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Effect of Electro Acupuncture on Body Fat in Obese Postmenopausal Women

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ABSTRACT

Objective: *This study was conducted to detect the efficacy of electrical acupoint stimulation on body fat composition (body mass index, waist hip ratio & body fats %) in obese postmenopausal women.* ***Subjects:*** *Twenty obese postmenopausal women participated in this study. Their ages ranged from 50 to 60 years old. Their body fats % were greater than 30%, waist hip ratio was greater than 0.85, body mass index was greater than 30 kg/m².* ***Methods:*** *They received electrical acupoints stimulation treatment, 30 min./session, twice per week, for 12 weeks. Body mass index, Waist hip ratio and Body Fat % values were measured before as well as at the 4ᵗʰ, 8ᵗʰ, and 12ᵗʰ weeks after application of treatment method.* ***Results:*** *The obtained results showed a statistically highly significant (P< 0.01) decrease in body mass index, waist hip ratio, and body fat %.* ***Conclusion:*** *Accordingly, it could be concluded that electrical acupoints stimulation was very effective in reducing body fat composition (body mass index, waist hip ratio and body fats %) in obese postmenopausal women.*
Key words: *Body fat composition, Electrical acupoints stimulation, Obesity, Postmenopausal women.*

INTRODUCTION

Menopause is defined as a permanent interruption of menstruation, because of limited endometrial stimulation by estrogens and the end of the ovarian follicles .The estrogen reduction happened especially during the first year of amenorrhea (Rannevik et al., 1986). Estradiol levels being reduced to near 75% in postmenopausal period than menstrual women (Barret and Stuenkel., 1999).

The Increase in Adiposity during menopause seemed to be a consequence of the decline in endogenous estrogens and reduced energy expenditure (Sowers et al., 2007 & Ferrara et al., 2002).

The autonomic nervous system plays an important role in the regulation of energy expenditure and body fat storage (Peterson et al., 1998 &Van Baak et al., 2001).

Redistribution of body fat with increased visceral fat is believed to correlate with increased prevalence of metabolic syndrome, and consequently, cardiovascular disease in postmenopausal women (Park et al., 2003 & Carr, 2003).

Sympatho-vagal activity has also been observed in women after menopause (Gao et al., 1996) and, this is associated with higher body fat content, blood pressure and blood lipid concentrations in postmenopausal women (Kimura et al., 2006).

Acupuncture has been applied extensively around the world as an alternative treatment to reduce body weight; both auricular and somatic acupoints have been shown to be effective in the acupuncture treatment of obesity (Cho et al., 2009).

The underlying mechanisms of acupuncture in weight reduction might result from reducing appetite (Shiraishi et al., 1995) and mobilizing the body energy depots through lipolytic effect (Shiraishi et al., 2003).

The treatment principles of traditional Chinese medicine for obesity are reinforcing Qi, the primary acupoints used in this study were Zusanli (ST 36) and Sanyinjiao (SP 6). The Zusanli was used for improving the stomach and invigorating the spleen to remove dampness and phlegm. The sanyinjiao was used for eliminating water and dampness. Stimulation of acupoints improves Qi and blood circulation (Dong et al., 2009) and subsequently activates the metabolism to increase energy consumption (Li, 1999).

This study was performed to determine the effect of electrical acupoint stimulation on body fat composition in obese postmenopausal women.

SUBJECTS, MATERIAL AND METHODS

Twenty obese postmenopausal women were selected from gynecological out patient clinic at EL- Haram Hospital .Their menopause started since one year ago, their ages ranged from 50 to 60 years old. Their body fats were greater than 30%, waist hip ratio was greater than 0.85, body mass index was greater than 30 kg/m². All women were free from any gynecological disease or gynecological operations including hysterectomy and/or oophoroctomy, cancer, cardiac arrhythmia or an implanted cardiac pacemaker, diabetis mellitus, decreased sensation.

Informed consent form had been signed from each subject before entry in this study .Duration of this study was 3 months from July to September 2010.

They received electrical acupoints stimulation treatment with alternative mode of frequency 2/100 Hz, 30 minute/session, twice per week, for 12 weeks.

Body mass index, waist hip ratio and body fats % values were measured before as well as at the 4th, 8th, and 12th weeks after application of treatment method.

Instrumentations
A. Evaluative instruments:
1. Weight- height scale (Model TZ160): It was used to measure the body weight and height for each woman in this study then body mass index (BMI) was calculated by dividing the body weight by the square of height.
2. Body fat analyzer (CyberMed3000):
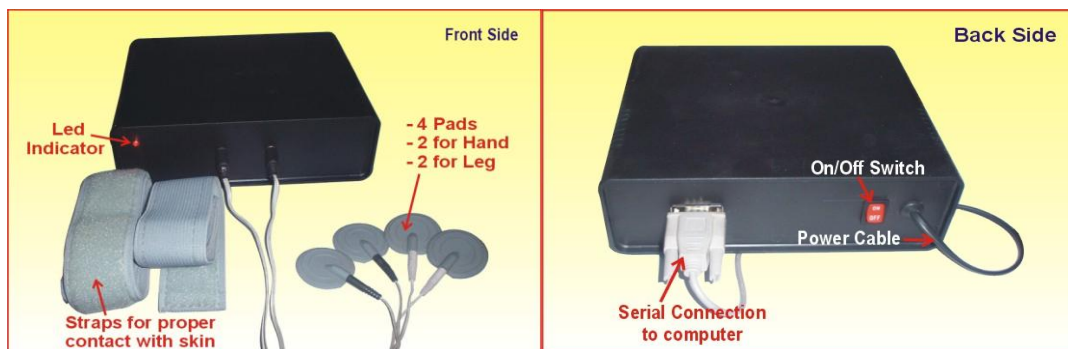
Body fat analyzer (Cyber Med 3000).

Body Composition Analyser (CyberMed3000, USA) is a PC-based complete wellness & fitness management system.

Body Composition Analyzer calculates body fat levels using bioelectric impedance analysis (BIA), BIA gives you a fast, easy, less intrusive, safe, and accurate way of measuring the body fat.
3. Tape measurement: A traditional tape divided to inches and centimeters to measure the waist and hip circumference. It was made from fiberglass.

B. The treatment instruments:
Transcutaneous Electrical Nerve Stimulator device: A multifunctional numerical computerized therapy device, (model SNH-368). It was a fully computer controlled system that applied stimulation and energy to certain acupoint. The device had six recipes and mainly treated six main parts which were shoulder, arm, buttocks, breast, belly and waist. The equipment had computer–control whole treatment course, easy operation and safe. Large L.C.D. screen directly showed the time and intensity. Beep reminded user to start the machine or switch off automatically. Intensity has 15 levels adjusted to comfort every patient choice .Time is up to 30 min.
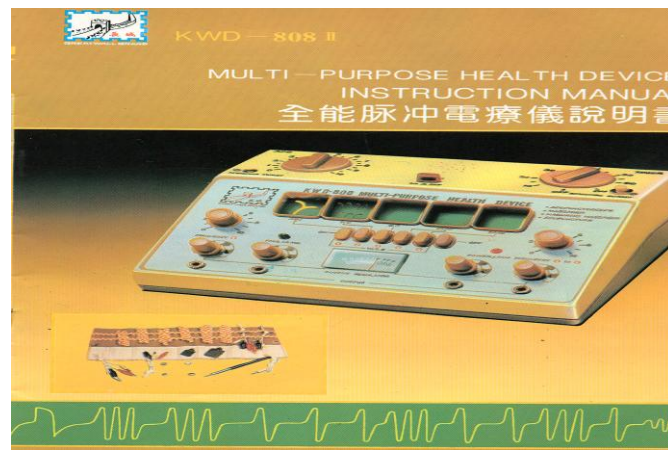
Electro acupuncture device.

Methods:

(A)Evaluative Procedures:

Each subject in this study was instructed about the different evaluative and treatment procedures to gain her confidence and cooperation through the study. Methods for evaluation were done before starting as well as at the 4th, 8th, and 12th weeks after application of treatment method for all subjects participated in this study as follow.

Measuring weight and height for each woman before treatment as well as at the 4th, 8th, and 12th weeks after treatment by using weight height scale ,then body mass index was estimated by dividing the body weight by the square of height (BMI = Kilogram/meters²).

Measuring body fat composition by using body composition analyzer before treatment as well as at the 4th, 8th, and 12th weeks after treatment .In order to obtain the most valid and reliable results the researcher followed the following:
- The skin was cleaned very well.
- The test was performed at least 5 hours after meals.
- The subjects did not drink coffee or alcohol at least 24 hours before the test as coffee and alcohol were diuretics.
- The test was performed at least 12 hours before exercise, if the woman was exercise performer, this is because exercise had a significant effect on body's water content.
- Subject was lying in supine position with arms slightly away from the body and palms flat facing the floor, and legs were slightly apart and extended. The sensor pads were placed on the usually used side (2 sensor pads were placed behind the wrist crease and another 2 sensor pads at the bend of the ankle in line with the shin bone).
- The device turned on and the subject's data were entered included, weight, height, age and sex.

Measuring waist hip ratio (the waist circumference divided by the hips circumference and that of more than 0.85 was used as indicator for central obesity). Using tape measurement, waist circumference was measured at the level midway between the lateral lower rib margin and iliac crest, hip circumference was measured at the level of the trochanters in the standing position.
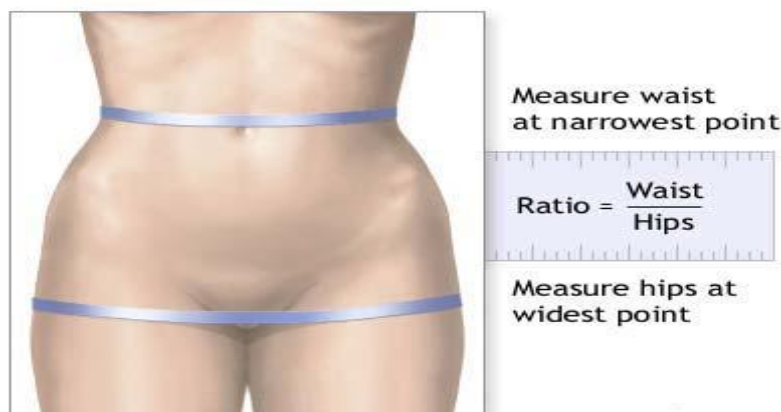
Measurement of waist hip ratio

(B)Treatment procedure:

Subjects were asked to evacuate their bladders before starting the treatment sessions to make sure that they were comfort and relaxed. At the beginning of the treatment session, all the knobs of the device were at zero position and the subject was lying in supine.

They received electrical acupoints stimulation treatment with intensity according to their tolerance, alternative mode of frequency 2/100 Hz, 30 min./session, twice per week, for 12 weeks at the following acupoints:
SP6: On the front of the leg, just behind the shin bone, the width of one hand (three thumbs) above the crown of the inner ankle.
ST36: In the trough or valley just away from the most prominent shin bone, the width of one hand (three thumbs) below the bottom of the knee cap, one finger breadth lateral to the inferior end of tibial tuberosity, toward outside of leg, the width of one thumb.

Statistical Analysis

The collected data were statistically analyzed by using t-test for comparing between before and at 4th, 8th and 12th weeks after treatment.
I- Descriptive statistics: Mean, Standard deviation, Percentage.
II- Significance.

Significance level of 0.05 was used throughout all statistical tests within this study, P-value <0.05 indicated a significant result, P-value<0.01 indicated a highly significant result.

RESULTS

All data had been collected and statistically analyzed and presented under the following headings;
- Body mass index.
- Waist hip ratio.
- Body fat percentage.

Body mass index:

The mean value of body mass index for subjects before starting the study was 30.78 ± 0.44 Kg/m^2 and it was decreased after the end of the treatment program to 29.6 ± 0.27Kg/m^2, with the mean difference of 1.18 Kg/m^2. This statistically differences revealed a highly significant (P<0.01) decrease in the body mass index at the end of the treatment program.

Table (1): The body mass index before as well as at 4th,8th&12th weeks after treatment.

Body mass index	Before treatment	4th weeks after treatment	8th weeks after treatment	12th weeks after treatment
Mean	30.78	30.33	29.91	29.6
±SD	±0.44	±0.4	±0.38	±0.27
P-value	0.0001			
S	Highly significant decrease			

Waist hip ratio:

The mean value of waist hip ratio for women before starting the study was 0.86 ± 0.005%and it was decreased after the end

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of the treatment program to 0.83±0.005%, with the mean difference of 0.03%. This statistically differences revealed a highly significant (P<0.01) decrease in the waist hip ratio at the end of the treatment program.

Table (2): The waist hip ratio before as well as at 4ᵗʰ, 8ᵗʰ and 12ᵗʰ weeks after treatment.

WAIST HIP RATIO	Before treatment	4 weeks after treatment	8 weeks after treatment	12 weeks after treatment
Mean	0.86	0.85	0.85	0.83
±SD	±0.005	±0.006	±0.006	±0.005
P-value	0.0001			
S	Highly significant decrease			

Body fat percentage:

The mean value of body fat percentage before starting the study was 36.7±1.34% and it was decreased after the end of the treatment program to 33.79±1.71%, with the mean difference of 2.91%. This statistically differences revealed a highly significant (P<0.01) decrease, with improvement in the body fat percentage at the end of the treatment program.

Table (3): The body fat percentage before as well as at 4ᵗʰ, 8ᵗʰ and 12ᵗʰ weeks after treatment.

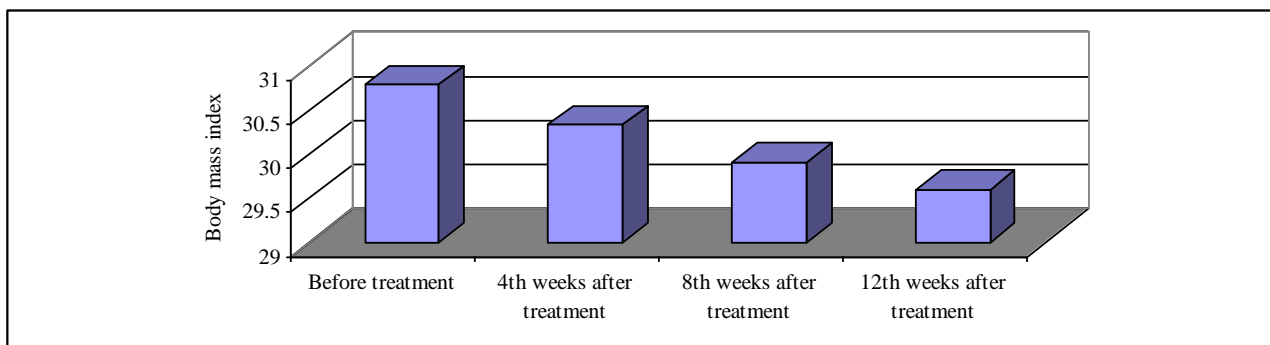| Body fat percentage	Before treatment	4 weeks after treatment	8 weeks after treatment	12 weeks after treatment
Mean	36.7	35.28	34.52	33.79
±SD	±1.34	±1.57	±1.67	±1.71
P-value	0.0001			
S	Highly significant decrease			

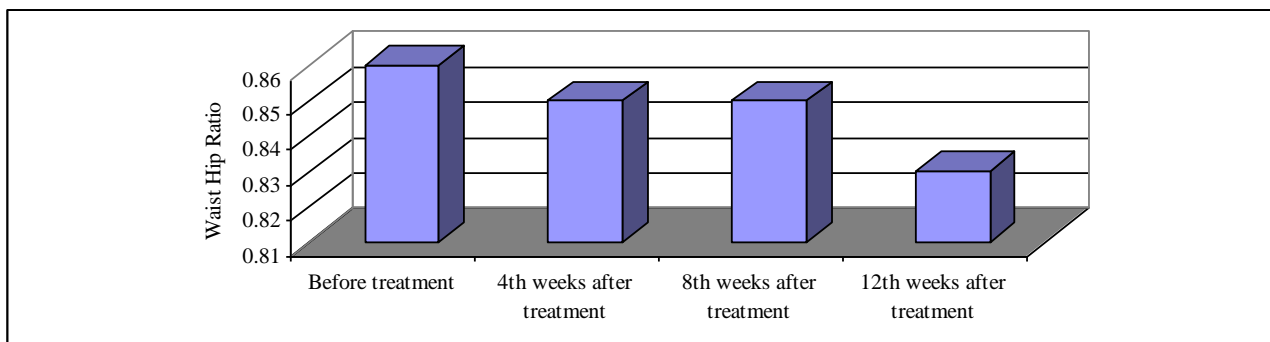*Fig. (1): The body mass index before as well as at 4ᵗʰ, 8ᵗʰ and 12ᵗʰ weeks after treatment.*

Fig. (2): The waist hip ratio before as well as at 4ᵗʰ, 8ᵗʰ and 12ᵗʰ weeks after treatment.
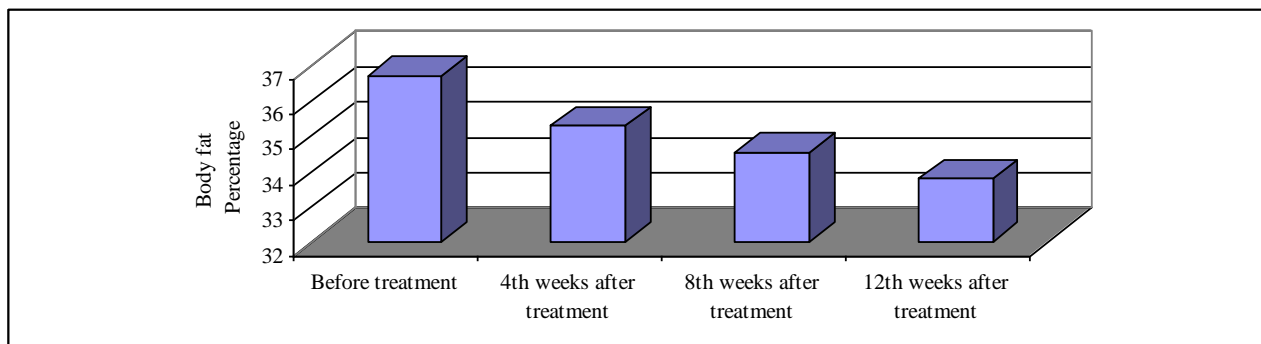
Fig. (3): The body fat percentage before as well as at 4th, 8th and 12th weeks after treatment.

DISCUSSION

Menopause is best defined as the absence of menses for 12 consecutive months. Menopause tended to be associated with increases in body weight and a shift to abdominal fat distribution. Alterations in circulating hormone levels appeared to regulate this shift because exogenous estrogen replacement therapy reduced abdominal adiposity in postmenopausal women. Hormonally induced changes in energy expenditure and/or dietary intake patterns may play a role in weight gain at menopause. After menopause 60% of females are obese or over weight and exhibit mostly android type of obesity. This is connected with hormonal alteration at that time (Poehlman et al., 1995, Toth et al., 2000 and Wozniak et al., 2003).

Both auricular and somatic acupoints have been shown to be effective in the acupuncture treatment of obesity (Cho et al., 2009).

The modes of stimulation include manual needling, mechanical pressure (acupressure), heating (moxibustion) and transcutaneous electrical nerve stimulation (TENS). Electrical stimulation applied on needles inserted into the acupoints has the advantage of using precisely identified frequency and intensity during the acupuncture treatment (Ma, 2004); Evidence from the rat experiment indicated that electroacupuncture at body points produced a significant reduction of both food intake and the body weight, with 2 Hz more effective than 100 Hz. Electroacupuncture could also produce a reduction of plasma level of total cholesterol and triglyceride, with 100 Hz more effective than 2 Hz. It was supposed that the 2/100 Hz

alternative mode of stimulation may have dural effect on both appetite and fat metabolism, but this still lacks convincing clinical evidence (Wang et al., 2008).

Previous studies of acupuncture for the treatment of obesity focused on weight reduction and most trials showed only modest effect on the weight loss (Cho et al., 2009).

This study was designed to detect the efficacy of electrical acupoints stimulation in the treatment of obese postmenopausal women in reducing body fat composition. A sample of twenty volunteer women, diagnosed as being obese. They were selected from out-patient clinic of gynaecological department at Al-Haram Hospital, their ages ranged from 50 to 60 years old and body mass index (BMI) was exceed 30 kg/m^2. All patients were referred from gynaecologists after gynaecological examinations.

There were no significant differences (P>0.05) in the age, height, weight and duration of menopause. Body mass index, waist hip ratio and fat percentage were measured before as well as at the 4th, 8th, and 12th weeks after application of treatment method for all subjects.

Results in this study showed a statistically non significant difference (P>0.05) in the body mass index, waist hip ratio and body fat % before treatment. While after treatment, when comparing the results, there was a statistically highly significant decrease (P< 0.01) at the end of treatment program.

Regarding to the effect of electrical acupoints stimulation treatment on waist circumference and body fat percentage, the results of the current study were supported by the results of Hsu et al., 2005 and Lee .et al., 2006, who found that, at the 8th and 12th weeks

of electrical acupoints stimulation treatment, waist circumference and body fat percentage in the study group were significantly less than those of the control group. The treatment resulted in weight loss or a smaller hip circumference than the non-treatment group.

Accordingly, the results of the current study were supported by that of Lacey et al., 2003, who found that waist circumference and percentage body fat of the study group remained less than those of the control group at the 12th week, despite the restoration of cardiac autonomic function. This suggested a local effect of TENS on the abdominal fat in favor of adipose tissue lipolysis. The treatment principles of Traditional Chinese Medicine for obesity are reinforcing Qi, resolving dampness, invigorating the spleen, and nourishing the kidney.

Results of this study agreed with those reported by Dong et al. (2009) and Ma, (2004) who found a primary acupoints used in this study were Zusanli (ST36) and Sanyinjiao (SP6). The Zusanli was used for improving the stomach and invigorating the spleen to remove dampness and phlegm. The Sanyinjiao was used for eliminating water and dampness. Stimulation of acupoints improves Qi, blood circulation and subsequently activates the metabolism to increase energy consumption.

The results of the current study were supported by those of Liu et al., (1998) who found that acupuncture can regulate body mass index very effectively.

The results of this study were also, supported by that of Liu, (1996) who reported that marked weight loss was noted in obese acupuncture. Acupuncture not only treats obesity and hyperlipidemia, but also it resists the pathogenic factors that might lead up to circulatory diseases.

The level of TC, TG, LDL-c, waist circumference (WC), hip circumference (HC) and WH ratio in the patient were finally regulated.

The result of this study agreed with that of Ba and Wang, (2006) who concluded that acupuncture has very good effects of slimming and reducing the waist circumference for the female of abdominal obesity with exceeding standard waist circumference or the patient of simple obesity, and it was suitable for treating obesity of different types.

Hsu et al., (2005) and Lee et al., (2006) found that waist circumference was the most affected variable in the previous trials of electro-acupuncture treatment in obese women.

Accordingly, it was found that electrical acupoints stimulation appeared to be effective in treating obese postmenopausal women as it reduced body fat composition (body mass index, waist hip ratio & body fats %) effectively.

Conclusion

It could be concluded that electrical acupoints stimulation appeared to be effective in reducing body fat composition (body mass index, waist hip ratio & body fats %) in obese postmenopausal women. Also, It was found to be effective, simple, realistic, safe, inexpensive and successful treatment method for obese postmenopausal women.

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الملخص العربي

تأثير التنبية الكهربي لنقاط الوخز على المكونات الدهنية للجسم في السيدات البدينات فترة ما بعد انقطاع الطمث

أجريت هذه الدراسة لمعرفة تأثير التنبية الكهربى لنقاط الوخز على المكونات الدهنية للجسم (مؤشر كتلة الجسم ، نسبة محيط الخصر إلى الفخذ ، نسبة دهون الجسم) فى السيدات البدينات فترة مابعد انقطاع الطمث . شاركت فى هذة الدراسة عشرون سيدة تراوحت أعمارهن بين 50-60 سنة وكان معيار كتلة الجسم اكثر من 30 كجم/م² . وقد تلقين برنامج العلاج بالتنبية الكهربي لنقاط الوخز ، لمدة 30 دقيقة فى الجلسة الواحدة مرتين أسبوعيا لمدة 12 أسبوعا . وتم التقييم لجميع الحالات عن طريق قياس مكونات الجسم الدهنية (مؤشر كتلة الجسم ، نسبة محيط الخصر إلى الفخذ ، نسبة دهون الجسم) قبل بداية العلاج وكذلك بعد الاسبوع الرابع والثامن والثانى عشر من تلقى العلاج . وكانت النتائج كالاتى : وجود فروق ذات دلالة احصائية عالية فى انقاص مؤشر كتلة الجسم ، نسبة محيط الخصر إلى الفخذ ونسبة دهون الجسم بعد العلاج فى الاسبوع الرابع والثامن والثانى عشر عما قبلة . ومن هنا يمكننا أن نستخلص أن برنامج التنبية الكهربى لنقاط الوخز فعال تماما فى تقليل المكونات الدهنية للجسم (مؤشر كتلة الجسم ، نسبة محيط الخصر إلى الفخذ ، نسبة دهون الجسم) فى السيدات البدينات فترة مابعد انقطاع الطمث .

الكلمات الدالة : المكونات الدهنية للجسم – نقاط الوخز بالتنبية الكهربى – السمنة – السيدات فى فترة مابعد انقطاع الطمث .