared to the initial follow-up, the scores of patients at the interim follow-up did not change, and that their scores increased at the final follow-up. This increase was found to be statistically significant ($p<0.05$). It was determined that the Modified Borg dyspnea scale scores of the experimental group were lower than the control group and this decrease was statistically significant at the final follow-up ($p<0.001$). (Table 3).

Here about Table 3

4. Discussion
Maximizing the effect of inhaler medications in COPD depends on the correct use of the medications. With training given to the patients, it is possible to ensure the correct techniques of use and to minimize the errors in the application steps. Previous studies have reported that written and visual planned inhaler medication use trainings, given to COPD patients increased their medication use skills and reduced errors [10,17]. This study was also determined in agreement with the literature that by the time of the final follow-up, 91.2% of the study group patients used their inhaler medications correctly, whereas all of the control group patients used their inhaler medications incorrectly. In this study, it can be thought that the follow-up of the patients for three months by the researcher and the correction of the wrong steps by making an interim follow-up contribute positively to the use of the correct inhaler. This result shows the importance of long-term follow-up of patients after education in ensuring the effectiveness of education. These results show the importance of training in the correct use of inhaler medications. In the self-management training program performed by Moriyama et al. that also involved correct medication use, it was found that patients had a significant decrease in dyspnea scores after six months [25]. There are studies showing the positive effects of inhaler drug training on dyspnea scores [1,17]. These results show the importance of patient training in the use of inhaler medications and the management of dyspnea. Based on the results of our study, planned inhaler medication training given to patients was found to be effective in decreasing dyspnea scores in COPD patients, which is in agreement with the literature. In the study, dyspnea scores of the control group increased at the last follow-up. In other studies, dyspnea scores were found between all follow-up ($p<0.001$). However, it was found in the control group that compared to the initial follow-up, the scores of patients at the interim follow-up did not change, and that their scores increased at the final follow-up. This increase was found to be statistically significant ($p<0.05$). It was determined that the Modified Borg dyspnea scale scores of the experimental group were lower than the control group and this decrease was statistically significant at the final follow-up ($p<0.001$). (Table 3).
severity increased in the last follow-up of patients in the control group who were not given inhaler drug training [1,17]. These results show that the use of the right inhaler is important in reducing the symptoms of dyspnea. It was also observed in this study that there was an increase in the self-care and self-efficacy levels of the patients in parallel with a decrease in dyspnea complaints. In the study, it was found that the individuals in the control group had a decrease in their self-efficacy and self-care levels. As the dyspnea experienced in COPD increases, the patients’ self-confidence may decrease, which in turn may reduce the self-efficacy scores by decreasing the individuals’ belief in their capability to carry out activities. In a study comparing self-efficacy levels of patients with a different chronic disease, it was found that the self-efficacy perception of patients with chronic diseases, and especially with COPD, was low [26]. In various studies on this subject, it is stated that the training on coping with dyspnea given to COPD patients increases their self-efficacy scale scores [27]. In the study of Kara and Asti examining the effect of a structured training program applied to COPD patients, it was stated that their total scores and sub-dimension scores in the self-efficacy scale increased [28]. In a study, it was reported that there was an improvement in the self-efficacy levels of individuals after inhaler drug training [29]. It was reported that patients with COPD had an increase in their self-efficacy scores after inhaler drug training. To the best of our knowledge, no study could be found that combined the effects of inhaler drug education on self-efficacy and self-care.

In a study investigating the impact of visual and auditory training on self-management in COPD, it was determined that the patients in the intervention group improved their inhaler use technique after training [30]. In line with these results, it was ensured in our study that nurses made the patients perform each step of the planned inhaler training one by one and identified their shortcomings; that they continued to make the patients perform the incorrect steps again and again until they were performed correctly; that they created a suitable environment for asking questions to the patient; and that they maintained communication by phone calls.

5. Conclusion
It was determined that planned inhaler medication training given to patients with COPD increases the usage of correct inhaler medication, self-care agency and self-efficacy level.
In line with these results, the following recommendations can be made:

- In patients with COPD who use inhaler medications, each of the steps in inhaler medication use should be checked, the steps that are implemented incorrectly should be evaluated together with the patients, and this should be continued until the patient gains the correct skills of use.
- Evidence-based guidelines should be used when providing inhaler medication training,
- Follow-ups should be performed at the appropriate time intervals after the training, and wrong practices should be corrected.

Limitations
The knowledge levels of COPD patients were determined for only three months. Results of our study are generalized to patients in samples. Another limitation is the lack of objective measurement of dyspnea.

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Female  7  20.6  7  21.2  $\chi^2=0.004$
Male    27  79.4  26  78.8  $p=0.950$

**Mean age**

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**Education status**

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**Marital status**

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**Duration of diagnosis**

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<td>Duration of diagnosis ($\bar{x}\pm ss$, years)</td>
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**Duration of inhaler usage**

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<tr>
<td>Duration of inhaler usage ($\bar{x}\pm ss$, years)</td>
<td>7.94±5.91</td>
<td>6.90±5.90</td>
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**Type of inhaler medication**

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**Inhaler training**

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</tbody>
</table>

**Those providing the training**

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<table>
<thead>
<tr>
<th>Measurement time</th>
<th>Control Group</th>
<th>Intervention Group</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Interim follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct use</td>
<td>0</td>
<td>0.0</td>
<td>27</td>
</tr>
<tr>
<td>Incorrect use</td>
<td>33</td>
<td>100.0</td>
<td>7</td>
</tr>
<tr>
<td>Final follow-up</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correct use</td>
<td>0</td>
<td>0.0</td>
<td>31</td>
</tr>
<tr>
<td>Incorrect use</td>
<td>33</td>
<td>100.0</td>
<td>3</td>
</tr>
</tbody>
</table>

χ²: Chi-squared test (Fisher-Exact tests)

Table 3. Distribution of the all scales score average / scores according to the follow-up times of the intervention and control group patients.

<table>
<thead>
<tr>
<th>COPD Self-Efficacy Scale</th>
<th>Intervention Group (n=34) (x±sx)</th>
<th>Control Group (n=33) (x±sx)</th>
<th>p**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative affect</td>
<td>(x±sx)</td>
<td>(x±sx)</td>
<td></td>
</tr>
<tr>
<td>Initial follow-up</td>
<td>1.90±0.54^a</td>
<td>1.92±0.51</td>
<td>0.848</td>
</tr>
<tr>
<td>Interim follow-up</td>
<td>2.48±0.46^b</td>
<td>1.93±0.46</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

t: t-test

χ²: Chi-squared test
Final follow-up 2.94±0.69<sup>c</sup> 1.95±0.39 <0.001

Emotional arousal

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional arousal</td>
<td>1.86±0.61&lt;sup&gt;a&lt;/sup&gt; 1.95±0.53&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.49±0.75&lt;sup&gt;b&lt;/sup&gt; 1.87±0.54&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.90±0.81&lt;sup&gt;c&lt;/sup&gt; 1.70±0.46&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Physical exertion

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical exertion</td>
<td>1.17±0.32&lt;sup&gt;a&lt;/sup&gt; 1.27±0.44&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>1.48±0.53&lt;sup&gt;b&lt;/sup&gt; 1.22±0.42&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.01±1.31&lt;sup&gt;c&lt;/sup&gt; 1.19±0.36&lt;sup&gt;b&lt;/sup&gt;</td>
<td>&lt;0.001 0.001</td>
</tr>
</tbody>
</table>

Weather/environment

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather/environment</td>
<td>1.46±0.58&lt;sup&gt;a&lt;/sup&gt; 1.48±0.54&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.73±0.68&lt;sup&gt;b&lt;/sup&gt; 1.31±0.46&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>3.06±1.31&lt;sup&gt;c&lt;/sup&gt; 1.26±0.42&lt;sup&gt;bc&lt;/sup&gt;</td>
<td>&lt;0.001 &lt;0.001</td>
</tr>
</tbody>
</table>

Behavioral risk factors

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral risk factors</td>
<td>1.55±0.57&lt;sup&gt;a&lt;/sup&gt; 1.68±0.58</td>
<td>1.98±0.57&lt;sup&gt;b&lt;/sup&gt; 1.56±0.59</td>
<td>3.11±1.04&lt;sup&gt;c&lt;/sup&gt; 1.53±0.60</td>
<td>&lt;0.001 0.005 0.001</td>
</tr>
</tbody>
</table>

Total skor

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total skor</td>
<td>1.67±0.47&lt;sup&gt;a&lt;/sup&gt; 1.73±0.45</td>
<td>2.16±0.47&lt;sup&gt;b&lt;/sup&gt; 1.67±0.43</td>
<td>2.98±0.77&lt;sup&gt;c&lt;/sup&gt; 1.62±0.36</td>
<td>&lt;0.001 &lt;0.001 &lt;0.001</td>
</tr>
</tbody>
</table>

Self-Care Agency Scale

<table>
<thead>
<tr>
<th></th>
<th>Initial follow-up</th>
<th>Interim follow-up</th>
<th>Final follow-up</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Care Agency Scale</td>
<td>101.44±17.19&lt;sup&gt;a&lt;/sup&gt; 104.57±17.03</td>
<td>104.57±17.03</td>
<td>101.44±17.19&lt;sup&gt;a&lt;/sup&gt; 104.57±17.03</td>
<td>0.456</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interim follow-up</strong></td>
<td>116.94±13.58&lt;sup&gt;b&lt;/sup&gt;</td>
<td>105.09±17.92</td>
</tr>
<tr>
<td><strong>Final follow-up</strong></td>
<td>120.47±14.55&lt;sup&gt;c&lt;/sup&gt;</td>
<td>102.51±20.43</td>
</tr>
<tr>
<td><strong>p</strong>*</td>
<td>&lt;0.001</td>
<td>0.131</td>
</tr>
</tbody>
</table>

**MRC dyspnea scale**

<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial follow-up</td>
<td>3.5 (3.0-4.0)</td>
<td>3.0(3.0-4.0)</td>
</tr>
<tr>
<td>Interim follow-up</td>
<td>3.0(2.0-4.0)</td>
<td>4.0(3.0-4.0)</td>
</tr>
<tr>
<td>Final follow-up</td>
<td>3.0(2.0-3.0)</td>
<td>4.0(3.0-4.0)</td>
</tr>
<tr>
<td><strong>p</strong>*</td>
<td>&lt;0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Modified Borg dyspnea scale**

<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial follow-up</td>
<td>5.5 (4.0-7.0)</td>
<td>5.0(4.0-7.0)</td>
</tr>
<tr>
<td>Interim follow-up</td>
<td>4.0(3.0-5.0)</td>
<td>5.0(4.0-7.0)</td>
</tr>
<tr>
<td>Final follow-up</td>
<td>3.0(2.0-5.0)</td>
<td>5.0(4.5-7.0)</td>
</tr>
<tr>
<td><strong>p</strong>*</td>
<td>&lt;0.001</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Variance analysis was conducted for repeated measurement.

**Two sample t test in independent groups was conducted.

¥: Mann Whitney U test.

***Friedmann Test.

<sup>a,b,c</sup> According to multiple compare test (posthoc-test:Bonferoni, post-hoc: Dunn testi) results, this different letters define that there was a significant difference between scale scores.
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Fig 1. The CONSORT chart of the study.