

To Evaluate the Effect of Pursed Lip Breathing Technique on Dyspnoea and Fatiguability, Activity Tolerance in Obese College Going Students

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Abstract: *Background:* Obesity is a significant risk factor for dyspnoea. Obesity affects the individual's physical performance and results in exertional dyspnoea which directly or indirectly affects the activity tolerance of the individual. *Objectives:* To evaluate the effect of pursed lip breathing in improving performance capacity and fatiguability of obese students. To study the benefits of PLB in enhancing activity tolerance of an individual. *Materials and Methods:* This is an interventional study and included 35 obese college going students aged between 18 - 25 years out of which 3 students were class - 1 obese and 32 students were class - 2 obese. The student having dyspnoea on exertion were included in the study and students with normal BMI and students having dyspnoea levels below 10 on Borg's RPE scale were excluded. The total duration of the study was 6 months. *Statistical Analysis Used:* Collected data were entered into Microsoft excel spreadsheet. Tables and charts were generated with the help of Microsoft word and excel software. Continuous variables (hemodynamic parameters) were presented as Mean SD. Categorical variables were expressed in frequency and percentages. Hemodynamic parameters were compared between pre and post intervention at different time period by performing paired t - test. P<0.05 was considered as statistical significance. Statistical software STATA version 14.0 was used for data analysis. *Results:* The result showed statistically significant changes in pre and post 6MWD covered i. e. the six minute walk distance covered increased after PLB training. We also found that there was highly significant reduction in the dyspnoea scores after PLB training. *Conclusions:* The study conclude that Pursed - lip breathing technique is effective in reducing dyspnoea scores in obese students as well the technique has positive effect on activity tolerance of the student.

Keywords: Performance capacity, Dyspnoea, Activity tolerance, Borg's scale, Obesity.

1. Introduction

The World Health Organization (WHO) defines obesity as "a condition in which percentage body fat (PBF) is increased to an extent in which health and well - being are impaired, and, due to the alarming prevalence increase, declared it as a "global epidemic" ². The high appearance of obesity is a global public health problem due to its association with several diseases and reduced lifespan ⁵. It appears as a result of complex interaction of genetic, life style, dietary intake, energy expenditure, nutritional and metabolic factors, as the adipocyte metabolism.⁴ Obesity is a highly dangerous factor which lead to dyspnoea. Obesity affects the individual's physical performance and results in exertional dyspnoea i. e. breathlessness on performing certain activities which results in their poor performance capacity. Obesity, in the absence of other health issues, affects several physiological variables that could cause dyspnoea, especially during exercise.⁶ Chest wall compliance are reduced due to the excess accumulation of adipose tissue in the chest and abdomen. The work of breathing is increased as the respiratory muscles must work against the excess chest wall fat; this increased respiratory neural drive to breathe puts the obese individual at risk for exercise - related dyspnoea. In contrast, sedentary behaviour of the individuals, rather than obesity, reduces cardiorespiratory fitness, which could also cause dyspnoea on exertion.⁶ 6MWT is a exercise tolerance test to assess the functional capacity or performance capacity of a healthy individual, an individual with obesity or individual suffering from various cardiopulmonary and respiratory diseases. According to American Thoracic Society guidelines for 6MWT age, gender, weight and height affect

6MWT distance independently. Therefore, they should be considered while measuring the distance. Pursed lip breathing is a method which helps in controlling shortness of breath it also provides a quick and easy way to lower your pace of breathing. PLB - is conducted to force the pulmonary system to do expiration. This is respiratory compensation strategy which is instinctively used during strenuous activity, increased exercise tolerance on the normal subject. While on the subjects with health issues or obese subjects, PLB has been inspiration, give ventilation while resting and during exercise.³

2. Materials & Methods

This study was an interventional study conducted among obese college going students at college of Physiotherapy, Maharashtra. The sample size estimated for the study was 35. The duration of the study was 6 months. The sample technique used in the study was convenient sampling. The sample was calculated by utilizing the standard formula:

$$\eta = \frac{2s_p^2[z_{1-\frac{\alpha}{2}} + z_{1-\beta}]^2}{\mu_d^2}$$

$$s_p^2 = \frac{s_1^2 + s_2^2}{2}$$

3. Methodology

The present study is based on 35 class - 1 obese female and male students aged 18 - 25 years. The subjects were selected

by purposive random sampling. A written consent was obtained from the students. The study evaluates the effect of pursed lip breathing exercise in technique on dyspnoea and fatiguability, activity tolerance in class - 1 obese college going students. According to obesity classification students who were class - 1 obese students were assessed for dyspnoea level by using Borg's RPE scale after the participants performed a 6MWT. Performance capacity was evaluated by measuring the total distance covered after 6MWT. Those who had dyspnoea score between 10 - 14 were assigned to training for pursed lip breathing for 4 weeks. PLB exercise was given for 10 min in 1st week, 15 min in 2nd week, 20 min in 3rd week and for 25 min in 4th week. After 28 sessions of training, 6MWT was performed and the total distance covered was recorded. Once again dyspnoea level was assessed by using Borg scale.

Pursed lip breathing technique

Students were asked to follow these steps:

- 1) Be in an upright position such as sitting or standing.
- 2) Relax your shoulders and neck muscles.
- 3) With your mouth closed, slowly inhale (breathe in) through your nose for at least 2 seconds. It may help to count to yourself.
- 4) With your mouth closed, slowly exhale (breathe out) all the air in your lungs with your lips pursed, "as if you were going to whistle or gently flicker the flame of a candle," for at least 4 seconds. It may help to count to yourself. Do not force the air out. Breathing out should be twice as long as breathing.
- 5) Perform pursed lip breathing until your breath becomes normal.

4. Result

The study which was undertaken to evaluate the effect of pursed lip breathing technique on dyspnoea and improving fatiguability, activity tolerance in class - 1 obese college going students by using 6WMT has yielded the following results:

A total of 35 obese students participated in the study. The mean age of the students was 21.8 ± 1.64 (19 – 25) years (Table no.1).

Around 26 (74.29) students were female and 9 (25.71) students were male (Table no.2).

Graph no.3 shows BMI wise distribution of the students in which 8.57% students were class - 1 obese and 91.43% students were class - 2 obese.

In table no.5 comparison of mean SpO2 pre and post intervention at baseline showed highly significant p - value <0.0001, HS and t - value 5.0400 and at immediate showed p - value 0.0001, HS and t - value 4.0605.

Table No.6 shows the descriptive statistics for dyspnoea scores before and after training. The reduction in dyspnoea scores was found and statistically significant differences were seen (P<0.0001HS).

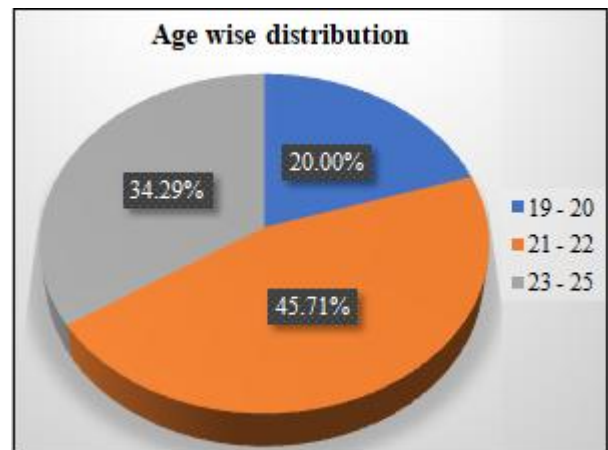
Graph no.6 shows the comparison of pre and post training values for dyspnoea scores. Dyspnoea levels decreased significantly.

Table No.7 shows the comparison of total distance covered pre and post PLB training. Statistically significant differences (p<0.0001, HS) and t - value 17.2691 were observed. There was highly significant increase in the scores of 6MWD of the student.

Tables

Table 1: Age distribution of study population

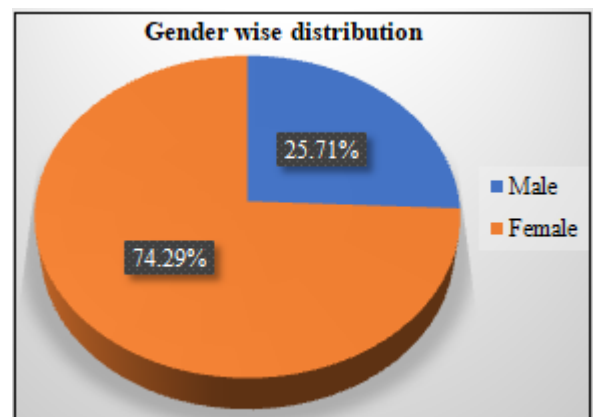
Age in years	No. of individuals	Percentage
19 – 20	7	20.00
21 – 22	16	45.71
23 – 25	12	34.29
Total	35	100
Mean Age ± SD (Range)	21.8 ± 1.64 (19 – 25)	



Graph 1: Age wise distribution of the students

Table 2: Gender wise distribution of study population

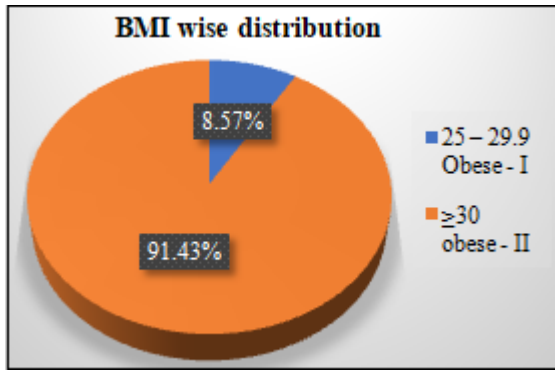
Gender	No. of individuals	Percentage
Male	9	25.71
Female	26	74.29



Graph 2: Gender wise distribution of students

Table 3: Distribution of study population as per BMI

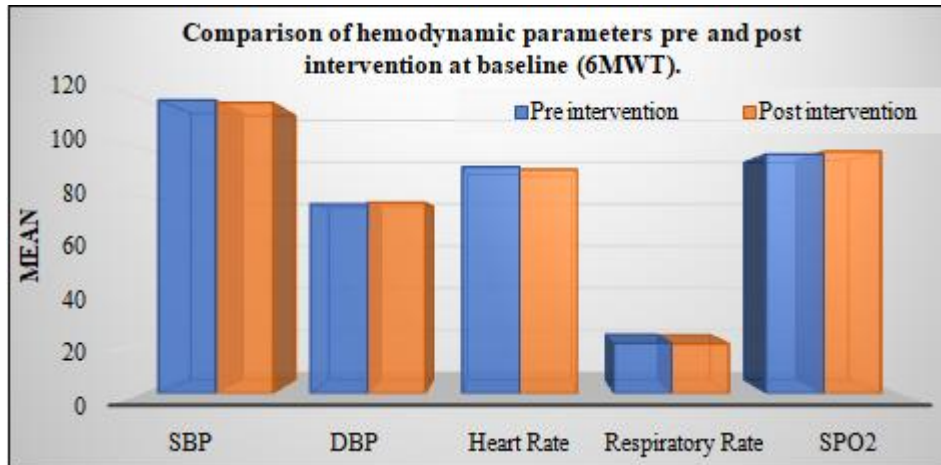
BMI	No. of individuals	Percentage
25 – 29.9 Obese – I	3	8.57
≥30 obese - II	32	91.43



Graph 3: BMI wise distribution of students

Table 4: Comparison of hemodynamic parameters pre and post intervention at baseline (6MWT)

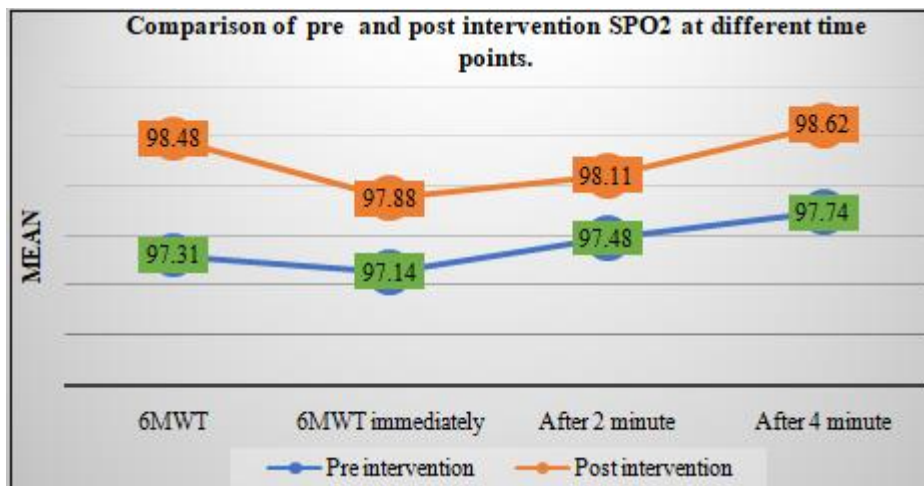
	Pre intervention		Post intervention		t - value	p - value
	Mean	SD	Mean	SD		
SBP	119.34	2.98	118.34	2.73	1.4606	0.1487, NS
DBP	77.2	3.78	77.68	2.81	0.6010	0.5498, NS
Heart Rate	92.17	7.33	91.17	5.57	0.6424	0.5228, NS
Respiratory Rate	20.34	2.49	20.22	1.26	0.2417	0.8097, NS
SPO2	97.31	1.15	98.48	0.74	5.0400	<0.0001, HS



Graph 4: Comparison of hemodynamic parameters pre and post intervention at baseline (6MWT)

Table 5: Comparison of pre and post intervention SPO2 at different time points

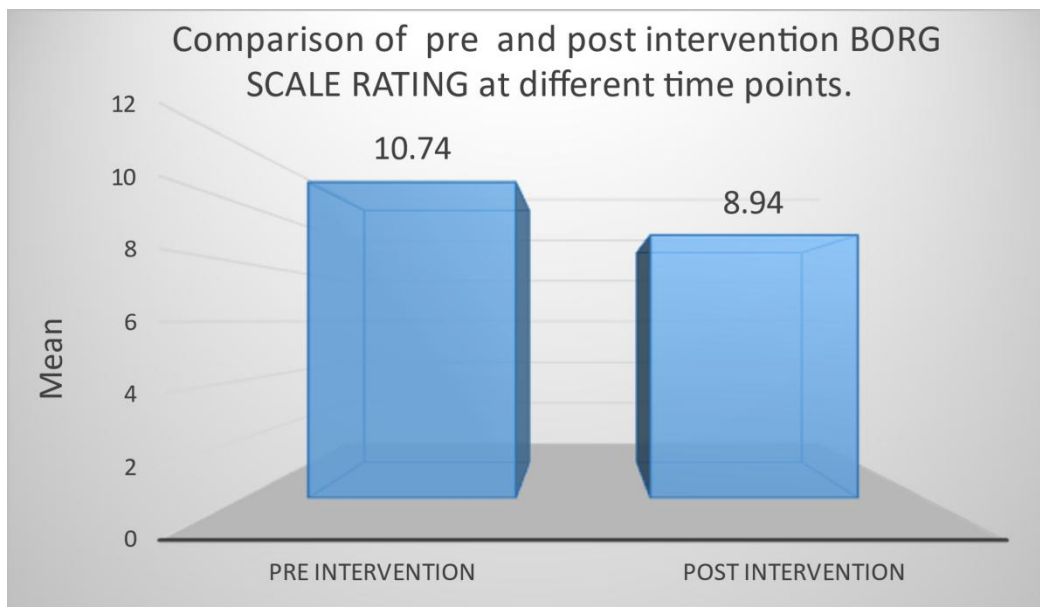
Time Point	Pre intervention		Post intervention		t - value	p - value
	Mean	SD	Mean	SD		
6MWT	97.31	1.15	98.48	0.74	5.0400	<0.0001, HS
6MWT immediately	97.14	0.84	97.88	0.67	4.0605	0.0001, HS
After 2 minute	97.48	0.98	98.11	0.76	2.9987	0.0038, HS
After 4 minute	97.74	0.81	98.62	0.55	5.3303	<0.0001, HS



Graph 5: Comparison of pre and post intervention SPO2 at different time points

Table 6: Comparison of pre and post intervention BORG SCALE RATING at different time points

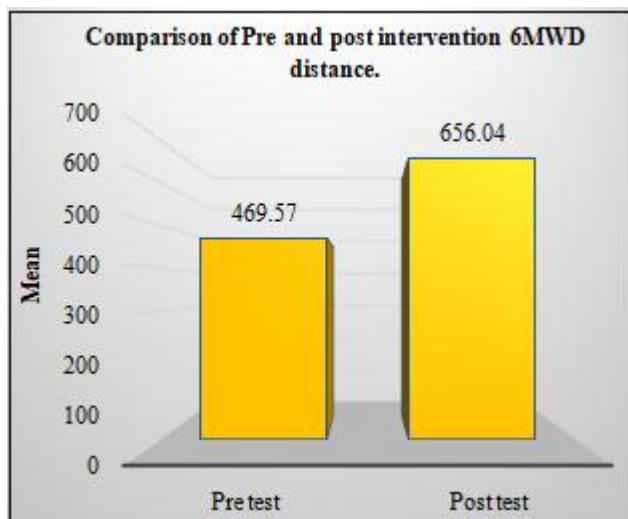
Time Point	Pre intervention		Post intervention		t - value	p - value
	Mean	SD	Mean	SD		
Post 6MWT immediately	10.74	0.74	8.94	0.72	10.2677	<0.0001, HS



Graph 6: Comparison of pre and post intervention BORG scale rating at different time points

Table 7: Comparison of Pre and post intervention 6MWD distance

Pre test		Post test		t - value	p - value
Mean	SD	Mean	SD		
469.57	52.69	656.04	34.20	17.2691	<0.0001, HS



Graph 7: Comparison of Pre and Post intervention 6MWD distance

5. Discussion

In this study, 35 obese students were taken in which 26 were female and 9 were male. Age of the student was from 18 to 25 year. The result of this study suggests that there is significant improvement in the level of dyspnoea and hemodynamic parameters after pursed lip breathing training for 4 weeks.

The findings of the present study support that PLB provided sustained improvement in exertional dyspnoea and physical function, thereby increasing the activity tolerance of the students.

Pursed lip breathing therapy is easy and affordable, and can give the decreasing effect on dyspnoea. The pursed lip breathing exercise increases the tidal volume of the individuals which thereby decreases the frequency of breathing. Thus ventilation will increase because increase in tidal volume leads to increase in O₂. i. e. the present study suggests improved lung capacity indirectly by improving the strength of inspiratory muscles.

Studies have shown that there is noticeable change in the respiratory rate and saturation levels compared to pre and post intervention. Comparison shows improvement in SpO₂ of the students and decreased levels of fatigue. We found the same conclusion in Budiono*, Mustayah, Aindrianingsih in their study "The effect of Pursed lip breathing in increasing oxygen saturation in patients with chronic obstructive pulmonary disease in internal ward 2 of the general hospital of Dr. R. Soedarsono Pasuruan" which concluded that there was a significant effect of PLB on oxygen saturation in patients with COPD.

PLB stabilize the vitals i. e; overall hemodynamic parameters. We also found same conclusion in Dr. JayaChandra et al., in their study "The Effect of Pursed - Lip Breathing Exercise Vs Diaphragmatic Breathing in Stabilizing the Vitals after 6 - MWT among Overweight Individuals". The study concluded that Pursed lip breathing is effective in stabilizing the vitals in over weight subjects.

The study showed significant increase in the distance covered by the student before and after Pursed lip breathing exercise training due to which after the intervention they were able to do activities of daily living with less discomfort. We got the same results in the study done by LaendroFeraccini Cabral which is titled as "Pursed lip breathing improves exercise tolerance in COPD" and the study concluded that, In COPD patients with low PEF, pursed lip breathing reduces dynamic hyperinflation and improves exercise tolerance, breathing pattern and arterial oxygenation at submaximal intensity exercise. Therefore we

can say that the study suggests increase in the ability to withstand physical activities.

Ethical Policy and institutional review board statement:

The study was approved by Institutional Review Board.

Declaration of patient consent:

The author clarifies that there was no compulsion on the students to participate in this project and they gave their consent for it. The students understand that the data or analysis of this project will be purely used for scientific purpose and their name will be kept confidential except when required for any legal purpose.

Data availability statement:

Data are available based upon request from Dr. More Sir.

Financial support and sponsorship:

Nil

Conflict of Interest:

There is no conflict of interest.

Acknowledgement:

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