The Bioscan
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
20(3): S.I (3), 24-27, 2025 www.thebioscan.com

"Effect of Respiratory Muscle Stretch Gymnastics Training on Peak Expiratory Flow Rate in Obese Female Subjects"

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DOI: 10.63001/tbs.2025.v20.i03.S.I(3).pp24-27

KEYWORDS
Obese female, Peak expiratory flow meter, Respiratory muscle stretch gymnastics (RMSG) training.

Received on:

10-05-2025

Accepted on:

07-06-2025

Published on:

07-07-2025

ABSTRACT

Background: Obesity is the condition in which excess body fat has accumulated which has negative impacts on the health of women in many ways. The prevalence of obesity ranges from 10-50% and morbid obesity affecting 5% of country's population. Many studies have found restrictive abnormalities associated with decreased breathing muscle strength and chest expansion. Respiratory muscle stretch gymnastics (RMSG) has been used as an additional form of rehabilitation for patients suffering from respiratory complications. RMSG is planned to reduce chest wall stiffness, particularly in the respiratory muscles of the chest wall.

AIM: To assess the effects of Respiratory muscle stretch gymnastics training on peak expiratory flow rate in female obese subjects.

Methodology: A total of 45 obese female subjects in age group of 20-40 years were selected according to the inclusion and the exclusion criteria. They were asked to perform RMSG exercises total 16 sessions spread over 4 weeks (4 days a week) 4 sets 3times. Pre and post peak expiratory flow rate were assessed on day one and 4th week of intervention by using peak expiratory flow meter.

Result: Statistical analysis was done by using paired t test in which mean pretest score was 176.77 with standard deviation ±2.994 and mean post test score was 249.55 with standard deviation ±4.332. The statistical value of the paired t test was 15.636 with p value 0.00001 which is < 0.05 considered as significant.

Conclusion: The study found significant improvement in PEFR among obese women following 4 weeks of RMSG training.

INTRODUCTION

Obesity is the condition in which excess body fat has accumulated which has negative impacts on the health of women in many ways. The prevalence of obesity ranges from 10-50% and morbid obesity affecting 5% of country's population.[1]

According to the World Health Organization a estimated of more than 1 billion people are overweight, with 300 million falling under the criteria for obesity. Twenty-six percent of nonpregnant women ages 20 to 39 are overweight and out of them 29% are obese. More than 23% of women are either overweight or obese which is higher that the prevalence among men. This is because of the accumulation of fat is common occurrence in women as sex hormone strongly influence adipocyte metabolism.[2]

Obesity has long been recognized as having significant effects on respiratory function with patients tend to have higher respiratory rates and lower tidal volumes. Total respiratory system compliance is reduced Lung volumes tend to be decreased, especially expiratory reserve volume.[3]

Respiratory muscle strength, compliance of the thoracic cavity, airway resistance and elastic recoil of the lungs determines the pulmonary functions. Peak expiratory flow rate (PEFR) is measured by a peak flow meter as convenient tool to measure lung functions. The various factors, such as sex, body surface area, obesity, physical activity, posture, environment and racial differences have an effect on the values. Therefore, markers of obesity, such as BMI correlates to PEFR. The PEFR in the obese

subjects should be lower, as the extra fat which exert a mechanical effect on the movement of chest or abdomen. [4]
Respiratory muscle stretch is a technique used to relieve exercise-induced respiratory distress. In this technique includes lengthening the afferent activities of external and internal intercostals muscle spindle, to alleviate dyspnoea to minimize the atrophy of respiratory muscles and facilitate coordinated contraction of respiratory muscles. Also, the lengthening of soft tissue around the chest wall and respiratory muscles helps efficiently in the contraction force and chest movement by gaining the lung volumes, breathing control. [5]
Studies have shown that there is significant increase of PEFR followed by RMSG exercise which is due to lengthening of pectoralis muscle in sawmill workers [6]. In our study we assessed the effect of RMSG on PEFR in female obese individual.
Patients who are morbidly obese (BMI>_40Kg/m) have increased respiratory rates as compared with normal subjects.
Respiratory muscle stretch gymnastic training is designed to decrease chest wall stiffness, particularly in the chest wall respiratory muscle.
PEFR it is effort dependent and reflects mainly the calibre of the bronchi and larger bronchioles which are subjected to reflex bronchoconstriction, PEFR is a fairly good indicator of bronchial hyper-responsiveness.

Aim and Objective

Aim:

To assess the effects of Respiratory muscle stretch gymnastics training on peak expiratory flow rate in female obese individual

Objective:

To evaluate the effects of respiratory muscle stretching gymnastics training on peak expiratory flow rate in female obese individual.

Procedure

Pre-Post experimental study was carried out after the approval from ethical committee. Total 45 Female participants were selected according to inclusion criterion in which both married and unmarried female having age group 20-40 year and BMI ranging between 30-34.9kg/m^2 were included. Female having musculoskeletal problems and respiratory diseases, history of chronic medical condition prior training of breathing exercises or yoga, psychiatric problems, addiction, pregnant women were excluded from the study. Consent was taken from the participant and the participants were explained about the study and the procedure.

PEFR as outcome measure was assessed by using peak flow meter. Subjects were sitting position with back straight. First adjust the knob of the peak flow meter to zero. Device should be held horizontally making sure that fingers are not on the scale. Then subjects were instructed to take deep inspiration and then expire forcefully into the mouth piece of the peak flow meter. Three consecutive trails were performed and the maximum value was recorded pre and post intervention[7]

Then the subjects were involved in respiratory muscle stretch gymnastics (4 exercises) for total 16 sessions spread over 4 weeks (4 days a week) 4 sets 3times.

Respiratory Muscle Stretch Exercise Includes: -

RMSG No. 1: Start with a relaxed position with a straight back Slowly elevate both shoulders while moving them backwards. At the same time, lean backward while inhalation. After full inspiration, exhale slowly, relax and resume original position.

RMSG No. 2: With the back straight, hold both hands at the back of the buttocks. Do full and slow inspiration, push the hands away from the body while slowly exhaling. After full expiration, breathe quietly and resume original position.

RMSG No. 3: With the back straight, hold both hands in front of the chest with the fingers interlock and the palms in. Inspire fully in this position. Then while exhaling slowly extend the arms and bend the upper body forward as possible. Take a full breath in that position. Then breathe quietly and resume original position.

RMSG No. 4: With the back straight, hold both hands interlocking fingers above the head with arms stretched and palms facing down. After full inspiration in this position pull the arms backward while exhaling slowly. After full expiration, resume original position and breathe quietly.

After 4 weeks post intervention PEFR were recorded.

Statistical Analysis

Statistical analysis of the recorded data was done by using the software.

Arhythmical mean and standard deviation were calculated for outcome measure.

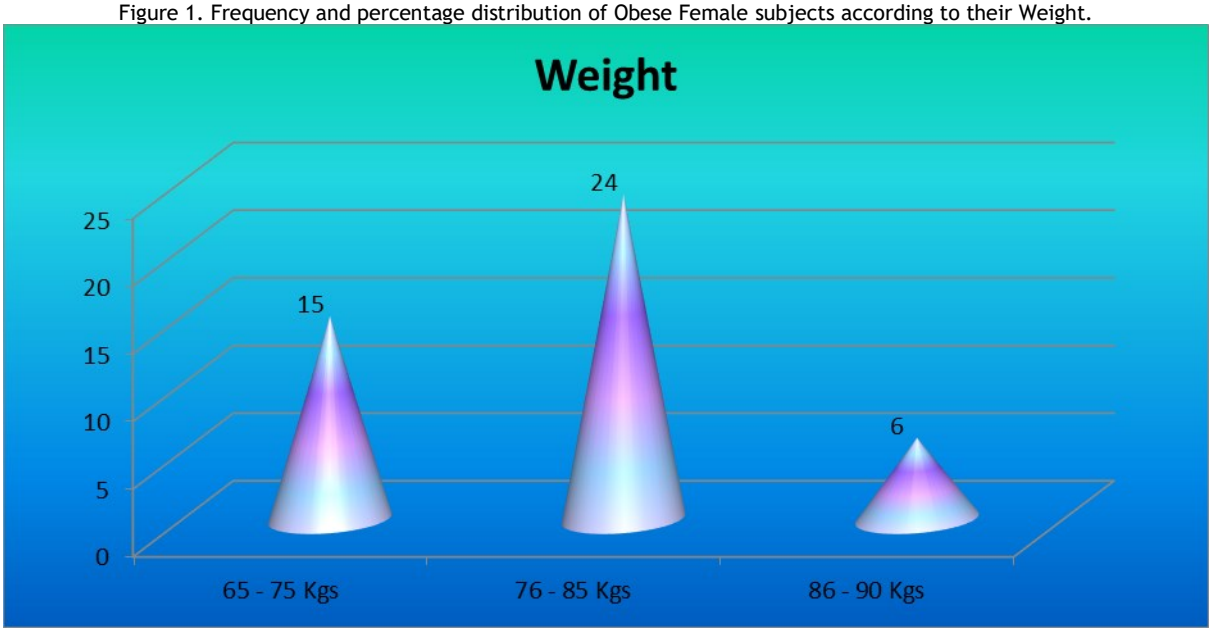
The statistical analysis was done by using paired t-test.

Paired t-test was used for statistical analysis to compare pre and post peak expiratory flow rate within group.

1. Result

The data were collected and entered in the master sheet and the findings are presented under the following headings.

Figure 1. Frequency and percentage distribution of Obese Female subjects according to their Weight.

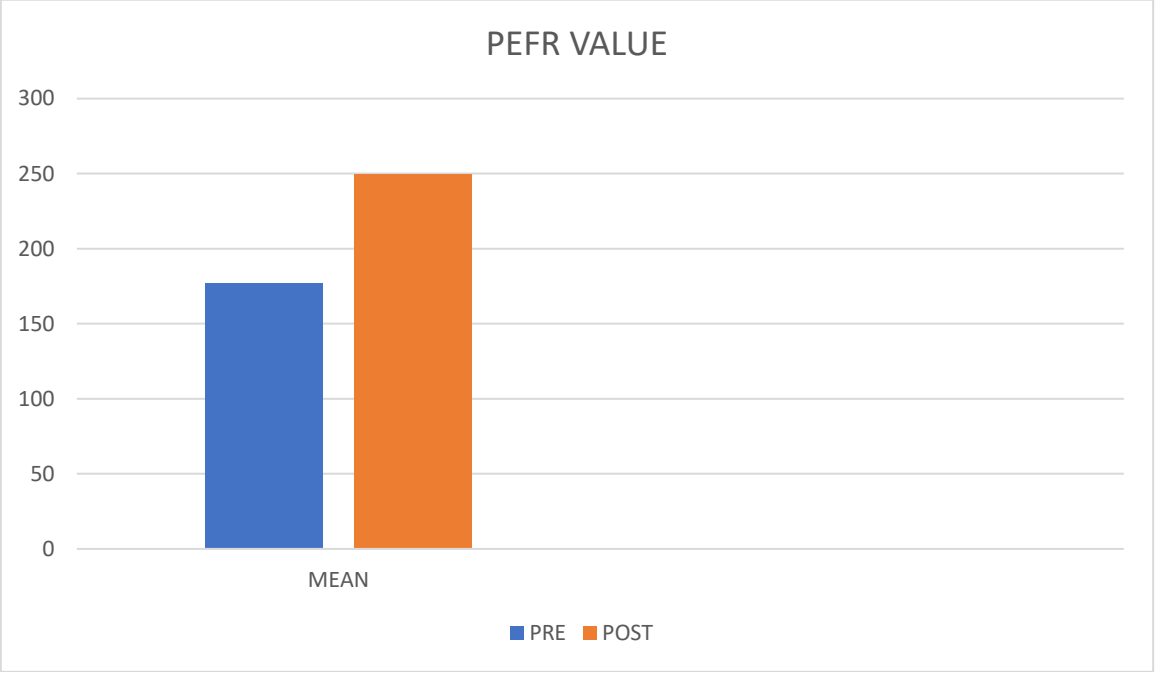


The data presented in the figure.no-1reveals, Majority of the samples 53.33% (24) had their weight ranging between 76 to 85 Kgs followed by 33.33% (15) had their weight ranging between 65 to 75 Kgs and least 15.33% (6) had weight ranging between 86 to 90 Kgs

a) Findings related to Mean, Median, Mode and Standard Deviation before and after Respiratory muscle stretch gymnastics training on peak expiratory flow rate among Figure 2.

Table.no -1 Mean and Standard Deviations of Obese Female subjects before and after Intervention

Respiratory muscle stretch gymnastics training					
Pre –test			Post-Test		
Mean	Median	S.D	Mean	Median	S.D
176.77	160	±2.994	249.55	250	±4.332



The data presented in Table- 2 shows the Pre-test Peak expiratory flow rate scores before and after Respiratory muscle stretch gymnastics training, During Pre-test peak expiratory flow rates was Mean 176.77, Median 160 and Standard deviation +2.994, While at Post-test the scores were, Mean 249.55 with Median 250 and Standard deviation of ±4.332.

Table no.2

b). Findings related to the effect of Respiratory muscle stretch gymnastics training on peak expiratory flow rate among Obese female patients.

In order to find out the effectiveness of Respiratory muscle stretch gymnastics training on Peak expiratory flow rate among Obese female subjects paired-t-test was computed, the results are tabulated as below and Null Hypothesis was stated

Table.no-02

Samples	Mean	Standard Deviation	Df	T	P-Value
Pre-test	176.77	±2.994	44	15.636	0.00001
Post-test	249.55	±4.332	44		

The above table – 2 depicts that, mean pretest score was 176.77 with standard deviation ±2.994 and mean posttest score was 249.55 with standard deviation ±4.332. The test statistical value of the paired t test was 15.636 with p value 0.00001 which is < 0.05. It concludes that, application of Respiratory muscle stretch gymnastics training on Peak expiratory flow rate among Obese female patients was effective.

DISCUSSION

The present study aimed to asses Effect of respiratory muscle stretch gymnastics training on peak expiratory flow rate in obese female subjects. (BMI- 30-34.9 kg/m^2)

RMSG was used to stretch the inspiratory and expiratory intercostal muscles during inspiration and expiration. This study included total 45 obese female subjects of the age of 20-40 (BMI- 30-34.9 kg/m^2) The duration was 4 weeks. paired t- test has been used for analysis of mean pre & post values, The score of p Value obtained was = 0.00001 which implies that is it statistically significant The present study results showed significant improvement in PEFR among obsess female subjects after 4 weeks of RMSG training. There was a statistically significant difference in pre-& post PEFR after RMSG training among in obese female subjects (BMI- 30-34.9 kg/m^2). RMSG method is effective and safe to impliment. RMSG, which was intended to stretch the respiratory muscles, which improved pulmonary function and chest expansion by increasing chest wall compliance and

decreasing chest wall stiffness. The result found in this study is with the accordance with the study done by E. Shanmugananth, et al 50 randomly selected sawmill workers aged 30–50 years in Chidambaram town were given RMSG training twice daily, four times each of five patterns for 4 weeks The result showed significant increased difference in chest expansion and PEFR after RMSG training among apparently healthy sawmill workers[7] The study done by Saylee R. Patil, et al which included 164 women, 82 obese (BMI > 25 kg/m2) and 82 non obese (BMI 18.5- 22.9 kg/m2). Women with age of 20–40-year-old. The study aimed at comparing PEFR in obese and non-obese women and results conclude that PEFR values were lower in obese women when compared with non-obese women. This indicates that obesity is an important risk factor for airflow limitation and lung function in obese women. According to the study done by Mistry Hetal1, et al in which There was an improvement in PEFR of subject's post intervention which was highly significant statistically ($p=0.00<0.05$). The study results suggested that RMSG immediately reduced dyspnea at rest, and improved spirometry variables including forced vital capacity (FVC) and PEFR in patients with severe COPD.[10] respiratory muscle stretching similarly affected wall compliance and decreased chest wall stiffness. Studies have reported that if the respiratory muscles are stretched to their full extent, the respiratory apparatus is able to work to their maximal capacity. the increase in PEFR might also be explained by this mechanism. Stretching stimulates muscle spindles and due to alpha-gamma linkage, the sensitivity of muscle spindles is increased during contraction.[10] In our study also we found an improvement in PEFR

CONCLUSION

The study found significant improvement in PEFR among obese women following 4 weeks of RMSG training.The study concluded that RMSG is a straightforward, safe, and effective treatment for improving the functional capacity of obese women. Future research is needed to evaluate the impact of RMSG on other parameters and rehabilitation approaches.

Limitations and Future Scope

Limitations:

Due to study setting at tertiary care center, the results cannot be generalized for the other population. After this study follow-up should be taken.

Future Scope:

Further study can be done with a larger sample size
Further studies can be done with different outcome measures comparison with other intervention can be done.

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