

# Efficacy of Balloon Blowing Exercise on Peak Expiratory Flow Rate in Young Adult Smokers

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**Background:** Smoking cigarettes which progressively impairs the lung functions is a leading risk factor for early death and disability worldwide. Alternate use of the tobacco products along with some exercise practicing behaviour help to prevent the impairment of lung function because most smokers fail to cease smoking. The objective of this research was to find out the effectiveness of the balloon blowing exercise among the young adult smokers using the peak expiratory flow meter.

**Methods:** A quasi- experimental study in which 100 male participants were included according to inclusion and exclusion criteria. Pre-test and Post-test was taken using Peak expiratory flow meter, after intervention is provided.

**Results:** The mean appraise of the Group A pre-test was 287.1 and the post-test was 283.2, and the mean appraise of the Group B pre-test was 279.7 and the post-test was 367.2. The significant appraise was .581 for Group A and .000 for the Group B since the  $p < 0.05$ . The study shows the significant result as the p appraise is less than 0.05.

**Conclusion:** This study concludes that there was a significant increase in the peak expiratory flow rate in the post test of Group B.

**Key Words:** Smokers, Peak expiratory flow, Balloon blowing exercise

## INTRODUCTION

Smoking cigarettes nearly harms every organ of the body, causes more diseases, and results in a decline of the health of the smoker and progressively impairs the lung function [1-3]. Tobacco substance is rolled and fired and the smoke

is inhaled and this process dates back to 4000 B.C [4]. India holds the second position in production and third position in consumption of tobacco, Worldwide [5].

The objective of this work was to find the Efficacy of the Balloon Blowing Exercise on Peak Expiratory Flow Rate in Young Adult Smokers.

As stated by the Indian Council of Medical Research (ICMR) nearly every year 0.16 million mankind develop carcinoma, 4.5 million people develop coronary illness, and 3.9 million develop chronic obstructive airway disease, as a consequence of consuming tobacco [6].

Due to smoking the mucus cell grows in size and number which results in thickening of mucous and hinders the natural defence mechanism. Inflammation of the mucous membrane decreases the air space and blood vessel results in less oxygen. Smoking reduces the ciliary action which further

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causes infection to the lungs [7]. Adverse effect of smoking on respiratory defences includes (structural, immune system changes induced by smoking) [8].

According to the American review of respiratory disease found that the acute smoking habit also has an impact on the damage of the respiratory functions found in the study changes in the forced expiratory spirogram in young adult smokers [9].

Expiration is a passive process as a result of which the dimension and the force of the thoracic cavity is lowered and it will cause the expelling of air from the lungs. During this activity the costal are lowered by the intercostal muscles and the diaphragm is raised to resume its original position as the result of this movement and the size of the thoracic cavity is reduced and lungs is higher than the atmospheric pressure and the air rushes out of the nose and trachea this is called forced expiration.

Peak Expiratory Flow Rate mainly consider the large airways flow and it relies on the voluntary attempt and muscle power, maximum flow of air occurs during the effort dependent part of the expiration movement, so low expiration rate is caused by the little than the maximal effort rather than the obstruction [10].

The transversus thoracic muscle is the accessory muscle of the expiration it is the thin muscle found in the inner surface of the anterior thoracic wall. Its action includes the support for the abdominal wall, role in maintenance of posture, trunk movement includes flexion, extension, lateral flexion, rises the intra-abdominal pressure in case of Forced Expiration, Defecation, Micturition, Parturition. The contraction of the transversus thoracic pulls the ribs caudally, and helps in the expiration and it is barely active in the supine lying position and while doing the stomach vacuum blow exercise [11].

The Peak Expiratory Flow rate is calculated using the Peak expiratory flow meter. Peak Expiratory Flow Meter, is a compact hand held apparatus which shows how speed air comes out of the lung when blow out forcefully after taking gasp of air completely. By this way a person's ability to breathe out can be monitored it is typically measured in units of litres per minute [12].

Greater the intensity of the cigarette smoking less will be the peak expiratory flow rate [12], the article done on the

effect of smoking on younger and middle-aged males showed that smokers between the age group 20-35 has decreased peak expiratory flow rate [13].

The Hemi-bridge with Ball and Balloon Blowing Exercise helps to reverse the tissue damage and improves the lung functions and the lung capacity was evolved by the postural restoration institute it was helpful in increasing the Zone of apposition and the proper position of the spine in order to allow the diaphragm to optimal ability to perform both the respiration and the postural role [3].

So this need for the study is to find the application of the hemi-bridge with the ball and Balloon Blowing Exercise whether it was useful in increasing the Peak Expiratory Flow Rate are not. The focus of this study was to find out the efficacy of balloon blowing exercise on peak expiratory flow rate in young adult smoker. There is a need for this study as Due to the cigarette smoking the person tend to develop suboptimal breathing pattern and impaired lung function.

The need of this study is to improve peak expiratory rate and to prevent further complications like adaptive breathing strategy, flattened diaphragm, and hyper inflated lungs which will further cause the use of the supplementary muscles of respiration.

## MATERIALS AND METHODS

A Quasi experimental study design of Pre and Post -test type was done on who were healthy cigarette smokers (chippers-5 cigarettes per day )with age of 25 to 50 years in and around SRM Institute of Science and Technology In this study the samples were selected randomly and allocated into 2 groups with 50 participants in each group (group A and group B). Subjects with known asthma, a disorder that affects the airflow, who works in the textile industry, or other places where lungs are affected, Subjects with oral lesion and Those who are doing regular exercise were excluded. Peak expiratory flow meter and balloon were used as an outcome measure to obtain pre-test and post-test values.

### 1. Procedure

The study included about 100 Subjects. The informed

consent was obtained from the subjects and the subjects were selected based upon the inclusion and exclusion criteria and the procedure was clearly explained to the subjects and the subjects were divided into Group A and Group B.

Peak Expiratory Flow Meter is used to monitor the Peak Expiratory Rate, the subjects were instructed to loosen the tight clothing because as it may prevent them from deep breathing and to maintain the upright position, standing and instructed how to use the equipment and the proper demonstration was given and this process includes how to hold the peak flow meter and how to blow in it.

First, the subjects were asked to breathe in and out normally, and then breathe in deeply as much as possible followed by quick expiration to the maximum and then again inspire. Three trials were taken and the best performance of the three is adopted.

The measurement or the value of the peak flow meter was monitored and recorded as the pre-test value and the equipment is sterilized before using to the next subject. The Group B is instructed to do the balloon blowing exercise. The subjects are asked to lie in a supine position hemi-bridge position is maintained with ball in between the knees and hold the balloon with left hand and right hand has to be placed above the head.

Then the subjects were asked to inhale through the nose and exhale slowly through the balloon after the balloon get filled. the neck of the balloon has to be pinched and take it away from the mouth and allow the air out and ask them to repeat the sequence 4 more times a day for 3 days a week

for 8 weeks period of time and while doing this they have to concentrate on low back flat and ask not to press the heel on the floor, and ask to keep the pressure on the ball and this position has to be maintained throughout the exercise and ask them not to strain the cheeks and neck while blowing. Some limitations of this study were that the sample size was small, as well as the intervention period was relatively short, this study not involve the pack per years of smoking and the relative resistance of the balloon was not constant.

## 2. Data analysis

The collected data were tabulated and analysed using descriptive and inferential statistics. Standard deviation and mean were used to assess all the parameters of the data using paired samples test and independent samples test of statistical package for social science IBM (SPSS) Version 22.

## RESULTS

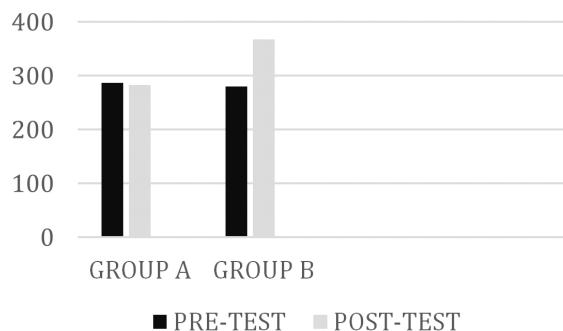
The Table 1 and Fig. 1 depicts the correlation with the pre- and post-test of the Group A and B. The mean value of the pre-test is 287.1 and the post-test value is 283.2. The significant value is .556 since the p-value is >0.05 and hence the comparison with the pre- and the post-test of the Group A is not significant. The mean value of the pre-test is 279.7 and the post-test value is 367.2. The significant value is .000. The p-value is <0.05 and hence the comparison with the pre- and post-test of the Group B is significant

**Table 1.** Differentiation between pre- and post-test value of Group A and B on peak expiratory flow rate in young adult smokers

Group	Mean	SD	t-value	Sig
A	287.1	103.32	.556	.581
	283.2	90.36		
B	279.7	103.63	12.34	.000
	367.2	92.56		

This table displays that the mean value of Group A pre-test is 287.1 and the post-test is 283.2 and there was no noticeable difference between pre and post-test value of the Group A ( $p > 0.05$ ), the mean value of Group B pre-test is 279.7 and the post-test is 367.2 and there was a noticeable difference between the pre- and post-test value of the Group B ( $p < 0.05$ ).

Differentiation between Group A and B



**Fig. 1.** Differentiation between pre- and post-test value of Group A and B on peak expiratory flow rate in young adult smokers.

**Table 2.** Differentiation between post- test value of Group A and Group B on peak expiratory flow rate in young adult smokers

Post-test	Mean	SD	t-value	Sig
Group A	283	90.36	.556	.581
Group B	367.2	92.56	12.34	.000

The Table 2 depicts the correlation with the post-test of the Group A and Group B. The mean value of the Group A is 283 and the Group B is 367.2. The significant value for the Group A is .581 and Group B is .000. The p-value for the Group B is <0.05 and hence the table shows the significant result as the p-value is <0.05.

## DISCUSSION

This study is aimed to find out the Efficacy of Hemi-bridge with Ball and Balloon Blowing Exercise. It was found to be Effective in increasing the Peak Expiratory Flow Rate in Young Adult Smokers.

Ball and Balloon blowing exercise helps to maintain the Optimal Breathing, Posture and Stability and it is even more challenging while performing any type of Exercise this study concerns about the activation and the contraction of the Transversus Thoracic (triangularis sterni) muscle.

This result shows that there is a statistical significant increase of Peak Expiratory Flow Rate in the Group B.

The results correlate with the some of the authors which concluded that as when the Exhalation became forced as during the Balloon Blowing Exercise, abdominal activity (rectus abdominis, internal oblique, external oblique, transversus thoracis) will get increased.

Expiratory muscle training in chronic obstructive pulmonary disorders (COPD) patients there was a remarkable change but this improvement is associated with an increase in exercise performance and no significant changes of dyspnoea in daily activity.

This study shows includes the training period of about 4-8 weeks where expiratory muscle strength has gained following the 4-8 weeks of protocol.

Without putting pressure on the respiratory muscle the Fast Expiration exercise has developed strength and increased the peak expiratory and inspiratory maximum of

healthy smokers.

The comparison of the Pulmonary functions between the Balloon Blowing group and the control group showed a significant difference in the vital capacity, expiratory reserve volume, inspiratory reserve volume, forced vital capacity and forced expiratory volume ( $p < 0.05$ ) and however there was a less significant difference in Peak Expiratory Flow Rate.

Hence this study concludes that the Balloon Blowing Exercise Effectively increase the Peak Expiratory Flow Rate in Young Adult Smokers. This study has several limitations subjects were limited, the relative resistance of the balloon is not constant because of the individual differences and the intervention period was short, pack years of smoking was not considered due to the insufficient study duration and further study should concentrate on the measuring the balloon resistance accuracy and more number of smoking population receiving the intervention and the duration of the intervention can also be increased and pack year can also be included.

For the upcoming studies on such topics recommendation such as that the Data Categorization can be made according to age, height, BMI. The balloon resistance accuracy measuring tool can be used and Alcohol consumption history can also be considered or may be those who are doing exercise less than 3 days a week can also be considered.

## CONCLUSION

The study concluded that there is an improvement in peak expiratory flow rate after the application of balloon blowing exercise among young adult smokers.

## CONFLICTS OF INTERESTS

None to declare.

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