



Research Article

EFFECT OF PURSED LIPS BREATHING ON DYSPNEA AND PERFORMANCE CAPACITY  
IN CLASS 1 OBESE COLLEGE GOING STUDENTS

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ARTICLE INFO

Article History:

Received 6<sup>th</sup> July, 2018

Received in revised form 15<sup>th</sup> August, 2018

Accepted 12<sup>th</sup> September, 2018

Published online 28<sup>th</sup> October, 2018

Key words:

Dyspnea, Pursed lips breathing (PLB),  
Performance, Capacity, Obese

ABSTRACT

**Objective:** To find out the effect of pursed lips breathing (PLB) on dyspnea and performance capacity in class 1 obese college going students of Teerthanker Mahaveer University (TMU), Moradabad Uttar Pradesh, India.

**Methods:** Out of 100 enrolled students, 50 were selected conveniently as per the inclusion criteria of Body Mass Index (BMI) between 30-33 (according to World Health Organization [WHO]) and dyspnea scores between 10-14 (according to Borg's Rate of Perceived Exertion [RPE] scale) after performing 6-minute walk test (6MWT). Training for pursed lips breathing was given for 4 weeks. Pre- training and post- training measurement of dyspnea levels and distance covered after performing 6MWT was recorded.

**Results:** There was a highly significant ( $p < 0.000$ ) reduction in dyspnea levels as well as the distance covered after 4 weeks of PLB training.

**Conclusion:** PLB was found to be effective in reducing dyspnea as the subjects were able to cover more distance after performing 6MWT. It indicates that subject's performance capacity has improved which can assist health related quality of life.

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INTRODUCTION

Dyspnea or shortness of breath negatively affects the health-related quality of life especially in those suffering from lung disease such as chronic obstructive pulmonary disease (COPD). Healthy individuals can experience dyspnea in various situations such as at high altitude, during stressful conditions causing anxiety and more often during strenuous exercise. Due to various alterations in respiratory mechanics during exercise, it is difficult to ascertain which alteration contributes most strongly to sensation of dyspnea.<sup>1</sup> Various medications are used to manage dyspnea by reducing the airway inflammation and bronchospasm.

Patients with cardiopulmonary disease often present with limited levels of activity and exercise capacity. Walk test is commonly performed to evaluate functional status, monitor efficacy of treatment as well as to establish prognosis. 6MWT is suggested as a useful test for evaluating the efficacy of treatment by assessing pulmonary function and exercise ability of patient with pulmonary disease.<sup>2</sup> 6MWT was reported to have higher sensitivity in measuring dyspnea in COPD than lung function tests or arterial blood gas analysis.<sup>3</sup> According to American Thoracic Society guidelines for 6MWT age, gender, weight and height affect 6MWT distance independently.

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Therefore, they should be considered while measuring the distance. Some studies also suggest relation with height and weight.<sup>4-6</sup>

PLB is a method by which variable expiratory resistance is created by constructing the lips. It helps to release the trapped air in lungs and improve ventilation. Hence, it helps to relieve dyspnea. The present study was also undertaken to study the effect of PLB on dyspnea and distance covered after performing 6MWT.

METHODOLOGY

The present cross-sectional study is based on 50 class I obese male and female students aged 20-24 years. Subjects were selected by purposive random sampling. The subjects were selected from various departments of TMU, Moradabad. The age of subjects was recorded from the date of birth registered in their respective departments. A written consent was obtained from the subjects. The data were collected under natural environmental conditions in morning between 08:00 am to 12:00 noon. The study was approved by the local ethical committee.

The height was recorded during inspiration by using a stadiometer (Holtain Ltd, Crymych, Dyfed, UK) to the nearest 0.1 cm and weight was measured by digital standing scales (Model DS-410, Seiko, Tokyo, Japan) to the nearest 0.1 kg. BMI was then calculated using the formula  $\text{weight (in kg)}/\text{height}^2$  (in meters<sup>2</sup>). Dyspnea level was assessed by using Borg's RPE scale<sup>7</sup> after the participants performed a 6MWT.

The total distance covered was recorded in meters. Those who had dyspnea score between 10-14, were assigned to training for pursed lips breathing exercise for 4 weeks. Pursed lips breathing exercise was given for 10 minutes (min.) in 1<sup>st</sup> week, 15 min. in 2<sup>nd</sup> week, 20 min. in 3<sup>rd</sup> week and 25 min. in 4<sup>th</sup> week. After 28 sessions of exercise, 6MWT was performed and the total distance covered after 6MWT was recorded. Dyspnea level was again recorded by using Borg’s RPE scale.

**RESULTS**

Table 1 shows the descriptive statistics of total distance covered before and after PLB training. Statistically significant differences (p<0.000) were observed for the distance covered. Table 2 shows the descriptive statistics for dyspnea scores before and after training. Reduction in dyspnea scores was found and statistically significant differences (P<0.000) were observed for the same.

Figure 1 shows the comparison of percentage value of the distance covered by subject’s pre and post PLB training. The subjects recorded significant improvement as the distance covered post training increased to 53% as compared to 47% pre-training. Figure 2 shows the comparison of pre and post training percentage values for dyspnea scores. Dyspnea levels decreased significantly from 70% pre- training to 30% post-training.

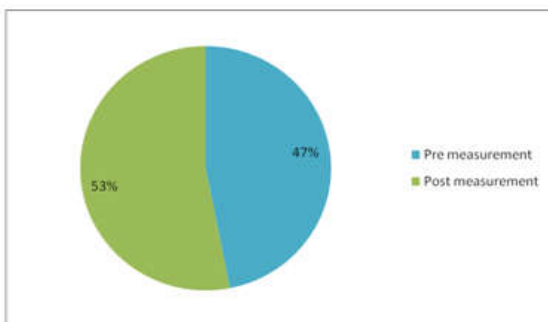


Fig 1 Pre and Post training percentage analysis of subject’s distances covered

**Table 1** Pre and Post training analysis of subject’s distance covered

Test	Mean	N	Std. deviation	t value	p value
Pre	614.80	50	8.98	68.518	.000
Post	667.00	50	8.02		

**Table 2** Pre and Post training dyspnea score

Training	Mean	N	Std. deviation	t value	p value
Pre	12.16	50	1.36	25.802	.000
Post	7.16	50	1.07		

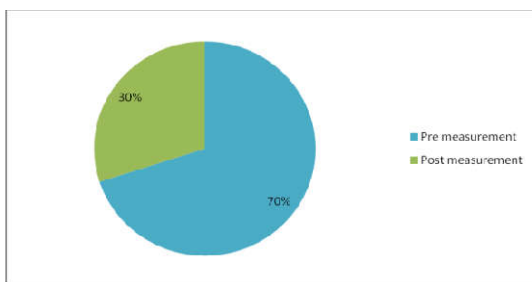


Fig 2 Pre and Post training percentage analysis of subject’s dyspnea levels

**Statistical analysis**

Descriptive statistics (mean± standard deviation) were determined for directly measured and derived variables. Paired t-test was used to analyze the day 1 and day 28 readings for distance covered after 6MWT test and dyspnea level using RPE scale. Data were analyzed by using SPSS (Statistical Package for Social Science) version 17.0. A 5% level of probability was used to indicate statistical significance.

**DISCUSSION**

The results of this study suggest that there was significant improvement in the amount of distance covered as well as the dyspnea levels after PLB training for 4 weeks. Chiti *et al.*<sup>8</sup> found that activity of scalene muscle increased in dyspnea and it would be useful to reduce its activity during mechanical ventilation. The findings of present study also support this as the dyspnea levels reduced will lead to decreased scalene muscle activity. Respiratory muscle training is used to improve the strength of diaphragm.<sup>9,10</sup> PLB has a variable effect on dyspnea when it is performed volitionally during exercise by patient of COPD. Effect on dyspnea due to PLB is related to the combined change that it promotes in tidal volume and end-expiratory lung volume and their impact on respiratory muscle to meet demands placed on them in terms of pressure generation<sup>11</sup>.

Studies have shown that with training, the improvement in inspiratory muscle strength might be related to decreased effort in breathing and a positive change in experience of breathlessness<sup>12</sup>. The findings of present study are consistent with the study of Villareal *et al.*<sup>13</sup> who reported that diet, exercise and a combination of both lead to significant improvement in peak VO<sub>2</sub> and other measures of physical function. Nield *et al.*<sup>14</sup> also reported a sustained improvement in exertion dyspnea and physical function with the use of PLB which is similar to findings of present study.

With greater strength of inspiratory muscles, less force is generated with each breath which may reduce motor output to respiratory muscles and decrease the perceived sense of respiratory effort<sup>15</sup>. Further studies are required with a large sample size and larger training period. Since the study was conducted on obese college students only, other groups especially those with pulmonary diseases should be considered in future.

**Clinical implication**

Obesity is common in people and is known to compromise both participation in activities of daily living and health-related quality of life due to breathlessness experienced while performing the activities. The results suggest that for management of breathlessness and for improving the quality of life, PLB exercises are extremely helpful.

**What is already known?**

Presently, obesity is a cause for increased risk of heart disease, type 2 diabetes, high blood pressure, certain cancer, and other chronic conditions.

**What this study adds?**

Research has shown that obese children are more likely to be obese as adults which can lead to decrease in performance capacity in early stages of life and an increase in the morbidity and mortality rate. Study perform on class 1 obese college

going students where pursed lips are a form of exercise which is clinically acceptable and an easy form of exercise as compared to anaerobic exercises for reducing the dyspnea level and increasing the performance and capacity.

#### Funding

No funding

#### Conflicts of interest

Author declares that there are no conflicts of interest.

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#### How to cite this article:

Arajit Das *et al* (2018) 'Effect of Pursed Lips Breathing on Dyspnea And Performance Capacity in Class 1 Obese College Going Students', *International Journal of Current Advanced Research*, 07(10), pp. 15731-15733.

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