

# Effect of Balloon Blowing Exercise on Peak Expiratory Flow Rate in Modified Radical Mastectomy

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## ABSTRACT

**Background:** Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death among females, accounting for 23% of the total cancer cases and 14% of the cancer deaths. Modified radical mastectomy was designed to reduce the cosmetic deformity produced by classical Halsted radical mastectomy. Peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR) is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air.

**Objective:** To determine the effect of balloon blowing exercise on peak expiratory flow rate in patients with Radical Mastectomy. Methodology: 30 Participants with operated case of radical mastectomy from female surgery ward (in patient department) of Pravara Rural hospital, Loni. Study design of the study was Pre and Post experimental study. Balloon blowing exercises given for 1 week & Peak expiratory flow was measured before and after the exercises Result: Using paired t-test the mean  $\pm$  SD value of pre and post PEFR were  $175 \pm 80$  and  $264 \pm 77$  respectively.

**Conclusion:** The study concluded that balloon blowing exercises improved peak expiratory flow rate and can be used as alternative method to improve respiratory functions

**Keywords:** Modified Radical Mastectomy, Peak expiratory flow meter, balloon blowing exercise

## INTRODUCTION

The global burden of cancer continues to increase largely because of the aging and growth of the world population alongside an increasing adoption of cancer-causing behaviors, particularly smoking, in economically developing countries. [1] Based on the GLOBOCAN 2008 estimates, about 12.7 million cancer cases and 7.6 million cancer deaths are estimated to have occurred in 2008; out of these 56% of the cases and 64% of the deaths occurred in the economically developing world. [2]

Cancer is an abnormal growth of cells which tend to proliferate in an uncontrolled way and, in some cases, to

metastasize (spread). Skin is the most common type of malignancy for both men and women, the second most common type in men is prostate cancer and in women, breast cancer. Cancers are alike in some ways, but they are different in the ways they grow and spread. The usual signs and symptoms of cancer include significant weight loss, fever, fatigue and pain. [3]

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death in females worldwide, accounting for 23% (1.38 million) of the total new cancer cases and 14% (458,400) of the total cancer deaths in 2008. About half the breast cancer cases and 60% of the

deaths are estimated to occur in economically developing countries. Alcohol consumption also increases the risk of breast cancer. The breast cancer incidence increases observed in many Western countries in the late 1980s and 1990s likely result from changes in reproductive factors (including the increased use of postmenopausal hormone therapy) as well as an increased screening intensity. Incidence rates in some of these countries, including the United States, Maintaining a healthy body weight, increasing physical activity, and minimizing alcohol intake are the best available strategies to reduce the risk of developing breast cancer. [4]

Early detection through mammography has been shown to increase treatment options and save lives, although this approach is cost prohibitive and not feasible in most economically developing countries. Recommended early detection strategies in these countries include the promotion of awareness of early signs and symptoms and screening by clinical breast examination. [5]

There are several options available for this potential curable breast cancer. The traditional surgical treatment for breast cancer involves total removal of the breast. Up to early 1970's breast cancer was treated by total mastectomy. This method may be the treatment of choice in stage 1 breast carcinoma, the most commonly performed operation was Halsted's radical mastectomy. [6]

Modified radical mastectomy was designed to reduce the cosmetic deformity produced by classical Halsted radical mastectomy. Patey, at the Middlesex hospital in London, developed a procedure that preserves the pectoralis major muscles and sacrifices the underlying pectoralis minor muscles to remove level I, II and III lymph nodes in the axilla. This is a widely used procedure to treat operable breast cancer. Auchincloss left both the pectoralis major and minor muscles intact removing the axillary nodes and the nodes between the two pectoral muscles. [7]

The peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR) is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. It measures the airflow through the bronchi and thus the degree of obstruction in the airways. [8]

Physiotherapy management for patients with modified radical mastectomy consist of breathing exercises, airway clearance techniques, incentive spirometer, transcutaneous electrical nerve stimulation for pain management, lymphedema management, and shoulder mobility exercise. [9]

Balloon blowing exercises are the types of expiratory exercises are mainly given to improve the expiratory flow rate and strength of respiratory muscles in respiratory conditions. This exercises also improves the respiratory function in patients with cervical spinal cord injury and in surgical conditions. [10]

In radical mastectomy due to surgical procedure and effects of general anesthesia leads to impairments in respiratory functions. Balloon blowing exercise may help to increase pulmonary function in respiratory condition like asthma and COPD. Most of the studies have shown that pulmonary functions are affected after radical mastectomy (vital capacity: FEV1, PEFR) Inspiratory exercises and incentive spirometer helps to improve pulmonary functions in various respiratory and obstructive conditions. [11] There are less evidence on the use of balloon blowing exercise in patient with radical mastectomy with impaired respiratory functions therefore following study is undertaken.

#### **Objective:**

1. To measure the peak expiratory flow rate in patients with Radical Mastectomy.
2. To see the effect of balloon blowing exercise on peak expiratory flow rate in patients with Radical Mastectomy.

#### **MATERIALS AND METHODS**

This study was conducted at Pravara rural hospital with 30 women with operated case of radical mastectomy. Study design was pre post experimental study with convenient sampling method. All the participants were screened properly on the basis of inclusion and exclusion criteria and informed written consent was taken. Participants were included with patients who underwent modified radical mastectomy with age group between 30-60 years and participants were excluded with lung carcinoma, any other chronic systemic diseases, known case of cardiovascular diseases and respiratory diseases.

**Outcome measure:**

Peak expiratory flow rate (PEFR): The peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR) is a person's maximum speed of expiration, as measured with a peak flow meter. Peak flow meter is a portable and hand held device.

Patient is asked to breathe in as deeply as you can and blow into the mouthpiece as quickly and as hard as they can.

Do not put your tongue in front of the mouthpiece.

Do this test three times. Note the highest speed of the three.

Test results are classified as green, yellow, and red zones.

**Protocol for Exercise:** Balloon blowing exercises with commercially Available balloon (Approx. 3 to 5 Inch long). Twelve repetitions in one set 2 times a day for 1 week.

Patients asked to breathe in air through the nose to the maximum then breathe out into the balloon at the maximum rate and maintain for 2-3 seconds without pinching the neck of the balloon.

This sequence is repeated 10-12 times with rest of 1 min in one set of training and three sets of training will be given approx. For 30 minutes in a one session

**Statistical Analysis:** Statistical analysis was carried out utilizing the trial version of SPSS 17.0 and P <0.05 is considered as level of significance. Student's t-test was applied to analyze the data.

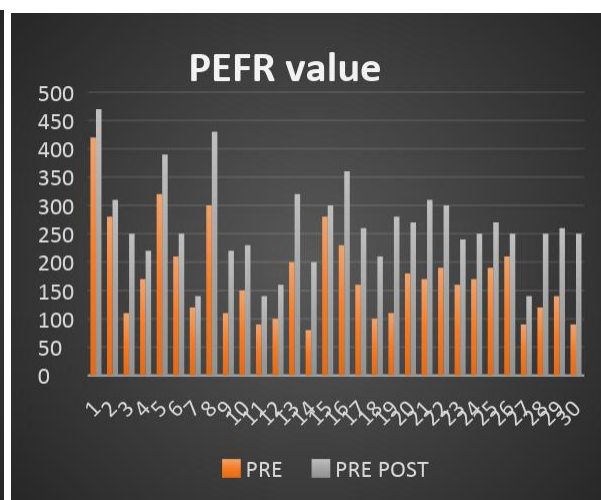
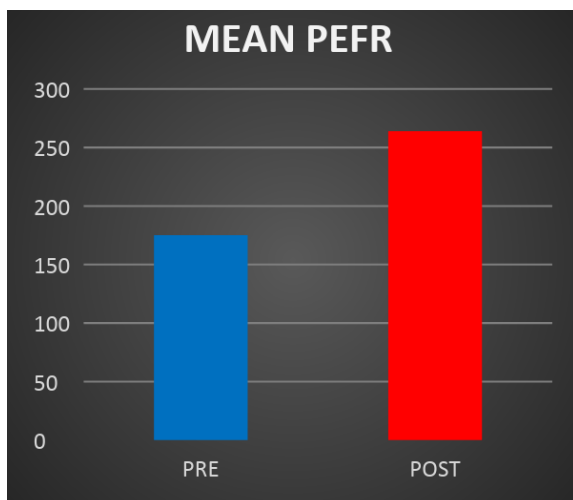
**RESULTS**

In this present study 30 women's with modified radical mastectomy with age between 30-60 years were taken. The percentage wise distribution of the patient was 30-40 years (27%), 40-50years (56%) and 50-60years (17%) respectively.

The mean ± SD value of pre and post PEFR 175±80 L/min and 264±77 L/min respectively.

**Table 1: Pre and Post value of Peak expiratory flow.**

	Mean ±SD L/min	Mean Difference	t Value	P value
Pre	175±80 L/min	89.33	4.36	P< 0.0001 Extremely significant
Post	264±77 L/min			



## DISCUSSION

The result of the study showed that there is improvement in Peak expiratory flow rate after balloon blowing exercises in patients with modified radical mastectomy. In the present study the mean  $\pm$  SD value of pre and post PEF was  $175 \pm 80$  L/min and  $264 \pm 77$  L/min respectively. Using Students paired 't' test within the group shows that there is extremely significant difference ( $p < 0.0001$ ).

It is presumed that pulmonary functions are usually reduced after surgery with general anesthesia. [12] Clinical factors that are responsible for the pulmonary alterations can be divided into four categories: a) mechanical pulmonary alterations; b) alterations in the respiratory pattern; c) alterations in gaseous exchange; d) alterations in the pulmonary defense mechanism. These dysfunctions are not limited to patients with lung diseases and can occur in any individual during the postoperative period. [13] So pulmonary functions (FEV1, FVC, PEF) are mainly affected in post-operative patients.

The BBE is a specific example of an exercise that could be useful for integrating co-activation of deep abdominal muscles with pelvic floor and diaphragm during neuromuscular training and a wide variety of stabilizing maneuvers. The BBE is a conservative exercise intended to assist a patient/athlete in obtaining optimal posture and respiration i.e. Diaphragm (ZOA) and neuro motor control. [14,15]

Pyeon et al stated that expiration is a passive process which occurs through natural relaxation of diaphragm and intercostal muscles and that when forced expiration is performed the abdominal muscles such as rectus abdominis and transverse abdominis actively contract. [15] The balloon blowing exercises performed in our study inflated of balloon with air blow in and the elastic force of rubber increased resulting in more resistances to abdominal muscles. It was reported that the expiratory muscles and abdominal muscle become more active as the volume of balloon is

increased. Peak expiratory flow is mainly based on expiratory phase and strength of expiratory muscles. Therefore the expiratory muscles and abdominal muscles might have been strengthened by the balloon blowing exercise and it may lead to improvement in peak expiratory flow in our study. [16,17]

In the study of Jeon et al. Effects of the expiratory and inspiratory exercise methods for the improvement of pulmonary functions in patients with cervical spinal cord injury were compared, and the result showed that the respiratory indices were significantly improved after the training in the expiratory training group. [18] This indicates that the positive result found in our balloon blowing exercise group was probably related to the balloon blowing exercise in this study was focused on the expiratory exercise rather than inspiratory exercise. This simple cost effective intervention can also be considered as an alternative measure to improve the lung function among patients with respiratory disorders.

## CONCLUSION

The study concludes that balloon blowing exercises significantly improves pulmonary functions (PEFR) in patients with radical mastectomy. Hence, these exercises can be used as intervention to improve respiratory functions in radical mastectomy.

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