Effect of Abdominal Fat Reduction on Stress Urinary Incontinence

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ABSTRACT

This study was conducted to determine the effect of the abdominal fat reduction on the symptoms of stress urinary incontinence. Thirty patients suffering from mild and moderate degree of stress urinary incontinence (diagnosed by certificated gynecologist) from Said Galal University Hospital, shared in this study between April and December 2012. Their ages ranged from 35 to 55 years old, their body mass index were exceeding 30 Kg/m^2 representing all types of obesity, Class I (30-34.9 Kg/m^2), Class II (35-39.9 Kg/ m^2) and Class III (more than 40 Kg/ m^2). All patients did not receive any other treatment method for stress urinary incontinence before or during participation in this study. They were treated by using low frequency ultrasound machine, used twice weekly for 6 weeks for 12 sessions. Weight, BMI, Waist circumference, Fat folds, Pad weight and number of episodes were evaluated for all patients before and after treatment. Results showed that there was a significant decrease in patients' weight and BMI after treatment. The percentage of improvement was 4.01 % & 4.02 % respectively (improved). Also results showed a significant improvement in waist circumference between pre and post treatment. The percentage of improvement was 7.6%. There was a significant decrease in fat fold at mid axillary point (MA), Abdominal point (Abd) and at suprailiac point (SI). The percentage of improvement was (8.01%, 19.73% and 14.48%) respectively. There was a significant decrease in pads weight between before treatment and after treatment as the percentage of improvement was 19.03 %. There was a significant difference of number of episodes between before and after treatment as the percentage of improvement was 12.2%. Accordingly, it could be concluded that abdominal fat reduction is very effective therapeutic modality in reducing the symptoms of stress urinary incontinence; so, it can be considered as an alternative as well as, adjacent method for treating such cases.

Key words: *Abdominal fat reduction, Stress Urinary Incontinence, Low frequency ultrasound.*

INTRODUCTION

Rising obesity rates around the world have had a profound impact on female reproductive health. Obesity can aggravate symptoms of pelvic organ prolapse, stress urinary incontinence and increase the risk of endometrial polyps and symptomatic fibroids[19]. Weight reduction enhanced reproductive outcomes, diminished symptoms of urinary incontinence and reduced morbidity following gynecological surgery. Urinary incontinence is a common problem in Egypt and its prevalence rates are higher when compared to other reports[1].

The pathophysiology of urinary incontinence during stress is complex, involving passive mechanisms such as urethral hypermobility, intrinsic sphincteric deficiency or abnormal urethral compliance and active mechanisms, such as voluntary or reflex contraction of per urethral and pelvic muscles[5].

The epidemiological literature on the urinary incontinence with respect to overweight and obesity confirmed them as risk and causal factors for this condition. In addition, an attempt was made to identity and assesses all relevant longitudinal studies, prospective case series and trials whatever design. It was found that the epidemiological studies document overweight and obesity as an important risk factor for urinary incontinence. There is now valid documentation for weight reduction as a treatment for urinary incontinence in women[11].

Morbid obesity is associated with urinary incontinence. The prevalence of fecal incontinence among morbidly obese women may be much higher than the rates reported in the general population. Fecal incontinence has adverse effects on quality of life. Its correlation with urinary incontinence suggests

that morbid obesity may pose a risk of global pelvic floor dysfunction[24].

Initial weight loss improves urinary incontinence in overweight and obese women. It was reported that weight loss intervention reduced the frequency of stress incontinence episodes through a year and improved patient satisfaction with changes in incontinence through a year and a half and ensure that, improving weight loss maintenance may provide longer term benefits for urinary incontinence[25].

Liposonix was considered to be a non-surgical treatment for body contouring that uses high-intensity focused ultrasound to disrupt adipocytes percutaneously. The average circumference reduction after treatment of the abdomen and waist is 4-5 cm. Liposonix turns out to be a safe and effective technique for non-surgical body sculpting by reduction of fat deposits which were ensured by Fatemi, (2009)[6].

High-intensity focused ultrasound presents a noninvasive approach to body sculpting for non-obese patients. Jewell et al., (2011)[12] confirmed that treatment with this high-intensity focused ultrasound device reduced waist circumference and was generally well tolerated for noninvasive body sculpting.

The risks of currently available invasive procedures in body contouring motivate a need for safer and non-invasive technologies. A new device has been developed that uses focused therapeutic ultrasound to reduce adipose tissue non-invasively. In addition, (Moreno-Moraga et al., 2007)[14] had showed a significant reduction in subcutaneous fat thickness within the treated area. The mean reduction in fat thickness after three treatments was nearby 2.28+/-0.80 cm. No adverse effects were observed.

Obesity is a recognized contributing factor to urinary incontinence in elders. Recently, epidemiological, as well as, clinical studies have reported that obesity is related to a higher risk for UI, but this within only one systemic review[13].

Adiposity and weight gain seem to be strong independent risk factors for incontinence development in middle-aged women[23].

Among overweight and obese women with type II diabetes; UI is highly prevalent and far exceeds the prevalence of other diabetes complications[22].

Foldspang and Mommsen, (2008)[9] studied the possible role of obesity in the etiology of adult female urinary incontinence. A random population sample of 3114 women aged 30-59 were sent a postal questionnaire concerning urinary incontinence and, among other things, body weight and height. The overall response rate was 85%, and the present analysis comprises 2589 women who gave information about their body weight and height. BMI interacted with childbirth in predicting stress UI prevalence, with cystitis in predicting urge UI, and with both in predicting mixed UI. Stress UI turned out to be the UI type most closely associated with BMI. In obese and overweight women enrolled in a clinical trial done by Subak et al., (2012)[21] on weight loss for urinary incontinence had found that incontinence management cost decreased by 81% at 18 months and was strongly and independently associated with decreasing incontinence frequency.

338 overweight and obese women with at least 10 urinary-incontinence episodes per week randomly assigned to an intensive 6-month weight-loss program that included diet, exercise, and behavior modification (226 patients) or to a structured education program (112 patients). A 6-month behavioral intervention targeting weight loss reduced the frequency of self-reported urinary-incontinence episodes among overweight and obese women as compared with a control group. A decrease in urinary incontinence may be another benefit among the extensive health improvements associated with moderate weight reduction[8].

There were highly significant trends of increasing risk of UI with increasing BMI and waist circumference. When BMI and waist circumference were included in models simultaneously, BMI was associated with urge and mixed UI (P for trend 0.003 and 0.03, respectively), but not stress UI (P for trend 0.77). Waist circumference was associated only with stress UI (P for trend <0.001). These results suggest that women who avoid high

BMI and waist circumference may have a lower risk of UI development[23].

SUBJECTS MATERIAL AND METHODS

Thirty women were suffering from mild and moderate degrees of stress urinary incontinence diagnosed by certificated gynecologists and suffer from abdominal obesity had selected randomly from Said Galal University Hospital in Cairo between April and December 2012, Their ages were ranged between 35-55 years. Their body mass indexes were exceeding 30 Kg/ m^2 representing all types of obesity, Class I (30-34.9 Kg/ m^2), Class II (35-39.9 Kg/ m^2) and Class III (more than 40). All patients were not receiving any other treatment method for stress urinary incontinence before participating in the present study. Weight-Height Scale (Healthy scale 160 kg) was used for measuring the body weight and BMI. A traditional tape divided to inches and centimeter was used for measuring waist circumference before starting the treatment also med of the treatment (after 3 weeks) and after 6 weeks of treatment. Computerized skin fold caliper was used for measuring the fat percentage in local areas at the beginning of the study and after the end of treatment. Electronic glass weight scale to weight the pad before and after using it for 24 hours (EK-12 Kinlee), which were weighted before and after using of the pad for 24 hours at 10 Am. This evaluation was done before starting the treatment also med of the treatment after 3 weeks and at the end of treatment after 6 weeks (Fig. 1).

Fig. (1): Electronic glass weight scale.

Female care pad weighted before and after use it for 24 continues hours. We use it to evaluate the case of the incontinence depending on the amount of urine leakage per gram. The original weight for the pad is 14g. We weight the pad before starting the treatment also med of the treatment after 3 weeks and at the end of treatment after 6 weeks.

Low frequency ultrasound machine:

By using low frequency ultrasound machine, the patient completely relaxed in supine lying position. The session was applied on the abdominal area, starting by the ultrasound head, power 2.50w/cm^2, emission type / combined, vacuum 50%, modulation 20 KHz and session time were 25minuts. We used the vacuum head to stimulate lymphatic drainage for 10 minutes. This had been used twice weekly for 6 weeks for 12 sessions, Fig. (2).

Fig. (2): Low frequency ultrasound machine.

The Student t- test was used to compare between pre and post treatment results and Chi-square test was used to compare qualitative variables.

RESULTS

A- Body weight:

Table (1), Fig. (3) demonstrated the body weight pre and post treatment. There was a significant difference in the paired t-test between pre and post treatment in body weight as the mean value of pre treatment was (98.31± 9.07) and for post treatment was (94.36±9.26) where the t-value was (14.02) and P-value was (0.0001). The percentage of improvement was 4.01 %.

Table (1): Mean and ±SD, t and P values of body weight pre and post treatment.

Body weight	Pre treatment	Post treatment
Mean	98.31	94.36
±SD	±9.07	±9.26
Mean difference	3.95	
Percentage of improvement	4.01 %	
t-value	14.02	
P-value	0.0001	
S	S	

*SD: standard deviation, P: probability, S: significant

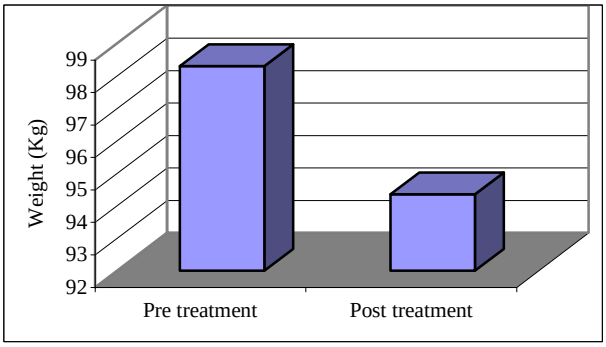

Fig. (3): Mean and ±SD of body weight pre and post treatment.

B- BMI:

Table (2) Fig. (4) demonstrated the BMI pre and post treatment. There was a significant difference in the paired t-test between pre and post treatment in BMI as the mean value of pre treatment was (38.97± 3.99) and for post treatment was (37.4±3.95) where the t-value was (13.27) and P-value was (0.0001). The percentage of improvement was 4.02 %.

Table (2): Mean and ±SD, t and P values of BMI pre and post treatment.

BMI	Pre treatment	Post treatment
Mean	38.97	37.4
±SD	±3.99	±3.95
Mean difference	1.57	
Percentage of improvement	4.02 %	
t-value	13.27	
P-value	0.0001	
S	S	

*SD: standard deviation, P: probability, S: significant.

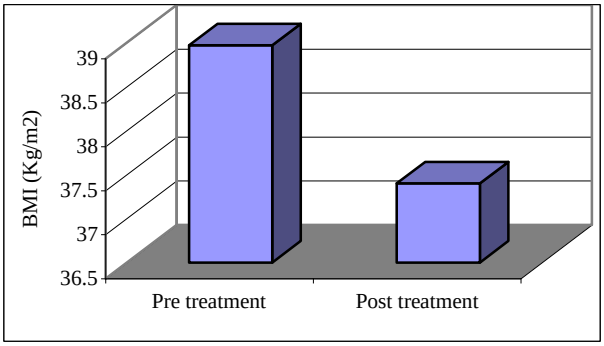

Fig. (4): Mean and ±SD of BMI pre and post treatment.

C- Fat fold:

Table (3) Fig. (5) demonstrated the fat fold at MA, Abd and SI point pre and post treatment. There was a significant difference in the paired t-test between pre and post treatment in fat fold at MA, Abd and SI as the t-value was (5.95, 14.55 and 12.37 respectively) and P-value was (0.0001). The percentage of improvement was (8.01%, 19.73% and 14.48% respectively).

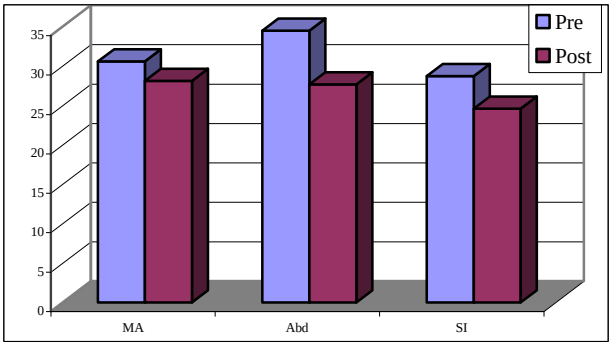

Fig. (5): Mean and ±SD of fat fold at MA, Abd and SI points pre and post treatment.

Table (3): Mean and ±SD, t and P values of fat fold at MA, Abd and SI points pre and post treatment.

Fat fold	MA		Abd		SI	
	Pre treatment	Post treatment	Pre treatment	Post treatment	Pre treatment	Post treatment
Mean	30.55	28.1	34.45	27.65	28.71	24.55
±SD	±6.38	±6.05	±6.29	±5.32	±6.16	±6.53
Mean difference	2.45		6.8		4.16	
Percentage of improvement	8.01 %		19.73 %		14.48 %	
t-value	5.95		14.55		12.37	
P-value	0.0001		0.0001		0.0001	
S	S		S		S	

*SD: standard deviation, P: probability, S: significant.

D- Waist circumference:

Fig. (6) demonstrated that there was a significant difference between waist circumference pre treatment and mid treatment as t-value was (6.56) and p-value was (P<0.001), there was significant difference between waist circumference pre treatment and post treatment value as t-value was (11.99) and p-value was (P<0.001), and finally there was a significant difference between waist circumference mid treatment and post treatment value as t-value was (5.42) and p-value was (P<0.001).

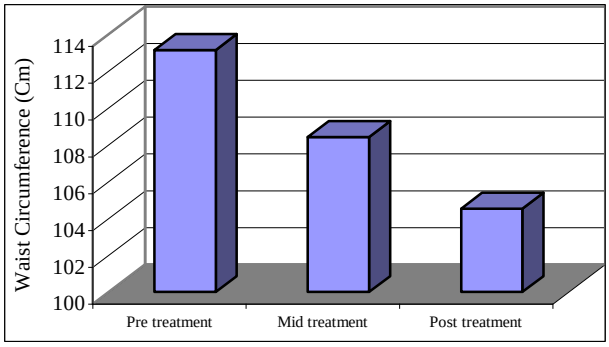

Fig. (6): Mean and ±SD of waist circumference pre treatment, mid treatment, and post treatment.

Repeated measurement ANOVA revealed that, there was a significant decrease in waist circumference as the F value was 72.1 and P-vale was (0.0001).

Table (4): Repeated measurement ANOVA of waist circumference pre treatment, mid treatment, and post treatment.

Source of variation	SS	MS	F	P	S
Within subjects	1117.0	558.52			
Between subjects	6813.6	234.95	72.1	0.0001	S
Error	449.29	7.74			

*SS: Sum of square, MS: Mean square, S: significant

E- Pad weights:

Fig. (7) demonstrated that there was a significant difference between pad weights pre treatment and mid treatment as t-value was (3.53) and p-value was (P<0.01), there was significant difference between pad weights pre treatment and post treatment value as t-value was (8.85) and p-value was (P<0.001), and finally there was a significant difference between pad weights mid treatment and post treatment value as t-value was (5.32) and p-value was (P<0.001).

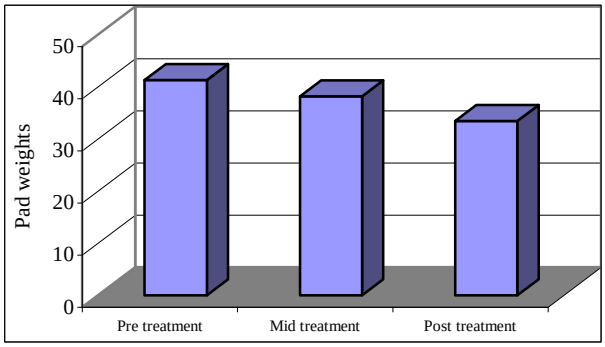

Fig. (7): Mean and ±SD of pad weights pre treatment, mid treatment, and post treatment.

Repeated measurement ANOVA revealed that, there was a significant change in pad weights as the F value was 39.74 and P-vale was (0.0001).

Table (5): Repeated measurement ANOVA of pad weights pre treatment, mid treatment, and post treatment.

Source of variation	SS	MS	F	P	S
Within subjects	936.87	468.44			
Between subjects	9550.8	329.34	39.74	0.0001	S
Error	683.63	11.78			

*SS: Sum of square *MS: Mean square *S: significant

F- Number of episodes:

Fig. (8) demonstrated that there was a significant difference between number of episodes pre treatment and mid treatment as t-value was (8.05) and p-value was (P<0.001), there was significant difference between number of episodes pre treatment and post treatment value as t-value was (11.6) and P-value was (P<0.001), and finally there was a significant difference between number of episodes mid treatment and post treatment value as t-value was (3.54) and p-value was (P<0.01).

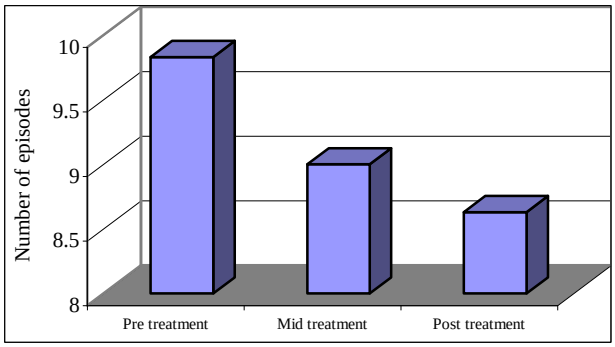

Fig. (8): Mean and ±SD of number of episodes pre treatment, mid treatment, and post treatment.

Repeated measurement ANOVA revealed that, there was a significant change in number of episodes as the F value was 70.66 and P-vale was (0.0001).

Table (6): Repeated measurement ANOVA of number of episodes pre treatment, mid treatment, and post treatment.

Source of variation	SS	MS	F	P	S
Within subjects	22.68	11.34			
Between subjects	225.82	7.78	70.66	0.0001	S
Error	9.31	0.16			

*SS: Sum of square *MS: Mean square *S: significant

DISCUSSION

Wing et al., (2010)[26] stated that weight losses between 5% and 10% of body weight were sufficient for significant urinary incontinence benefits. In obese and overweight women enrolled in a clinical trial done by Subak et al., (2012)[21] on weight loss for urinary incontinence had found that incontinence management cost decreased by 81% at 18 months and was strongly and independently associated with decreasing incontinence frequency.

Results of this study showed that there is a significant decrease in patients' weight and BMI after treatment. The percentage of reduction was 4.01 % & 4.02 % respectively. As well as, regarding waist circumference pre and post treatment in the present study, the statistical analysis of results showed a significant improvement in waist circumference between pre, mid and post treatment.

The results regarding fat folds at MA (mid axillary line point), Abd. (abdominal point beside umbilicus) and at SI (suprailiac point) pre and post treatment showed that there was significant difference between pre and post treatment fat folds. The percentage of improvement was (8.01%, 19.73% and 14.48%) respectively. Regarding the pad weight the statistical analysis of results showed a significant improvement in the pad weight between pre, mid and post treatment.

Finally, regarding the number of episodes, there was a significant difference of number of episodes between before treatment, mid and post treatment.

Subak et al., (2005)[20] agreed with this study when they conduct controlled clinical trial on a total of 48 women were randomized and 40 were assessed 3 months after randomization. Women in the immediate intervention group had a 16 kg weight reduction compared with 0 kg in the control group. The immediate intervention group experienced a 60% reduction in weekly UI episodes compared with 15% in the control group and had greater improvement in quality of life scores. Stress and urge incontinent episodes decreased in the immediate intervention vs control group. Following the weight reduction program the control group experienced a similar median reduction in weekly UI episodes (71%). Among all 40 women mean weekly UI episodes decreased 54% after weight reduction and the improvement was maintained for 6 months. Weight reduction is an effective treatment for overweight and obese women with UI. Weight loss of 5% to 10% has an efficacy similar to that of other nonsurgical treatments and should be considered a first line therapy for incontinence.

Burgio et al., (2007)[3] agreed with this study. They confirmed that the prevalence of UI and fecal incontinence decreased after bariatric surgery. Magnitude of weight loss was associated with reduction in UI prevalence, strengthening the inference that improvements are attributable to weight loss. Mean BMI decreased from 48.9+/-7.2 pre surgery to 35.3+/-6.5 at 6 months and 30.2+/-5.7 at 12 months post surgery. Prevalence of UI decreased from 66.7% pre surgery to 41.0% at 6 months and 37.0% at 12 months. Reduction in prevalence of UI was significantly associated with decreases in BMI (P=.01).

The results of this study agreed with that of Moreno-Moraga et al., (2007)[14] who showed the efficacy and safety of focused ultrasound, using the UltraShape Contour I, as a non-invasive transdermal method for reducing unwanted fat deposits in the body. All patients in his study showed significant reduction in subcutaneous fat thickness within the treated area. The mean reduction in fat thickness after three treatments was 2.28+/-0.80 cm. Circumference was reduced by a mean of 3.95+/-1.99 cm. Weight was unchanged during the treatment and follow-up period. No adverse effects were observed. Efficacy was determined by change in fat thickness, assessed by ultrasound measurements, and by circumference measurements.

The results of the present study are supported by the work done by Hunskaar, (2008)[11] who confirmed that weight reduction found to be now a valid documented treatment for urinary incontinence in women.

The results of this study are supported by the work of Shilpi and Siladitya, (2010)[19] who

stated that obesity can aggravate symptoms of stress urinary incontinence. Also, There was an agreement with that obesity is a recognized contributing factor to urinary incontinence in older women and men according to Larrieu et al., (2004)[13] and correlates with Wasserberg et al., (2008)[24] who confirmed that morbid obesity is associated with urinary incontinence. Thus, ensures the study generalizability so may apply to different populations such as young elderly patients attending healthcare facilities, those from different ethnic groups and even higher risk elderly patients.

Coleman et al., (2009)[4] agreed with this study. They found that numerous nonsurgical techniques and devices have sought to reproduce the effectiveness of liposuction. Unfortunately, the vast majority of these has fallen short of adequate results or has been plagued with complications. Non thermal ultrasonic energy is able to produce cavitation leading to fat cell lysis while sparing adjacent blood vessels and nerves. Although the results are not equivalent to surgical results, this device will offer a safe and effective alternative for patients who are apprehensive about undergoing liposuction.

Fatemi (2009)[6] agreed with our results. He confirmed that Liposonix is considered to be a nonsurgical treatment for body contouring that uses high-intensity focused ultrasound (HIFU) to disrupt adipocytes percutaneously. The histologies show clearly that adipocytes are disrupted by HIFU. The pathologies show the lesions, but they are always at a safe distance from dermis or the epidermis. The correlation between focal depth, energy levels, and clinical results is evident. The average circumference reduction after treatment of the abdomen and waist is 4-5 cm. Liposonix turns out to be a safe and effective technique for nonsurgical body sculpting by reduction of fat deposits.

Roberson et al., (2010)[17] agreed with our study. They confirmed that morbidly obese women have markedly high rates of urinary and fecal incontinence. Weight loss reduces prevalence and severity of urinary incontinence; however, the effect of weight loss on fecal incontinence is unknown.

Antonella et al., 2010[2] agreed with our study, he found that the non-invasive transdermal focused ultrasound is an alternative method for body contouring that is gaining interest both in patients and physicians. They reported on a controlled clinical study assessing the safety and efficacy of a new therapeutic ultrasound device for non-invasive body contouring named Proslimelt (Promo Italia Group s.p.a, Pozzuoli, Italy). A prospective study was conducted on 50 healthy patients (37 female and 13 males). The evaluation period lasted 8 consecutive weeks at the frequency of 1 session every 15 days for a mean total of 3.37 sessions. Results were assessed immediately after completion of the treatment protocol. Area treated were the abdomen, the ankles, the arms, the buttocks and inner and outer thighs. Efficacy was determined by subjective and objective determinations. All patients showed significant reduction in subcutaneous fat thickness within the treated area determined both by subjective and objective evaluation. Interestingly, weight was unchanged during the treatment and follow up period.

The results of this study agreed with West et al., (2010)[25] who reported that weight loss intervention reduced the frequency of stress incontinence episodes through a year and improved patient satisfaction with changes in incontinence through a year and a half and ensure that, improving weight loss maintenance may provide longer term benefits for urinary incontinence.

Townsend et al., (2011)[23] agreed with the result of this study. They found that overall body fat and central adiposity may reflect different mechanisms leading to urinary incontinence (UI). They examined the associations of BMI and waist circumference with incident UI, including the independent associations of BMI and waist circumference with UI type. There were highly significant trends of increasing risk of UI with increasing BMI and waist circumference. Waist circumference was associated only with stress UI. These results suggest that women who avoid high BMI and waist circumference may have a lower risk of UI development.

Qiu et al., (2011)[16] agreed with our study as they found that BMI was positively

associated with urinary incontinence and the association was mainly observed for stress urinary incontinence. A positive association between stress incontinence and waist circumference was observed for women who had waist circumference between 70 cm and 75 cm compared to waist circumference less than 70 cm. Recreational physical activity was inversely associated with overall and mixed urinary incontinence. A significant interaction between physical activity and waist circumference was found for overall and stress incontinence.

The results of this study agreed with that of Gadsden et al., (2011)[10] who confirmed that HIFU (high-intensity focused ultrasound) appeared to provide a safe mean for removing and remodeling unwanted deposits of abdominal subcutaneous adipose tissue (SAT) over the course of three studies evaluating the safety of the HIFU device for ablating human SAT.

Jewell et al., (2011)[12] confirmed our results when he used a preclinical swine model; he found that the controlled thermal effect of HIFU appears to provide a safe and effective means for ablating subcutaneous adipose tissue. The application of HIFU energy levels of 166 to 372 J/cm² generated tissue temperature approaching 70°C, which was restricted to the focal area. Application of 68 and 86 J/c m² did not produce clinically-significant changes in serum liver function tests, free fatty acids, or cholesterol. Gross examination of tissue from various organs showed no evidence of fat emboli or accumulation. Histology demonstrated well-preserved vasculature and intact nerve fibers within the HIFU focal area. Following treatment with 85.3 to 270 J/ cm², normal healing response included the migration of macrophages into the damaged tissue and removal of disrupted cellular debris and lipids.

Palumbo et al., (2011)[15] agreed with this study. They confirmed that the effects of a new low frequency, high intensity ultrasound technology on human adipose tissue ex vivo were studied. In particular, they investigated the effects of both external and surgical ultrasound-irradiation (10 min) by evaluating, other than sample weight loss and fat release, also histological architecture alteration as well apoptosis induction. The results suggest that, both transcutaneous and surgical ultrasound exposure caused a significant weight loss and fat release.

The results revealed at this study were correlated with the clinical trial done by Subak et al., (2012)[21] on weight loss for urinary incontinence who found that incontinence management was strongly and independently associated with decreasing incontinence frequency. These results confirmed that women who avoid high BMI and waist circumference may have a lower risk of UI development.

Shek et al., (2009)[18] had a different result when they found that focused ultrasound is not effective for non-invasive body contouring among Southern Asians as compared with Caucasian. Such observation is likely due to smaller body figures. Design modifications can overcome this problem and in doing so, improve clinical outcome. The overall satisfaction amongst subjects was poor. Objective measurements by ultrasound, abdominal circumference, and caliper did not show significant difference after treatment.

Conclusion:

On the basis of the data obtained in the present study, it could be concluded that abdominal fat reduction as a form of physical therapy is very effective therapeutic modality in reducing the symptoms of stress urinary incontinence, so, it can be considered as an alternative as well as, adjacent method for treating such cases.

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الملخص العربي

تأثير انخفاض دهون البطن على سلس البول الاجهادي

أجريت هذه الدراسة لمعرفة تأثير انخفاض دهون البطن على أعراض مرض سلس البول الاجهادي لدى السيدات. وقد شارك في هذه الدراسة ثلاثون مريضة مصابات بالدرجة الخفيفة و المتوسطة من مرض سلس البول الاجهادي من مستشفى سيد جلال الجامعي بمحافظة القاهرة وقد تم تشخيصهن بواسطة أطباء نساء وتوليد مؤهلين وذلك فى الفترة من أبريل الى ديسمبر سنة 2012. تراوحت أعمارهن بين 35 إلى 55سنة ومؤشر كتلتهن الجسدي يتعدى 30 كجم/ المتر المربع. تشمل العينة مختلف أنواع السمنة النوع I (من 30 إلى 34.9 كجم/ المتر المربع) النوع II (من 35 إلى 39.9 كجم/ المتر المربع) النوع III (اكتر من 40 كجم/ المتر المربع). لم تتعاطى أى مريضة أى علاج للمرض قبل أو أثناء المشاركة فى هذه الدراسة. تم علاجهن بواسطة جلسات موجات فوق صوتية منخفضة التردد(12 جلسة لمدة 6 أسابيع) بواقع جلستين أسبوعيا . وقد تم متابعة كلا من الوزن ، مؤشر كتلتهن الجسدية ، محيط الخصر ، طيات الدهون ، وزن المتسرب من البول وعدد مرات تسرب البول قبل وبعد إجراء الدراسة . أوضحت نتائج الدراسة أن هناك نقصان ذو دلالة إحصائية فى الوزن و مؤشر الكتلة الجسدية و كانت نسبة التحسن 4.01% و4.02% على الترتيب.كما أوضحت نتائج الدراسة أن هناك تحسن ذو دلالة إحصائية فى محيط الخصر حيث كانت نسبة التحسن 7.6%. كما أوضحت نتائج الدراسة أن هناك نقصان ذو دلالة إحصائية فى طيات الدهون (وسط خط الإبط الواصل لعظمه الحرقفة ، وسط البطن وأعلى عظمه الحرقفة) وكانت نسبة التحسن 8.01% و19.73% و14.48% على الترتيب . كما أوضحت نتائج الدراسة أن هناك نقصان ذو دلالة إحصائية عالية فى الوزن المتسرب من البول حيث كانت نسبة التحسن 19.03% . كما أوضحت نتائج الدراسة أن هناك نقصان ذو دلالة إحصائية فى عدد مرات تسرب البول حيث كانت نسبة التحسن 12.2% . وهكذا يمكن أن نستخلص أن بتخفيض دهون البطن كإحدى وسائل العلاج الطبيعي يعد آلية ذات كفاءة عالية في تقليل أعراض سلس البول الإجهادى لدى السيدات و بالتالى يمكن اعتبارها طريقة علاجية بديلة أو مساعده لعلاج هذه الحالات .

الكلمات الدالة : انخفاض دهون البطن – سلس البول اللإجهادى لدى السيدات -موجات صوتية منخفضة التردد .