EFFECT OF REDUCING ABDOMINAL OBESITY ON LOW BACK PAIN IN POST NATAL WOMEN

Heba Essam Adel¹, Khadyga S. Abd El Aziz², Amr H. Abbassy³, Amel M. Yousef⁴
¹PhD student at Department of Woman Health, Faculty of Physical Therapy, Cairo University.
²Professor of Physical Therapy for Woman’s Health, Faculty of Physical Therapy, Cairo University
³Researcher Reproductive Health Department, National Research Center.
⁴Corresponding Author: E-mail: amelyousef@pt.cu.edu.eg.

ABSTRACT

Background: Low back pain (LBP) is a frequent post-natal musculoskeletal condition that is severe enough to interfere with everyday life, resulting in decreased work performance and productivity, increased sick leave, high rates of functional disability, and increased treatment seeking for symptom relief.

Objective: The goal of the study was to investigate how lowering abdominal fat affected postpartum women’s LBP.

Patients and Methods: The participants in this study were forty obese post-natal women with low back pain, ranging in age from 25 to 35 years old and with a BMI of less than 40 kg/m². They were divided into two equal groups at random. Group (A) received focused ultrasound cavitation (FUSC) and low caloric diet in addition to performing abdominal strengthening and posterior pelvic tilt exercises and Group (B) performed the same exercises as group (A) for one month. Before and after 4 weeks of treatment, both groups (A&B) were assessed, by using visual analogue scale (VAS) to assess pain intensity, algometer to assess the pain threshold at the most tender points at back, Oswestry disability questionnaire for functional disability and obesity by weight and waist circumference.

Results: showed that after treatment, mean values of weight, waist circumference, pain threshold for most tender points in the lumbar region, pain intensity, and functional disability decreased significantly in groups (A & B), with the exception of weight and waist circumference, which showed no significant difference in group (B), but the results of group (A) were superior to those of group (B) when comparing the two groups.

Conclusion: It can be concluded that combination of FUSC, diet and exercise is considered as a safe and effective adjuvant to weight loss and reducing of back pain for abdominal obese post-natal women.

Keywords: low back pain, post-natal, cavitation, abdominal obesity, exercise

I. INTRODUCTION

Post natal Low back pain (LBP) sufferers frequently experience discomfort of varied intensities, with symptoms ranging from mild annoyance to severe impairment. A past history of LBP, back pain during pregnancy, hormonal changes, postural changes linked with a new baby, exhaustion, and mood are all regarded to be contributing causes. (1). LBP has been connected to a number of factors, including postural, muscular, and mobility factors, as well as other factors such as: Overweight, increased lumbar lordosis, weak abdominal muscular strength, a trunk muscle strength imbalance between flexors and extensors, and limited spinal mobility are all things to consider about. (2). Pregnancy encourages abdominal obesity, which is a leading cause of metabolic diseases. in the future and is linked to an increase in waist circumference rather than total weight gain. (3). The removal of small quantities of adipose tissue to obtain a more appealing body form is known as body contouring. Noninvasive body contouring treatments have been increasingly popular in recent years as a result of their ability to give patients with obvious improvements in body shape and image without requiring the use of more invasive surgical approaches .(4). Focused Ultrasound Cavitation (FUSC) is a technique for treating
obesity, particularly for eliminating fat and sculpting a specific body region. FUSC is preferred as one of the non-surgical corrective options for reducing the risk of obesity-related problems. (5). Abdominal exercises target the abdominal muscles and are a sort of strength training (colloquially known as the stomach muscles or “abs”). Diet and/or exercise can help to reduce intra-abdominal fat, but there is no evidence on the best effective strategy to lose weight in this area. (6). As more women report persistent LBP after childbirth, medical societies are paying more attention (7). The goal of this study was to see how lowering abdominal fat affected LBP in postpartum mothers.

II. SUBJECT, MATERIALS AND METHODS

Study Design

This study used a randomised, pre–post-test, controlled trial. The Cairo University Faculty of Physical Therapy's institutional review board gave ethical permission to the study before it began. [No: P.T.REC/012/003218]. Each participant gave informed consent after being informed about the study's nature, aim, and advantages, as well as the confidentiality of any information obtained, as well as their ability to decline or withdraw at any moment. Anonymity was assured through the coding of every data. The study was conducted between January 2020 till February 2021.

Subjects:

In this study, forty post-natal women with LBP from Sheikh Zayed Hospital's outpatient clinic actively participated. Their age varied from 25 to 35 years old, their BMI was < 40 kg/m², and their waist/hip ratio was greater than 0.8. If the women had already had a caesarean section, they were not eligible to participate in this study or using spinal anesthesia during labor or history of previous vertebral fractures, spinal abnormality, and back surgery, neuromuscular diseases like multiple sclerosis, delivery of twins, diabetes mellitus, diastasis recti and using contraceptive device. All participated women complained form their back pain during pregnancy and continued after labor for at least 3 months as well as they were breast feeding.

They were subdivided, each with the same number of people.: Group (A) got focused ultrasound cavitation and a low-calorie diet, as well as abdominal strengthening and posterior pelvic tilt exercises twice a week for four weeks, and Group (B) did nothing but exercises as group (A).

Randomization

The recruited patients were randomly assigned, after signing consent form, into two equal groups. A single blind randomization was carried out by assigning the odd numbers to group (A) (experimental group) and the even numbers were assigned to group (B) (control group). Following randomization, there was no dropping out of subjects from the study, Figure (1).
**Procedures:**

**A. Evaluative procedures**

Before and after 4 weeks of treatment, the two groups (A and B) were evaluated as follows:

Body weight and height were measured for each patient using calibrated standard weight – height scale; each patient stood two times wearing light clothes and per feet and the average of the weight and height was taken. After that, the BMI was calculated by using the formula: Height/Weight (Kg) (m)² = BMI.

A visual analogue scale (VAS): was used to determine the severity of the pain (VAS). It consists of a horizontal line 10 cm long with anchors at both ends. The first anchor denotes no pain, while the last anchor denotes the most severe pain possible. The patient was instructed to draw a line across the line at the area where he or she felt the most pain. The distance between the zero end and the mark made by the patient was measured. For persistent pain, VAS provides reliable information. (8).

Oswestry Disability Index: To assess functional impairments, the it was used. It is a valid and accurate method for determining functional impairment in those who have LBP. It is divided into 10 sections, one of which is dedicated to everyday functional incapacity, with six options in each section. The patient chose the one that best described her condition. The maximum score is 50 points, divided as follows: each part gets five points, the first statement gets zero points, and the sixth statement gets five points. The highest possible score was 45. The higher the score, the more disabled you are. Scores ranging from 0 to 40%, >40% to 60%, >60% to 80%, and >80% to 100% indicate minimum disability, moderate disability, and crippling disability, respectively, and patients are confined to bed. (9).

Algometer: The pain threshold of the most tender region for pressure applied between the spinous processes of the lumbar spine L1-L5 was measured using an algometer.. The patient was measured with a pressure algometer while lying prone on a plinth with the interspinous regions between her spinal processes exposed. When the first
sense of discomfort was noticed during the assessment, the patient spoke vocally by saying "stop." The pressure was then turned off, and the data was collected. (10).

Tape measurement: Measure waist circumference with a tape measure at a point halfway between the lowest palpable rib and the iliac crest. It's a sign that you're overweight in your belly. Participants were asked to stand in an upright stance with their feet together and arms relaxed at their sides, exposing the areas to be measured. Measurements were taken at the end of normal expiration, with great care taken to ensure that the anthropometric tape was parallel to the floor and perpendicular to the long axis of the body. (11).

B. Therapeutic procedures:
Ultrasound-Cavitation: Mable6 Duo Ultra cavitation is a product of DAEYANG MEDICAL, a Korean company. Input voltage (AC100/240V). Output frequency: 40 KHz, power: 45W, hand probe diameter: 5.0 cm

Ultrasonic cavitation: Output frequency: 40 KHz, power: 45W, hand probe diameter: 5.0 cm In group (A), was employed to apply ultrasonic cavitation. After cleaning the abdomen wall with alcohol and applying ultrasound cavitation to the anterior abdominal wall at 40 KHz, 2.5 watt/cm2 for 30 minutes, the procedure was repeated twice a week. With adequate gel between the skin and the ultrasound head, the ultrasound head moved slowly across the skin in a circle (12). After the session, the left-over gel was wiped using a warm towel to clean the patient's skin and the ultrasound head.

Diet Plan
During the four-week treatment period, all participants in group (A) were given the same diet programme, which consisted of a balanced diet ranging from 1600 to 2000 kcal/day, Carbohydrates account for 45 to 65 percent of total calorie consumption, proteins for 10 to 35 percent, and fats for 20 to 35 percent. which was calculated on an individual basis for each woman based on her height and weight. (13).

Exercise: Both groups (A & B) did abdominal strengthening and posterior pelvic tilt exercises twice a week for one month. Each exercise was done in three sets, with each set consisting of ten repetitions (14).

Posterior pelvic tilt exercise: The patient was in the usual laying position with her feet flat on the treatment table. She tightened her abs and pressed her back into the treatment table, keeping the position for 5 seconds before relaxing.

Partial sit-ups: The patient was advised to slowly curl up her head and shoulders off the treatment table while holding for 5 seconds from a supine laying position with her feet flat on the treatment table. Slowly returned to the starting position.

Statistical analysis:
SPSS for Windows, version 23 was used for statistical analysis (SPSS, Inc., Chicago, IL). In this experiment, two independent variables were utilized. The (tested group) was the first; there were two levels of subject factor (In group A, ultrasound cavitation, nutrition, and workouts were given; in group B, only exercises were given.) The second was the (measurement periods); a two-level within-subject factor (pre-treatment, post treatment). In addition, five dependent factors were investigated in this study (weight, waist circumference, VAS, Oswestry disability index, pain threshold of most tender point in lumbar region).

III. RESULTS

Subject characteristics:
Table 1 shows the subject characteristics of both groups. (Both A and B). There were no significant differences in age, height, or BMI across groups (p > 0.05).

Table 1. Basic characteristics of participants.

<table>
<thead>
<tr>
<th>Items</th>
<th>Group (A)</th>
<th>Group (B)</th>
<th>Comparison</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>t-value</td>
<td>P-value</td>
<td></td>
</tr>
</tbody>
</table>
Age (years) | 31.35±3.11 | 30.7±3.40 | 0.63 | 0.533 | NS
Height (cm) | 161.85±5.81 | 164.65±4.83 | -1.655 | 0.106 | NS
BMI (kg/m²) | 31.49±3.54 | 31.8±2.94 | -0.305 | 0.762 | NS

SD: standard deviation; p-value: level of significance

**Effect of treatment on weight, waist circumference, VAS, Oswestry disability index, Pain threshold for most tender points in lumbar region:**

The results of a statistical analysis utilizing a 2x2 mixed design MANOVA revealed Weight, waist circumference, VAS, Oswestry disability index, and pain threshold of most tender point in lumbar region all had significant effects on all tested dependent variables (F=32.817, P=0.0001*) in the tested group (the first independent variable). The measuring periods (the second independent variable) did, however, have a significant effect on the dependent variables (F= 290.788, P=0.0001*). The effect of the tested group (first independent variable) on the dependent variables was influenced by the measuring periods (second independent variable) (F=237.189, P=0.0001*), implying that the effect of the tested group (first independent variable) on the dependent variables was influenced by the measuring periods (second independent variable). (Table 2).

**Table (2): The 2x2 mixed design Multivariate Analysis of Variance (MANOVA) for all dependent variables at different measuring periods between both groups (A&B).**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>32.817</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Within groups</td>
<td>290.788</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Interaction</td>
<td>237.189</td>
<td>0.0001*</td>
</tr>
</tbody>
</table>

*Significant at alpha level <0.05.

Weight, waist circumference, VAS, Oswestry disability index, and Pain threshold for most tender areas in the lumbar region all decreased statistically significantly (P<0.01) after treatment in group (A & B), with the exception of weight and waist circumference in group (A) (B). There was no statistically significant difference between groups before therapy, except for waist circumference, but there was a statistically significant change (P<0.01) following treatment. The outcomes after treatment favoured group (A) over group (B). (Table 3).

**Table (3): Mean weight, waist circumference, VAS, Oswestry disability index, Pain threshold for most tender points of the two groups:**

<table>
<thead>
<tr>
<th></th>
<th>Pre-treatment mean ± SD</th>
<th>Post-treatment mean ± SD</th>
<th>Mean difference</th>
<th>% of change</th>
<th>Within groups P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (Kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>81.62±10.24</td>
<td>77.83±10.01</td>
<td>3.79</td>
<td>4.64%</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Group B</td>
<td>85.95±8.82</td>
<td>85.9±8.2</td>
<td>0.05</td>
<td>4.21%</td>
<td>0.99</td>
</tr>
<tr>
<td>P-value*</td>
<td>0.166</td>
<td>0.011*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waist circumference (Cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>100.02±7.79</td>
<td>94.62±7.63</td>
<td>5.4</td>
<td>5.39%</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Group B</td>
<td>97.5±6.32</td>
<td>97±6.32</td>
<td>0.5</td>
<td>0.5%</td>
<td>0.99</td>
</tr>
<tr>
<td>P-value*</td>
<td>0.272</td>
<td>0.208</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>6±1.41</td>
<td>1.94±0.77</td>
<td>4.06</td>
<td>67.66%</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Group B</td>
<td>6±1.25</td>
<td>5±1.29</td>
<td>1</td>
<td>16.66%</td>
<td>0.0001*</td>
</tr>
<tr>
<td>P-value*</td>
<td>0.98</td>
<td>0.0001*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Oswestry disability index

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (SD)</th>
<th>VAS</th>
<th>Oswestry disability index</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>24.94±9.27</td>
<td>10.31±3.07</td>
<td>14.63</td>
<td>58.66%</td>
</tr>
<tr>
<td>Group B</td>
<td>24±7.86</td>
<td>19.7±5.47</td>
<td>4.3</td>
<td>17.91%</td>
</tr>
</tbody>
</table>

P-value* 0.732 0.0001*

Pain threshold for most tender points at lumbar region

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (SD)</th>
<th>VAS</th>
<th>Pain threshold for most tender points</th>
<th>P-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>4.55±0.83</td>
<td>7.84±0.5</td>
<td>-3.29</td>
<td>72.3</td>
</tr>
<tr>
<td>Group B</td>
<td>4.1±0.61</td>
<td>5.07±0.73</td>
<td>-0.97</td>
<td>23.65</td>
</tr>
</tbody>
</table>

P-value* 0.061 0.0001*

SD, Standard deviation; p-value, Level of significance.

IV. DISCUSSION

Up to 82 percent of women experience postnatal LBP within the first year after delivering child (15).

The results of the current research demonstrated a significant difference in mean weight, waist circumference, VAS, Oswestry disability index, and pain threshold for the most of tender areas. In group (A), there was a significant difference in all measurements except weight and waist circumference, but in group (B), there was a significant difference in all measurements except weight and waist circumference. between before and after one of treatment. Comparison of results between groups in favor of group (A) post treatment.

This study's conclusions are supported by Yang et al., (2017) (16), who found that being overweight or obese is highly linked to back pain, with abdominal obesity being particularly linked to LBP and worse physical and social functioning.

Increased adiposity (total body, upper and lower limbs, trunk, android, and gynoid) is linked to higher levels of LBP intensity and disability, according to Urquhart et al., (2011) (17), suggesting that adipose tissue may play a role in the development of chronic pain syndromes.

In accordance with the findings of group (A), Nicklas et al., (2009) (18) found that the most effective treatment for abdominal obesity is a combination of a low-calorie diet and regular aerobic activity. Abdominal exercise's main purpose was to strengthen the abdominal muscles and thereby reduce the lumbar curve. It's been suggested that weak abdominal muscles have a role in the development of back problems, so it makes sense that strengthening them would be helpful (19). However, abdominal exercise alone does not reduce abdominal fat; in order to do so, a caloric restriction must be produced, hence abdominal workouts alone are insufficient to reduce abdominal fat and the girth of the abdomen (20).

Also Teitelbaum et al. (21) In the abdominal, waist, and flank regions, research measured at the efficacy and safety of an ultrasound cavitation device and found similar results. They stated that following the treatment, the circumference of the above-mentioned locations decreased by 1.9cm on average.

. In addition, Moreno-Moraga et al. (22) used the same ultrasound device three times in several unidentified areas. The following settings were utilised with the equipment: The frequency is 20±30kHz, and the intensity is 17.5W/cm2. After treatment, the circumference of the treated areas was reduced by 3.9cm on average.

Ultrasound cavitation combined with a low-calorie balanced diet was effective for obesity management, but combining ultrasound cavitation and electro lipolysis with a low-calorie balanced diet and auricular acupuncture was more effective than either method alone, according to Mahgoub et al.(23) and Mohammed et al.(24).

The findings of this study matched with those of Nazanin et al. (25) who stated that a single treatment leads in a 2cm reduction in abdomen circumference.

Previous studies and literatures by Fulvio et al. (26) and Mohamed et al. (27) supported the findings of this study, demonstrating that ultrasonic is an alternative for treating localised fat deposits without the side effects of traditional surgical procedures and had a significant effect on reducing abdominal fat by a significant decrease in waist circumference.
Furthermore, the findings of this study agree with those of Fatemi (2018) who claimed that ultrasound cavitation reduces abdominal fat by ablating subcutaneous adipose tissue and causing molecular vibrations that raise the temperature of local tissue and induce rapid cell necrosis, resulting in coagulative necrosis of the adipocytes and a reduction in the femoral neck circumference.

The research was restricted to the physical and psychological conditions of the patients that could influence their evaluation and treatment.

V. CONCLUSION

The following conclusion is warranted, given the limitations of this study

Finally, based on the earlier discussion of these findings and other investigators' reports in similar investigations. It can be explained by the fact that ultrasound cavitation was effective in reducing abdominal adiposity in the study's subjects. The results of cavitation on weight loss and waist circumference reduction, as well as pain threshold values for most painful points in the lumbar area and VAS and Oswestry disability index values, were all excellent.

The results of the current study would introduce a scientific applicable protocol to help physical therapists in their dealing with post natal LBP patients, organize a plan of care to overcome this problem and prevent the progression of it and the development of associated morbidities, including sleep disturbance and depression of patients and to improve those the patients' overall well-being.

REFERENCES


