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Effectiveness of Breathing Exercises in Patients with COPD

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is one of the most common life-threatening diseases affecting populations globally. The present study conducted to assess effectiveness of breathing exercises in patients with COPD. **Methods:** 60 COPD patients of both genders (Group I) and equal number of healthy control were also recruited (Group II) Patients were prescribed PLB, VF training, VF plus exercise, singing, DBE, and combined BEs training. Parameters such as ventilation, dyspnea, exercise capacity, and QoL and ventilation-related outcomes included respiratory rate (RR), tidal volume (VT) etc. were recorded. **Result:** The mean respiratory rate (RR) in group I was 20.4 and in group II was 23.8, tidal volume was 628.2 in group I and 480.4 in group II, inspiratory time was 1.52 in group I and 1.30 in group II, total respiratory time was 4.40 in group I and 3.42 in group II and oxygen consumption was 1024 in group I and 1124.6 in group II. The difference was significant (P< 0.05). **Conclusion:** There was improvement in all parameters in COPD as well as in control group, hence can be concluded that exercises have great impact on respiratory functions.

Keywords: Chronic Obstructive Pulmonary Disease, Dyspnea, Quality of Life.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is one of the most common life-threatening diseases affecting populations globally. Pathophysiological changes in airway, tissue, and vascular supply to lungs increase airway resistance and air trapping, and decrease lung compliance resulting in increased work of breath, and dyspnea in COPD patients. To avoid dyspnea, COPD patients commonly avoid or limit physical activities which, in turn, lead to decrease in exercise tolerance, and an increase in anxiety, disability, and poor quality of life (QoL).[1,2]

Breathing technique is an all embracing term for a range of techniques such as active expiration, slow and deep breathing, pursed lips breathing, relaxation therapy, body positions such as forward leaning, inspiratory and expiratory muscle training and diaphragmatic breathing.[3] The aims of these techniques vary considerably and include the improvement of (regional) ventilation and gas exchange, reduction of dynamic hyperinflation, improvement of respiratory muscle function, reduction in dyspnea and improvement of exercise tolerance and quality of life.[4] In patients with COPD, breathing techniques aim at relieving dyspnea by: 1) increasing strength and endurance of the respiratory muscles;

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2) optimizing the pattern of thoracoabdominal motion; and 3) reducing dynamic hyperinflation of the rib cage and improving gas exchange.[5] Many types of BE such as slow and deep breathing, active expiration, pursed-lip breathing (PLB), relaxation breathing, diaphragmatic breathing (DBE), and ventilatory feedback (VF) training, have been prescribed to decrease lung hyperventilation, enhance respiratory muscle function, exercise tolerance, and QoL in COPD patients. These BEs have been used individually, or in combination of different types of BE.[6] The present study conducted to assess effectiveness of breathing exercises in patients with COPD.

MATERIALS AND METHODS

The present study was conducted among 60 COPD patients of both genders (Group I). Enrolment of patients was done after obtaining their written consent.

Demographic data of all patients was recorded. Equal number of healthy control were also recruited (Group II) Patients were prescribed PLB, VF training, VF plus exercise, singing, DBE, and combined BEs (combination of DBE with other BEs). Duration of BE training was one session to 4 weeks. Parameters such as ventilation, dyspnea, exercise capacity, and QoL and ventilation-related outcomes included respiratory rate (RR), tidal volume (VT), inspiratory time (Ti), expiratory time (Te), minute ventilation (Ve), total respiratory time (Ttot), mean inspiratory flow (VT/Ti), oxygen saturation (SpO2) were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1: Distribution of patients

Total- 60		
Gender	**Males**	**Females**
Number	35	25

[Table 1] shows that out of 60 patients, males were 35 and females were 25.

Table 2: Comparison of parameters

Parameters	Group I	Group II	P value
Respiratory rate	20.4	23.8	0.91
Tidal volume	628.2	480.4	0.04
Inspiratory time	1.52	1.30	0.09
Total respiratory time	4.40	3.42	0.05
Oxygen consumption	1024	1124.6	0.12

[Table 2, Figure 1] shows that mean respiratory rate (RR) in group I was 20.4 and in group II was 23.8, tidal volume was 628.2 in group I and 480.4 in group II, inspiratory time was 1.52 in group I and 1.30 in group II, total respiratory time was 4.40in group I and 3.42 in group II and oxygen consumption was 1024 in group I and 1124.6 in group II. The difference was significant (P< 0.05).

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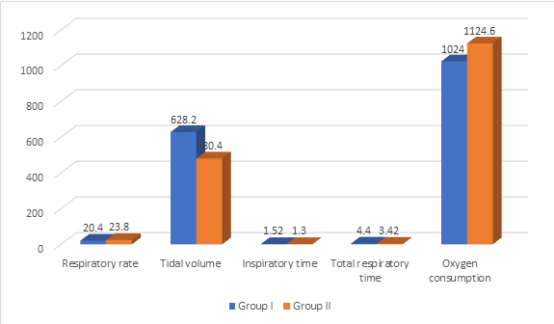

Figure 1: Comparison of parameters

DISCUSSION

Dyspnea is an important and debilitating symptom in patients with chronic obstructive pulmonary disease (COPD).[7] Several pathophysiological factors known to contribute to dyspnea include: 1) increased intrinsic mechanical loading of the inspiratory muscles; 2) increased mechanical restriction of the chest wall; 3) functional inspiratory muscle weakness; 4) increased ventilatory demand related to capacity; 5) gas exchange abnormalities; 6) dynamic airway compression; or 7) cardiovascular effects. The relief of dyspnea is an important aim of the treatment of COPD, an only partially reversible disease.[8] Among treatment modalities commonly applied such as bronchodilator therapy, exercise training and oxygen therapy, breathing techniques are also applied to alleviate symptoms and improve respiratory physiology.[9] It is believed that when respiratory muscle effort (ratio of the actual inspiratory pressure over the maximal inspiratory pressure, PI/Pimax) exceeds a critical level, breathing is perceived as unpleasant. By improving respiratory muscle function or reducing inspiratory load the aim is to reduce the relative load on the muscles (PI/PImax) and hence dyspnea and to increase maximal sustained ventilatory capacity. This might also imply an improvement of exercise capacity in patients with ventilatory limitation during exercise.[10] The present study conducted to assess effectiveness of breathing exercises in patients with COPD.

In present study, out of 60 patients, males were 35 and females were 25. Ubolnour et al,[11] conducted a randomized controlled trials investigating the effects of BEs in COPD patients. Risk of bias and quality of evidence were assessed, using Cochrane Collaboration's tool, and the Grading of Recommendation Assessment, Development, and Evaluation (GRADE) approach, respectively. Nineteen studies (n=745), were included. Quality of evidence, was low to moderate. When compared to the control groups, respiratory rate significantly ($p \leq 0.001$) improved in the pursed-lip breathing (PLB), ventilatory feedback (VF) plus exercise, diaphragmatic breathing exercise (DBE), and combined BEs. Additionally, PLB significantly improved tidal volume ($p<0.001$), inspiratory time ($p=0.007$), and total respiratory time ($p<0.001$). VF plus exercise significantly improved inspiratory capacity ($p<0.001$), and singing significantly improved the physical component of QoL, than did the control groups ($p<0.001$). All BEs did not significantly improve dyspnea, compared to the controls ($p>0.05$).

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We found that mean respiratory rate (RR) in group I was 20.4 and in group II was 23.8, tidal volume was 628.2 in group I and 480.4 in group II, inspiratory time was 1.52 in group I and 1.30 in group II, total respiratory time was 4.40 in group I and 3.42 in group II and oxygen consumption was 1024 in group I and 1124.6 in group II. In the 19 included studies, the effects of PLB, VF training alone, VF plus exercise, singing, DBE, and combined BEs were examined. According to the GRADE approach, quality of evidence of PLB and VF plus exercise was downgraded to low to moderate because of a small sample size, heterogeneity among studies, and/or low methodological quality of included studies. For VF training alone singing and combined BEs, the quality of evidence was moderate because of a small sample size. For DBE, quality of evidence was low because of a small sample size and heterogeneity among studies. PLB significantly improved RR VT (p=0.0004) Ti (p=0.007) and Ttot (p=0.0004) than did the control group. Quality of evidence of these outcomes was moderate. There was no significant between-group difference in other ventilatory related outcomes (p=0.10–0.85), dyspnea (p=0.15), and 6MWD (p=0.85).[12] The limitation of the study is small sample size.

CONCLUSION

Authors found that there was improvement in all parameters in COPD as well as in control group, hence can be concluded that exercises have great impact on respiratory functions.

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