The Effect of Central Weight Reduction on Body Mass Index in Obese Women Postnatal

ISMAIL H. ISMAIL, M.Sc.; AMEL YOUSSEF, Ph.D.; HANAN S. EL-MEKAWY, Ph.D.; MAGDY M. ABD EL-RAHMAN, M.D.; and SOZAN S. AL-TAHLAWY, M.D.

The Departments of Physical Therapy, Gynecology & Obstetrics, Radiology, El-Matarya Teaching Hospital and The Department of Physical Therapy Gynecology & Obstetrics, Faculty of Physical Therapy, Cairo University

Abstract

Background: Body Mass Index (BMI) has become a widely used tool for identifying overweight and obese individuals, it is the most commonly used indicator of health risks associated with overweight.

Objective: This study assessed the effect of central weight reduction on body mass index in obese women postnatal.

Methods: Fifty postpartum, multiparous obese women, with a bulged abdomen associated with diastasis recti more than 2.5 cm and less than 4 cm. Their ages ranged from 25-35 years, their body mass index ranged from 30.0 to 34.9 kg/m² and waist circumference was more than 88 cm, they divided randomly into two equal Groups (A & B), each of them consisted of 25 women, participants of Group (A) received low frequency non thermal ultrasound, faradic stimulation and abdominal exercise program. While participants of Group (B) received faradic stimulation and abdominal exercise program, three times per week for eight weeks.

Results: Showed that the combination of ultrasound, faradic stimulation and exercises characterized by a higher efficiency than faradic stimulation and exercises.

Conclusion: It could be concluded that there was a significant effect of central weight reduction on decreasing BMI in obese women postnatal.

Key Words: Obesity – Low frequency non thermal ultrasound – Faradic stimulation – Abdominal exercises.

Introduction

OBESITY is known as excess body fat, obesity depend on the amount of body fat to be specific as adipose tissue [1]. Adipose tissue is the major storage site of fat in the form of triglycerides. It is found in two forms, white adipose tissue and brown adipose tissue. The presence, amount, and distribution of each vary depending on the species [2].

Most health care professionals agree that men with more than 25 percent body fat and women with more than 30 percent body fat are obese [3]. Obesity may be peripheral, central, or combination of both. Peripheral obesity is deposition of excess fat in the buttock, hips, and thighs, but central obesity is deposition of excess fat in the abdominal area which is a dangerous place for fat to build up because it is closely located to the vital organs and their blood supply [4].

BMI is an index of weight to height (kg/m²), it has become a widely used tool for identifying overweight and obese individuals, and it is the most commonly used indicator of health risks associated with overweight and underweight [5].

Although waist circumference and body mass index are interrelated, waist circumference provides an independent prediction of risk over and above body mass index. The waist circumference at which there is an increased relative risk is defined as follow: Men >102 cm and women >88 cm [6].

It was proved that physical exercises affect physical fitness, subcutaneous fat reduction of different parts of body and reduce whole body weight [7]. Poorly executed abdominal exercises can cause an increase in intra-abdominal pressure, this force may cause recti separation and hernia [8]. Also faradic is a form of electrical stimulation that used for body contouring, slimming and toning. Each treatment session provides a form of passive muscle exercise [9].

Low-frequency non-thermal ultrasound used for body contouring. It causes cavitation effect where bubbles are created inside the cell, which swell and rupture, creating mechanical stress that
disrupts the adipose cell membrane and releases the stored triglyceride contents \[10\]. Although non thermal ultrasound is designed to disrupt tissue in only a narrowly defined target zone, cavitation generally is less predictable and harder to control than the thermal effects of ultrasound delivered at higher frequency and energy levels \[11\].

**Patients and Methods**

Fifty postpartum, multiparous obese women selected from outpatient clinic of Obstetrics and Gynecology, EL-Matarya Teaching Hospital after two months of normal vaginal delivery, they involved in the study from March 2014 to March 2015 All participants were divided randomly into two equal groups. Group (A) performed low frequency non thermal ultrasound, faradic stimulation and abdominal exercise program three times per week for eight weeks. Group (B) performed faradic stimulation and abdominal exercise program. Three times per week for eight weeks. All women signed a written consent forms approved by the Ethical Committee of the Faculty of Physical Therapy, Cairo University.

**Inclusion criteria:**
- All women had a bulged abdomen associated with diastasis recti more than 2.5cm and less than 4cm.
- Age ranged from 25 to 35 years.
- All women had given birth two to three times.
- BMI ranged from 30.0 to 34.9kg/m\(^2\).
- Waist circumference >88cm.
- All women were not be engaged in any organized sport activity.

**Exclusion criteria:**
- Woman less than 25 years and more than 35 years.
- Primipara and woman had given birth more than three times.
- BMI less than 30.0 and more than 34.9kg/m\(^2\).
- Waist circumference less than 88cm.
- Women had previous cesarean section, abdominal and/or back operations, abdominal skin diseases, spinal disorders.

**Instrumentation:**
- Weight height scale for measuring the weight and height in two groups before and after treatment program.
- A one centimeter wide measuring tape: To measure waist circumference in two groups before and after treatment program.
- Ultrasonic device (Body son 4, include four fixed heads and one movable head, model EME, made in Italy with a frequency of 3MHz) was used for participant of Group A.
- Faradic stimulation unit (computerized multi current device, two channels, model EME, made in Italy) was used for participant of both groups.

**Assessment procedures:**
- A full history was taken from each participant before starting the study.
- Weight and height were measured for each participant to calculate the BMI according to the following equation: $\text{BMI} = \frac{\text{Weight}}{\text{height}^2}$ (kg/cm\(^2\)).
- Waist circumference was measured for each participant from the waist, mid-way between palpated iliac crest and palpated lower rib margin at mid axillary line, while the subject in supine position. Measuring at least one hour after meal intake.

**Therapeutic procedures:**

**Volunteers of Group (A) received a program of:**
Ultrasound device was used for 20 minutes three times per week for a total period of 8 weeks aiming to remove fat at abdominal region. The woman was asked to assume a comfortable supine lying position, four heads were covered with gel and placed on the main bulged area at the abdominal region and wrapped in their position with straps.

**Volunteers of both groups received:**
Faradic stimulation unit was used for 30 minutes three times per week for a total period of 8 weeks. Before starting the treatment session, each woman asked to evacuate her bladder to make sure that she was relaxed. Then the woman was asked to assume a comfortable supine lying position. Stimulation performed bilaterally for the rectus abdominis muscles, four electrodes were covered with gel, each two electrodes formed a channel for stimulation and placed one on the origin of the muscle (at the anterior surface of pubic crest and front of symphsis pubis), while the other electrode placed on the insertion of the same muscle (along horizontal line into the anterior surface of xiphoid process and outer surface of 5,6 and 7 costal cartilages) the electrodes wrapped in their position with straps.
Traditional abdominal exercises which included sit up exercises, reverse sit-up exercise, reverse trunk twist exercise, and U-seat exercise was performed for 30 minutes three times per week for a total period of 8 weeks.

Results

In this study 50 postpartum, multiparous obese women were assigned randomly into equal two groups; Group A (n=25) their mean age was 29.12, mean waist circumference was 102.52 ± 6.482 cm, and mean BMI was 32.408 ± 1.059 kg/cm². Group B (n=25) their mean age was 29.33, mean waist circumference was 101 cm ± 6.238 cm, and mean BMI was 32.508 ± 1.356 kg/cm².

BMI of Group A which evaluated before treatment was ranged between 30.7 kg/cm² and 34.4 kg/cm² with a mean value of 32.408 ± 1.059 kg/cm². And after treatment was ranged between 29.9 kg/cm² and 33.2 kg/cm² with a mean value of 31.328 ± 1.093 kg/cm². There was highly significant (p=0.0009) difference in BMI of Group A before treatment when compared to after treatment values as shown in (Table 1 & Fig. 1).

Table (1): Mean value and SD of BMI of Group A before and after treatment.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>32.408</td>
<td>31.328</td>
</tr>
<tr>
<td>± Standard deviation</td>
<td>±1.059</td>
<td>±1.093</td>
</tr>
<tr>
<td>t-value</td>
<td>3.549</td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td>0.0009</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>HS</td>
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</tr>
</tbody>
</table>

H.S.: Highly Significant.

Fig. (1): Mean value and SD of BMI of Group A before and after treatment.

BMI of Group B which evaluated before treatment was ranged between 30.6 kg/cm² and 34.9 kg/cm² with a mean value of 32.508 ± 1.356 kg/cm². And after treatment was ranged between 29.5 kg/cm² and 34 kg/cm² with a mean value of 31.716 ± 1.350 kg/cm². There was significant (p=0.0439) difference in BMI of Group B before treatment when compared to after treatment values as shown in (Table 2 & Fig. 2).

Table (2): Mean value and SD of BMI of Group B before and after treatment.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>32.508</td>
<td>31.716</td>
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<tr>
<td>± Standard deviation</td>
<td>±1.356</td>
<td>±1.350</td>
</tr>
<tr>
<td>t-value</td>
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<tr>
<td>p-value</td>
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<td></td>
</tr>
<tr>
<td>Significance</td>
<td>S</td>
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</tr>
</tbody>
</table>

S.: Significant.

Fig. (2): Mean value and SD of BMI of Group B before and after treatment.

Waist circumferences of Group A which evaluated before treatment was ranged between 92 cm and 116 cm with a mean value of 102.52 ± 6.482 cm. And after treatment was ranged between 91 cm and 108 cm with a mean value of 96.38 ± 6.182 cm. There was highly significant (p=0.0013) difference in waist circumferences of Group A before treatment when compared to after treatment values as shown in (Table 3 & Fig. 3).

Table (3): Mean value and SD of waist circumferences of Group A before and after treatment.

<table>
<thead>
<tr>
<th>Waist circumference</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>102.52</td>
<td>96.38</td>
</tr>
<tr>
<td>± Standard deviation</td>
<td>±6.482</td>
<td>±6.182</td>
</tr>
<tr>
<td>t-value</td>
<td>3.428</td>
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</tr>
<tr>
<td>p-value</td>
<td>0.0013</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>HS</td>
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</tbody>
</table>

Fig. (3): Mean value and SD of waist circumferences of Group A before and after treatment.
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Fig. (3): Mean value and SD of waist circumferences of Group A before and after treatment.

Waist circumferences of Group B which evaluated before treatment was ranged between 90.5cm and 114cm with a mean value of 101cm ±6.238cm. After treatment was ranged between 87cm and 110cm with a mean value of 97.6 ±6.315cm. There was no statistically significant \( (p=0.0614) \) difference in waist circumferences of Group B before treatment when compared to after treatment values as shown in (Table 4 & Fig. 4).

Table (4): Mean value and SD of waist circumferences of Group B before and after treatment.

<table>
<thead>
<tr>
<th>Waist circumference</th>
<th>Before treatment</th>
<th>After treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>101</td>
<td>97.6</td>
</tr>
<tr>
<td>± Standard deviation</td>
<td>±6.238</td>
<td>±6.315</td>
</tr>
<tr>
<td>( t )-value</td>
<td>1.915</td>
<td></td>
</tr>
<tr>
<td>( p )-value</td>
<td>0.0614</td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

N.S.: Non Significant.

Fig. (4): Mean value and SD of waist circumferences of Group B before and after treatment.

Discussion

The effect of central weight reduction on body mass index in obese women was studied postnatal. There was highly significant \( (p=0.0009) \) decrease in BMI of Group A before treatment when compared to after treatment values, and there was significant \( (p=0.0439) \) difference in BMI of Group B before treatment when compared to after treatment values.

Nikzad studied circumstance abdomen of 20 subjects in an exercise program for eight weeks and five days a week. After conducting the protocols of training the extent of their abdomen, chest and shoulder fat were determined. The results showed a significant addition in the density of the body and a significant decrease in the subcutaneous fat in subjects [12].

Moreno-Moraga et al., reported that ultrasound at cavitation is the method in handling obesity, especially in destroying fat and shaping a particular part of the body [13].

Livia et al., reported that the effectiveness of low frequency ultrasound in reducing localized fat deposits was represented by a reduction in the body contour exclusively in the treated areas as there were no significant changes in the control area (hip circumference), body weight, or BMI during the study and there was a significant reduction of 1.5cm in the waist circumference \( (p=0.032) \) [14].

In contradiction Maha Saber et al., reported that, either sham ultrasound cavitation or low frequency ultrasound cavitation has no significant differences regarding weight loss at the end of sessions and diet program of the study [15].

Ascher reported that, non thermal ultrasound may be appropriate for nonobese patients (body mass index B 30) with focal adiposity [16].

The results of the current study are also supported by Mark et al., (2011) who reported that in clinical trials, a single treatment of low frequency ultrasound reduced mean waist circumference by 1.3-2.5cm. And three treatments reduced waist circumference by 2.3-3.5cm [17].

Said, reported that abdominal exercise program produces a statistically highly significant decrease in body weight, rectus diastasis, BMI, and waist circumference [18].

Wallner et al., reported that, the use of subcutaneous adipose tissue topography (SAT- Top) is
more effective than BMI in assessing obesity in physically active people and young adults. These results suggest that subcutaneous fat patterns are a better screening tool to characterize fatness in physically active young people [19].

So, it could be concluded that there was a significant effect of central weight reduction on decreasing BMI in obese women postnatal.

References

المختصر العربي

مقدمة: يستخدم مؤشر كتلة الجسم في تحديد زيادة في الوزن والسمنة ويعتبر مؤشر للمخاطر الصحية المصاحبة للزيادة في الوزن.

الهدف: أجريت الدراسة الحالية للتحديد تأثير إنقاص الوزن المركزى في السيدات البدينات بعد الولادة على مؤشر كتلة الجسم.

الأساليب: اشتركت في هذه الدراسة خمسون سيدة بدينة بعد الولادة صلة رائدة من سمنة موضعية في البطن وتباعد بين عضلات البطن المستقيمين مسافة أكثر من 2 سم وأقل من 8 سم وقد تراوح أعمارهن بين 20-25 سنة ومؤشر كتلة الجسم من 0.24 كغم/م2 إلى 0.24 كغم/م2. ودوام الوسط أكثر من 18 سنة وقد تم تقسيمهم عشوائياً إلى مجموعتين مشابهتين. تكمن كل منهما من خمس وبعضين سيدة.

المجموعة الأولى تلتقت برنامج الموجات فوق الصوتية بشكل ثلاث جلسات أسبوعياً إلى جانب تربية للعضلات وتمارين للبطن لمدة أربع وعشرون جلسة. المجموعة الثانية تلتقت برنامج تربية للعضلات وتمارين للبطن خلال فترة الدراسة.

النتائج: وأوضحت النتائج أن العلاج بالأوجات فوق الصوتية مع تربية للعضلات وتمارين البطن أكثر فاعلية من تربية للعضلات وتمارين البطن فقط.

المراجعة: يُنصح من هذه النتائج أن إنقاص الوزن له تأثير فعال على تقليل مؤشر كتلة الجسم لدى السيدات البدينات بعد الولادة.