

## Effect of Abdominal Muscle Exercises on Peak Expiratory Flow Rate in Post-Menopausal Women

Patil Poonam<sup>1</sup>, Sagar Javid<sup>2</sup>

<sup>1</sup>Post Graduate Student, Faculty Of Physiotherapy. Krishna Institute Of Medical Sciences Deemed University, Karad, District -Satara, Maharashtra.

<sup>2</sup>Associate Professor, Faculty Of Physiotherapy. Krishna Institute Of Medical Sciences Deemed University, Karad, District -Satara, Maharashtra.

### Abstract:

**Purpose of the study:** To find the effect of abdominal muscle exercises on peak expiratory flow rate in post-menopausal women.

**Material and Methods:** 60 subjects post menopause between the age group of 45-55 years, were selected for the study. They were bounded in single group. The pre outcome measure was peak expiratory flow rate, waist hip ratio and abdominal strength. Peak expiratory flow rate measured by peak expiratory flow rate device, waist hip ratio measured by inch tape and abdominal muscle strength measured by grades of abdominal muscle. The specific exercise protocol was given to the subjects which was included abdominal muscle exercises (graded abdominal muscle exercises). Post treatment outcome measure were performed for peak expiratory flow rate, waist hip ratio and abdominal muscle strength. Statistical analysis was done using paired 't' test.

**Results:** In study pre-intervention peak expiratory flow rate was  $290 \pm 58.251$  and post-intervention peak expiratory flow rate was  $307 \pm 60.914$ . Peak expiratory flow rate statistically extremely significant difference and increasing peak expiratory rate post intervention with ( $p < 0.0001$ ) with  $t = 5.633$  with 59 degree of freedom.

In the study the pre intervention values of waist hip ratio was  $38.683 \pm 3.000$  and post intervention waist hip ratio was  $37.566 \pm 2.708$ . In waist hip ratio statistically extremely significant difference and reducing waist hip ratio post intervention with ( $p < 0.0001$ ) with  $t = 6.996$  with 59 degree freedom.

In the study the pre intervention values of abdominal muscle strength (MMT or grades of abdominal muscle) was  $1.63 \pm 0.7357$  and post intervention abdominal muscle strength was  $2.5 \pm 0.7249$ . In abdominal muscle strength statistically extremely significant difference and increases abdominal muscle strength with ( $p < 0.0001$ ) with  $t = 11.851$  with 59 degree of freedom

**Conclusion:** Thus the above study it concludes that abdominal muscle exercises had significant improved clinically and statistically on peak expiratory flow rate in post-menopausal women. So this study accepts the alternate hypothesis.

**Keywords:** Graded Abdominal Muscle Exercises, PEF, Menopause.

### I. Introduction

Menopause is a natural process that occurs as a woman's ovaries stop producing eggs, and the production of hormones such as estrogen and progesterone decline. Menopause does not occur suddenly. Menopause is a sign of aging in the woman. Loss of ovarian function induces a reduction in resting metabolic rate, physical energy expenditure, fat-free mass and abdominal adipose tissue accumulation. Location of adipose tissue deposit in abdominal region plays an important role in occurrence of hyperlipidemia, diabetes, and hypertension<sup>[1]</sup>

In Normal circumstances show that at the post-menopausal age, women start gaining excessive weight around the abdominal area and there is difficulty in performing strenuous activities like stair climbing, brisk walking. Hence, there was need to find out if there is a co-relation between abdominal weight gain and lung capacity in menopausal women.<sup>[14]</sup>

Peak Expiratory Flow Rate [PEFR]<sup>[3]</sup>

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

Graded abdominal muscle exercises include<sup>[4,15,29]</sup>

Upper abdominal exercises-

Starting position-The subjects were instructed to lie in supine with the hips at 45 degree and knees at 90 degree and hand at sides. In all these activities subjects were instructed to keep the low back flat.

**Grade 1**-subjects were asked to perform the curl ups by contracting abdominal muscles and then lifting the head off table with flexed knees.

**Grade 2**-the progression was made by lifting the shoulders until the top of scapulae lift from table, keeping the arms extended towards knees.

**Grade 3**- The next progression was done by lifting the shoulders until the scapulae clear table, keeping the arms horizontal.

**Grade 4**- The subjects were asked to progress further by keeping the arms crossed over chest, until scapulae clear table.

**Grade 5**- The subjects were asked to progress the difficulty of the curl ups by having the subject change the arm position from horizontal and then to behind the neck, until scapulae clear table.

### **Participants**

60 women diagnosed with menopause of age 45-55 years in Krishna hospital and Peth area were been participated in the study. They were bounded in single group. The pre outcome measure was peak expiratory flow rate, waist hip ratio and abdominal strength .peak expiratory flow ate measured by peak expiratory flow rate device, waist hip ratio measured by inch tape and abdominal muscle strength measured by grades of abdominal muscle. The specific exercise protocol was given to the subjects which was included abdominal muscle exercises (graded abdominal muscle exercises).

### **Outcome measures:**

1. **Peak expiratory flow rate** -: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.<sup>[3]</sup>

2. **Waist Hip ratio**:- Waist-hip ratio or waist-to-hip ratio (WHR) is the ratio of the circumference of the waist to that of the hips. This is calculated as waist measurement divided by hip measurement ( $W \div H$ ). For example, a person with a 25" (64 cm) waist and 38" (97 cm) hips has a waist-hip ratio of about 0.66.The WHR has been used as an indicator or measure of health, and the risk of developing serious health conditions. WHR correlates with fertility (with different optimal values for males and females).

3. **MMT for abdominal muscle**<sup>[5]</sup> –

Graded abdominal muscle exercises include

Upper abdominal exercises-

Starting position-The subjects were instructed to lie in supine with the hips at 45 degree and knees at 90 degree and hand at sides. In all these activities subjects were instructed to keep the low back flat.

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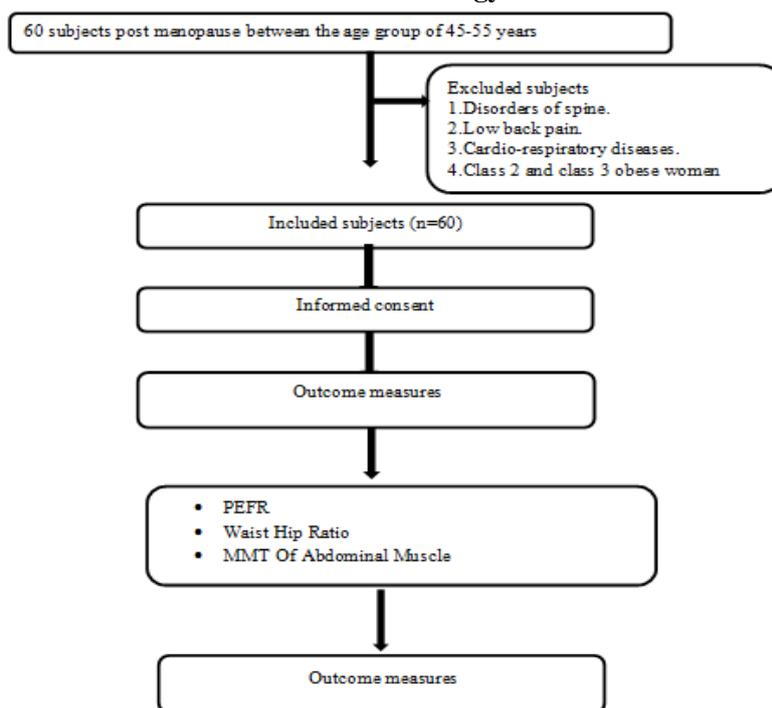
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### **Procedure:**

A subject who was fulfilling the inclusion and exclusion criteria was included. Informed consent form was taken from each of the subjects prior to treatment. An instruction was given to the subjects about techniques performed. Prior to the treatment abdominal girth was checked by inch tape method.Prior to the treatment MMT of abdominal was checked .Prior intervention peak expiratory flow rate was checked.Peak expiratory flow rate checked by peak expiratory flow rate device.In this study, graded abdominal muscle exercise protocol was prescribed to the subjects.A set protocol of graded abdominal muscle exercise was demonstrated and taught to the subject. 3 set of each exercises was given to the subject for 6 times per week for 20 repetitions for duration 1 months<sup>[7]</sup>.The effect of graded abdominal exercises was noticed and measured using the peak expiratory flow rate and abdominal girth measurement checked with using inch tape.

## II. Methodology



### Statistical Analysis

Statistical analysis was done by using INSTAT software, version 3.10. Within group analysis was done using paired “t” test.

## III. Results

### 1) Peak Expiratory Flow Rate:

The pre intervention peak expiratory flow rate value were  $290 \pm 58.251$ , whereas post intervention the value was  $307.33 \pm 60.914$ . the post intervention change in peak expiratory flow rate values showed statistically extremely significant. The “P” value is  $<0.0001$  considered extremely significant. This was done using paired ‘t’ test. ‘t’ value is  $t=5.633$  with 59 degree of freedom.

Pefr	Pre Pefr	Post Pefr
Mean	290	307.33
SD	58.251	60.914

**Table 1: Mean and Standard deviation of PEFR**

### 2) Waist Hip Ratio:

The pre interventional waist hip ratio value was  $38.683 \pm 3.000$  whereas post interventional the value was  $37.566 \pm 2.7088$ . the post interventional change in waist hip ratio value showed statistically extremely significant. The “P” value is  $<0.0001$  considered extremely significant. this was done using paired “t” test. the “t” value is  $t=6.996$  with 59 degree freedom.

WHR	PRE WHR	POST WHR
MEAN	38.683	37.566
SD	3.000	2.7088

**Table 2: Mean and SD of waist hip ratio**

### 3) Manual Muscle Testing :

The pre interventional MMT value was  $1.63 \pm 0.7357$  whereas post interventional the value was  $2.5 \pm 0.7249$ . the post interventional change in value showed statistically extremely significant. The “P” value is  $<0.0001$  considered extremely significant. this was done using paired “t” test. the “t” value is  $t=11.851$  with 59 degree freedom.

MMT	PRE MMT	POST MMT
MEAN	1.63	2.5
SD	0.7357	0.7249

**Table3:** Mean and SD of MMT

#### IV. Discussion

Menopause is a natural process that occurs as a woman's ovaries stop producing eggs, and the production of hormones such as estrogen and progesterone decline. Menopause does not occur suddenly. Menopause is a sign of aging in the woman. Loss of ovarian function induces a reduction in resting metabolic rate, physical energy expenditure, fat-free mass and abdominal adipose tissue accumulation. Location of adipose tissue deposit in abdominal region plays an important role in occurrence of hyperlipidemia, diabetes, and hypertension. In Normal circumstances show that at the post-menopausal age, women start gaining excessive weight around the abdominal area and there is difficulty in performing strenuous activities like stair climbing, brisk walking. Hence, there was need to find out if there is a co-relation between abdominal weight gain and lung capacity in menopausal women<sup>[14]</sup>. Relation between abdominal fat and menopause-Menopause is a sign of aging in the woman. Loss of ovarian function induces a reduction in resting metabolic rate, physical energy expenditure, fat-free mass and abdominal adipose tissue accumulation. 60 women diagnosed with menopause of age 45-55 years in Krishna hospital and Peth area were been participated in the study. They were bounded in single group. The pre outcome measure was peak expiratory flow rate, waist hip ratio and abdominal strength .peak expiratory flow ate measured by peak expiratory flow rate device, waist hip ratio measured by inch tape and abdominal muscle strength measured by grades of abdominal muscle. The specific exercise protocol was given to the subjects which was included abdominal muscle exercises (graded abdominal muscle exercises).post treatment outcome measure were performed for peak expiratory flow rate, waist hip ratio and abdominal muscle strength. Statistical analysis was done using paired't' test.

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#### V. Conclusion

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#### Conflicts Of Interest

Nil

#### Source Of Funding

Krishna Institute Of Medical Sciences Deemed University, Karad.

#### Ethical Clearance

Study approved by Institutional Ethics Committee of Krishna Institute of Medical Sciences, Karad.

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