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

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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±58.251 and post-intervention peak expiratory flow rate was 307±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±3.000 and post intervention waist hip ratio was 37.566±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±0.7357 and post intervention abdominal muscle strength was 2.5±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, PEFR, 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.

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.

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, 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

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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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 progresses 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 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).

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.\(^3\)

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 \((W ÷ H)\). 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**\(^5\) – 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.
     - **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.
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     - **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.

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\(^7\). 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

60 subjects post menopause between the age group of 45-55 years

Excluded subjects
1. Disorders of spine
2. Low back pain
3. Cardio respiratory disease
4. Class 2 and class 3 obese women

Included subjects (n=50)

Informed consent

Outcome measures

- PEFR
- Waist Hip Ratio
- MMT Of Abdominal Muscle

Outcome measures

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 vale were 290 ± 58.251 whereas post intervention the value was 307.33 ± 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’ test. ‘t’ value is t=5.633 with 59 degree of freedom.

<table>
<thead>
<tr>
<th>PEFR</th>
<th>Pre PEFR</th>
<th>Post PEFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>290</td>
<td>307.33</td>
</tr>
<tr>
<td>SD</td>
<td>58.251</td>
<td>60.914</td>
</tr>
</tbody>
</table>

Table 1: Mean and Standard deviation of PEFR

2) Waist Hip Ratio:

The pre interventinoal waist hip ratio value was 38.683±3.000 whereas post interventional the value was 37.566±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 doing using paired” t” test .the “t” value is t=6.996 with 59 degree freedom.

<table>
<thead>
<tr>
<th>WHR</th>
<th>PRE WHR</th>
<th>POST WHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN</td>
<td>38.683</td>
<td>37.566</td>
</tr>
<tr>
<td>SD</td>
<td>3.000</td>
<td>2.7088</td>
</tr>
</tbody>
</table>

Table 2: Mean and SD of waist hip ratio

3) Manual Muscle Testing :

The pre interventional MMT value was 1.63±0.7357 whereas post interventional the value was 2.5±0.7249.the post interventional change in value showed statistically extremely significant. The “P” value is <0.0001 considered extremely significant .this was doing using paired” t” test .the “t” value is t=11.851with 59 degree freedom.
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<table>
<thead>
<tr>
<th></th>
<th>PRE MMT</th>
<th>POST MMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN</td>
<td>1.63</td>
<td>2.5</td>
</tr>
<tr>
<td>SD</td>
<td>0.7357</td>
<td>0.7249</td>
</tr>
</tbody>
</table>

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.[14]. 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 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.

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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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