# Influence of Ultrasound Cavitation and Electrolipolysis on Obesity Management

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**Abstract: Background:** obesity can be an underlying cause of many disorders and even early death.Aesthetic physical therapy has recently gotten more attention.**Purpose:** The aim of this study was to explore the role of the UC and electrolipolysis for management of obese persons.**Material and methods: Design:** Pre-test Post-test research design.**Subjects:** 60 healthy participants' females ranging between 20 to 35 years of age participated in this study. They were randomly assigned into three equal groups, each contains 20 participants. **Group (A)** received UC (1 treatment/week), (40 Khz., 2.5 watt/cm2; 40 min); **Group (B)** received needle electrolipolysis (2 times weekly; rectangular waveform,30 Hz.**,** not exceeding 900 micro amps.;50 min.) **Group (C)** received UC and electrolipolysis (1 treatment/week). All groups had received low calorie diet and auricular acupuncture, the treatment period was for 4 weeks. **Methods:**weight (Wt.), body mass index (BMI),skin fold thickness (SFT) and waist circumference (WC) were measured before treatment, one week after the 1st treatment and one week after the 4thtreatment. Lipid profile was measured before treatment and one week after the 4ththe treatment.**Results:** All groups showed significant improvement after 1 week (WK) and after 5Wks. as regard to Wt., BMI, SFT, WC and lipid profile except group B showed no-significant difference between before and after 1Wk. In comparison between groups, there were no significant difference between the 3 groups as regard to Wt. and BMI, but there were significant difference for WC, SFT and lipid profile post treatment in favor to group C. **Conclusion:** Combination of UC and electrolipolysis in addition to low calorie diet and auricular acupuncture was more effective than each method separately in improving the WC, SFT and metabolic parameters (Total cholesterol (TC), Triglyceride (TG), High density lipo-protein (HDL) and Low density lipo-protein (LDL).
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## 1- Introduction

Obesity is a grave and recalcitrant problem, the cause of substantial morbidity and mortality throughout the globe, and reduction of quality of life. It is well established that obesity can be an underlying cause of many disorders such as arthritis, lung disease, diabetes, hypertension, coronary artery disease, heart failure, cataracts, cancer, and even early death. The psychological effects are serious and may include depreciation of body self-image, poor quality of life and depression[1].Obesity is characterized by excessive accumulation of body fat and when presenting the BMI (body mass index) greater than 30 kg/m², metabolic complications begin to appear. This is because adipose tissue (AT) is an organ with multiple endocrine and regulatory functions, triggered by neurological and hormonal stimuli[2]. The society has a fascination about body image, bringing as ideal beauty of a slim body. Body fat is increasingly associated with neglect and ugliness, and these often become social patterning unreal, the individual loses his identity. Nowadays obesity is a health problem. Obesity is called android, when fat is deposited in the abdominal area and gynoid when located in the hips and thighs[3].Cellulite, varix, weight gain, formation of melasma and acne, which reflect on the appearance of the mother future.Dermato-functional physiotherapy has efficient resources to fight these esthetics problems[4].Ultrasound (US) used for aesthetic purposes (body contouring) can be divided into two different categories; the first one is US of very low frequency (kHz) and relatively low intensity aimed to cause cavitation in the ATcells (also referred to as non-thermal US. The second category is focused US with very high intensity aimed to ablate the AT by heating (referred to as high intensity focused US or HIFU). This technique has been used for decades for the purpose of noninvasive treatment of tumors in various organs[5and6].US affects the adipocytes in two ways: mechanical compression causing destructive cavitation of adipocytes and thermogenesis secondary to cellular absorption[7].The working principle of the UC is a 20-70 kHz US energy will be emitted at certain depth in a convergent way and focused at a certain point to produce unlimited small vacuum bubbles (fat bubbling)[8].One of the methods used by dermato-

functional physiotherapy is the electrolipolysis, for the treatment of adiposity and accumulation localized fat[9and10]. The electrolipolysis applied through very fine needles implanted in the panniculus adipose or through electrodes on the skin surface[11]. This application provides physiological effects such as an increase in temperature, changes in the polarity of cell membrane, activation of microcirculation, improved skin tone, and lipolysis[12].

## 2- Subjects, material and methods

Sixty healthy participants' females ranging between 20 to 35 years of age with BMI more than 30 kg/m2 and at least 2.5 cm of fat thickness participated in this study. Their management with UC and electrolipolysis during the 4 weeks was done at **El-Tal El-kebeer central hospital and private clinicin Ismailia – Egypt.** The participants were randomly divided into three equal groups; each group included twenty participants, Participants have been informed about the study procedures and its possible risks and then have been provided written consent. The purpose of training program, UC, electrolipolysis, auricular acupuncture and diet was explained for each subject in each group;**Group A:** 20 participantsreceived UC LUVITRA model, DAEYANG MEDICAL company, Korea for 4 sessions on the abdominal area in lower abdomen (1 time weekly, 40 Khz., 2.5 watt/cm2; 40 min); The instrument was set by the operator through a touch screen and emits ultrasonic frequencies for a defined time period. On the session day before starting treatment session, each woman was asked to evacuate her bladder to make sure that she was comfortable and relaxed. After the area to treat has been clearly signed through apposite dermographic pencils, the patient is comfortably positioned on a bed,before beginning of the procedure; the treatment area is covered with a conductive gel. The tip of the ultra hand-piece was maintained perpendicular to the skin and maneuvered with a semi-rotational movement within the treated area**(Fig.1).**Treatment time for the right side of the abdomen was 20 minutes. The patient was turned onto the left flank position, and the treatment was administered for another 20 minutes. In order to stimulate the purifying action of the liver and kidneys, it is fundamental to suggest the patient to start drinking from the week before the session, at least 1.5 – 2 liter of water per/day[13 and 14].
**Group (II)** received needle electrolipolysis produced by the company Derm Tone ® model 2000for 8 sessions on the abdominal area in lower abdomen(2 times weekly, automatic polarity mode reversal every 2.5 seconds, rectangular waveform, 30 Hz., intensity was determined by the sensitivity and tolerance of the patient, and increased how many times were

necessary after the process of accommodation not exceeding 900 micro amps.;50 min). After the delimitationand sterilization(70% alcohol) the area to betreated;disposableacupuncture needle0.30X75 mm, stainless steel and diamond tipswere introducedin the region ofthe abdomenlowerhorizontalinsertion in the AT), which were introduced into the region above and below the umbilicus, distribute of pairs **(Fig.2).** Needles were placed so as to cover the entire area to be treated. The distance between the needles was 6 cm[2,15 and 16].



**Fig.1:** Application of UC on the abdominal area.



**Fig.2:**Application of electrolipolysis andplacement of needles on the abdominal area.

**Group (III)** received UC and electrolipolysis 1 time weekly for 4 sessions. All groups had received low calorie diet (1200 kcal/day)and auricular acupuncture for 4 weeks. Stainless steel needles per each session were used in one ear; the needles were changed every 7 days for sterilization and to prevent adaptation (the auricular points were shenmen, stomach, endocrine, hunger and spleen points)[17];**(Fig.3).**The exclusive criteria were:Pregnant, lactating women or diabetic patients,

oral contraceptive therapy started less than 1year ago history of active or chronic infections, autoimmune diseases, dermatological disease, liver diseases, renal insufficiency, coagulation disorders or on anticoagulant drugs, pacemaker, hernias, scars, diastasis recti, extreme skin laxity, use of any product or weight-loss treatment (manual or instrumental) during the last month, participation in a similar study during the previous 6 months, hormonal disturbance, andmissing two successive sessions.Anthropometrical parameters (Wt., BMI,Skin fold thickness at two sites using digital skinfold caliper:an umbilical site and a suprailiacsite[18]and WC was measured using height of iliac crest method at baseline, in three zones: the level of the iliac crest, 2 cm above the umbilicus, and 2 cm below the umbilicus)[19]were reassessed before treatment, one week after the 1st treatment and one week after the 4th the treatment[20]. Biochemical parameters: (Total cholesterol (TC), Triglyceride (TG), High densitylipo-protein cholesterol (HDL-C), Low density lipo-protein cholesterol (LDL-C). Lipid profile were reassessed before treatment and one week after the 4th the treatment.
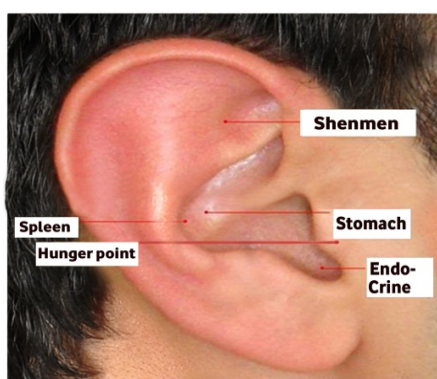


**Fig.3:**Obesity auricular points.

### 3- Results
**The results of the present study showed that:** *The anthropometric measurements:*

Results post treatment revealed a statistically highly significant (*P*<0.01) decrease in weight, BMI,skin fold and WC, for each group. For group **(A)** the mean of pretreatment BW was (93.76±9.43) andone week after the 4th the treatment was (88.43±8.77); BMI was (35.83±3.16) and one week after the 4th the treatment was (35.76±3.95); WC at iliac level was(116.5±9.84) and one week after the 4th the treatment was(109.57±9.57); WC 2 cm below umbilicus was (112.6±10.17)and one week after the 4th the treatment was(105.85±10.23); WC 2 cm above umbilicus was (106.95±11.55)and one week after the 4th the treatment was(98.15±11.37); Skin fold at

umbilical site was (30.55±4.34) and one week after the 4th the treatment was (26.44±3.77); Skin fold at Supra-iliac site was (37.46±5.15)and one week after the 4th the treatment was (33.2±4.66).For group **(B)** the mean of pretreatment BW was (91.94±16.45) and one week after the 4th the treatment was (88.59±16.17); BMI was (34.99±3.28) and one week after the 4th the treatment was (34.85±3.9); WC at iliac level was (119.6±11.17), after 1 week of treatment was (112.1±9.44), and one week after the 4th the treatment was (109.57±9.57); WC 2 cm below umbilicus was (116.65±11.42), after 1 week of treatment was (116.25±11.52),and one week after the 4th the treatment was (114.0±11.62); WC 2 cm above umbilicus was (110.25±8.75), after 1 week of treatment was (109.8±8.62),and one week after the 4th the treatment was(107.1±9.33); skin fold at umbilical site was (31.93±5.13), after 1 week of treatment was (31.53±5.16), and one week after the 4th the treatment was (29.99±5.01); skin fold at supra-iliac site was (38.56±2.65), after 1 week of treatment was (38.42±2.66),and one week after the 4th the treatment was (35.78±2.49). For group **(C)** the mean of pretreatment BW was (92.8±14.46)and one week after the 4th the treatment was (86.2±14.05).; BMI was (33.81±3.07) and one week after the 4th the treatment was (33.19±3.78); WC at iliac level was (116.25±12.16)and one week after the 4th the treatment was (102.65±11.77); WC 2 cm below umbilicus was (112.65±11.4)and one week after the 4th the treatmentwas (98.8±11.02); WC 2 cm above umbilicus was (105.85±11.41)and one week after the 4th the treatment was (91.45±10.43), skin fold at umbilical site was (29.52±2.79) and one week after the 4th the treatmentwas (23.84±2.51); skin fold at supra-iliac site was (36.42±3.01)and one week after the 4th the treatment was (30.94±2.84). While, comparing the results of both groups post treatment showed that no statistical significant differences of Wt. and BMI values between the three groups for the after 1 week of treatment and for one week after the 4th the treatment; no significant difference of WC (at iliac level, 2 cm below umbilicus and 2 cm above umbilicus) and skin fold (at umbilical site and at supra-iliac site) values between pre treatment value and after 1 week of treatment value for group B as *P*>0.05; a significant difference of WC (at iliac level, 2 cm below umbilicus and 2 cm above umbilicus) and skin fold (at umbilical site and at supra-iliac site)values for after 1 week of treatment between groups A and B and groups B and C; a significant difference of WC (at iliac level, 2 cm below umbilicus and 2 cm above umbilicus) and skin fold (at umbilical site and at Supra-iliac site) values for one week after the 4th the treatment between groups A and B, groups A and C and groups B and C.

**Table (1): Repeated measurement ANOVA of** Body Wt.Pre treatment, After 1 week of treatment, and After 1 week of the 4th the treatment for groups (A,B,C)**.**

| Group | F-value | *P*-value | Significance |
|---|---|---|---|
| Group (A) | 141.1 | 0.0001 | S |
| Group (B) | 103.81 | 0.0001 | S |
| Group (C) | 396.09 | 0.0001 | S |

**Table (2): Results of ANOVA** among the three groups for BMI.

| BMI | F | *P* value | Significance |
|---|---|---|---|
| Pre Treatment | 0.03 | 0.96 | NS |
| After 1 week of treatment | 0.01 | 0.98 | NS |
| After 1 week of the 4th the treatment | 0.33 | 0.71 | NS |

**\* P: probability, NS: no Significant.**

**Table (3): Post hoc test among** the three groups for WC and SFT:.

| | | | Mean difference | *P* value | S |
|---|---|---|---|---|---|
| **Waist circumference at iliac level (cm)** | **After 1 week of treatment** | Group A vs. group B | 7.35 | 0.03 | S |
| | | Group A vs. group C | 0.85 | 0.8 | NS |
| | | Group B vs. group C | 8.2 | 0.02 | S |
| | **After 1 week of the 4th the treatment** | Group A vs. group B | 7.67 | 0.02 | S |
| | | Group A vs. group C | 6.92 | 0.04 | S |
| | | Group B vs. group C | 14.6 | 0.0001 | S |
| **Waist circumference 2 cm below umbilicus (cm)** | **After 1 week of treatment** | Group A vs. group B | 7.1 | 0.04 | S |
| | | Group A vs. group C | 1.25 | 0.72 | NS |
| | | Group B vs. group C | 8.35 | 0.02 | S |
| | **After 1 week of the 4th the treatment** | Group A vs. group B | 8.15 | 0.02 | S |
| | | Group A vs. group C | 7.05 | 0.04 | S |
| | | Group B vs. group C | 15.2 | 0.0001 | S |
| **Waist circumference 2 cm above umbilicus (cm)** | **After 1 week of treatment** | Group A vs. group B | 7.05 | 0.04 | S |
| | | Group A vs. group C | 2.65 | 0.43 | NS |
| | | Group B vs. group C | 9.7 | 0.005 | S |
| | **After 1 week of the 4th the treatment** | Group A vs. group B | 8.95 | 0.009 | S |
| | | Group A vs. group C | 6.7 | 0.04 | S |
| | | Group B vs. group C | 15.65 | 0.0001 | S |
| **Skin fold at Umbilical site(mm)** | **After 1 week of treatment** | Group A vs. group B | 2.67 | 0.04 | S |
| | | Group A vs. group C | 1.21 | 0.35 | NS |
| | | Group B vs. group C | 3.88 | 0.004 | S |
| | **After 1 week of the 4th the treatment** | Group A vs. group B | 3.54 | 0.006 | S |
| | | Group A vs. group C | 2.6 | 0.03 | S |
| | | Group B vs. group C | 6.15 | 0.0001 | S |
| **Skin fold at Supra-iliac site (mm)** | **After 1 week of treatment** | Group A vs. group B | 2.67 | 0.03 | S |
| | | Group A vs. group C | 1.29 | 0.29 | NS |
| | | Group B vs. group C | 3.97 | 0.002 | S |
| | **After 1 week of the 4th the treatment** | Group A vs. group B | 2.57 | 0.02 | S |
| | | Group A vs. group C | 2.26 | 0.04 | S |
| | | Group B vs. group C | 4.83 | 0.0001 | S |

*The lipid profile measurements:*

For group (A) the mean of TC pre-treatment was(200.25± 22.86) and for one week after the 4th the treatmentwas (181.05±16.91); the mean of TGs pre-treatment was (101.05± 10.48) and for one week after the 4th the treatment was (89.45±12.58); the mean of HDL pre-treatment was (54.4± 4.0) and for one week after the 4th the treatment was (58.75±3.95) and the mean of LDL pre-treatment was(109.8± 11.33) and

for one week after the 4th the treatment LDL was (99.7±10.35).For group (B) the mean of TC pre-treatment was(204.35± 16.21) and for one week after the 4th the treatment was (195.15±16.19); the mean of TGs pre-treatment was (105.5± 9.78) and for one week after the 4th the treatment was (96.95±11.57); the mean of HDL pre-treatment was (53.75± 3.89) and for one week after the 4th the treatment was (56.25±4.21) and the mean of LDL pre-treatment was

(110.95± 7.87) and for one week after the 4<sup>th</sup> the treatment LDL was (105.65±8.22).For group (C) the mean of TC pre-treatment was(199.1± 21.71) and for one week after the 4<sup>th</sup> the treatment was (165.0±17.01); the mean of TGs pre-treatment was (103.1± 12.35) and for one week after the 4<sup>th</sup> the treatment was (81.0±8.0); the mean of HDL pre-treatment was (54.85± 1.95) and for one week after the 4<sup>th</sup> the treatment was (61.3±2.65) and the mean of LDL pre-treatment was (108.2± 10.11) and for one week after the 4<sup>th</sup> the treatment LDL was (92.45±9.17).To determine the difference in the mean value of the TC analysis of variance (ANOVA) test was performed. It revealed that there was no significant difference among the three groups for

thepre treatmentas F value was (0.36)and *P* value was (0.69) for TC, F value was (0.83)and *P* value was (0.44) for TGs; F value was (0.52) and *P* value was (0.59) for HDL; F value was (0.39) and *P* value was (0.67) for LDL.While there was a significant difference among the three groups for one week after the 4<sup>th</sup> the treatment as F value was (16.29) and *P*value was (0.0001) for TC; F value was (10.71) and *P*value was (0.0001) for TGs, F value was (9,44) and *P*value was (0.0001)for HDL;F value was (10.12) and *P* value was (0.0001) for LDL.

To determine the difference between the three groups in the mean value of the TC for the one week after the 4<sup>th</sup> the treatment values post-hoc test (Least square difference (LSD) test) was performed.

**Table (4): Results of ANOVA** among the three groups for total cholesterol.

| Total cholesterol (mg/dl) | F-value | *P*-value | S |
|---|---|---|---|
| **Pre treatment** | 0.36 | 0.69 | NS |
| **After 1 week of the 4<sup>th</sup> the treatment** | 16.29 | 0.0001 | S |

*P: probability, S: significance, S: Significant.

**Table (5): Results of ANOVA** among the three groups for triglycerides.

| Triglycerides (mg/dl) | F-value | *P*-value | S |
|---|---|---|---|
| **Pre treatment** | 0.83 | 0.44 | NS |
| **After 1 week of the 4<sup>th</sup> the treatment** | 10.71 | 0.0001 | S |

*P: probability, S: significance, S: Significant.

**Table (6): Results of ANOVA** among the three groups for HDL.

| HDL (mg/dl) | F-value | *P*-value | S |
|---|---|---|---|
| **Pre treatment** | 0.52 | 0.59 | NS |
| **After 1 week of the 4<sup>th</sup> the treatment** | 9.44 | 0.0001 | S |

*P: probability, S: significance, S: Significant.

**Table (7): Results of ANOVA** among the three groups for LDL.

| LDL (mg/dl) | F-value | *P*-value | S |
|---|---|---|---|
| **Pre treatment** | 0.39 | 0.67 | NS |
| **After 1 week of the 4<sup>th</sup> the treatment** | 10.12 | 0.0001 | S |

*P: probability, S: significance, S: Significant.

**Table (8): Post hoc test** among the three groups for lipid profile:

| | | | Mean difference | *P* value | S |
|---|---|---|---|---|---|
| **Total cholesterol** (mg/dl) | **After 1 week of the 4<sup>th</sup> the treatment** | Group A vs. group B | 14.1 | 0.01 | S |
| | | Group A vs. group C | 16.05 | 0.004 | S |
| | | Group B vs. group C | 30.15 | 0.0001 | S |
| **Triglycerides** (mg/dl) | **After 1 week of the 4<sup>th</sup> the treatment** | Group A vs. group B | 7.5 | 0.03 | S |
| | | Group A vs. group C | 8.45 | 0.01 | S |
| | | Group B vs. group C | 15.95 | 0.0001 | S |
| **HDL** (mg/dl) | **After 1 week of the 4<sup>th</sup> the treatment** | Group A vs. group B | 2.5 | 0.03 | S |
| | | Group A vs. group C | 2.55 | 0.03 | S |
| | | Group B vs. group C | 5.05 | 0.0001 | S |
| **LDL** (mg/dl) | **After 1 week of the 4<sup>th</sup> the treatment** | Group A vs. group B | 5.95 | 0.04 | S |
| | | Group A vs. group C | 7.25 | 0.01 | S |
| | | Group B vs. group C | 13.2 | 0.0001 | S |

## 4- Discussion

Reduction measures are one of the most desired goals in treatment of localized adiposity, in order to minimize the thickness of the fabric. Several features of thedermato-functional (Aesthetic) physiotherapy have attempted to minimize the thickness of AT, however fewer dermal tissues are affected, the greater the reduction in subcutaneous tissue and your fat cells[21].The purpose of this research was to evaluate the anthropometric parameters and quantify lipid profile of obese women, since in previous studies the sample consisted of individuals with BMI, WHR and WC within normal limits, not presenting a group at risk for developing diseasescardiovascular[22,23,24and15], but in our study the sampleconsisted of individuals with BMI more than 30 kg/m2 and at least 2.5 cm of fat thickness.The possibility of reducing the WC, change skinfold thickness and improve lipid hormone of this profile population is of great clinical interest. In our study average Wt. loss after 4 weeks of UC application was 3.13 kg; average WC loss at iliac level was 6.92 cm, at 2cm below umbilicus was 6.75 cm, at 2cm above umbilicus was 8.8 cm and average skin fold loss at umbilical site was 4.1 mm; at supra-iliac site was 4.26 mm.Regarding the results of anthropometric variables. The weight loss decrease in BMI in this study after low caloric diet may attributed to several mechanisms including, the diuresis and depletion in stored glycogen and reduction in fat mass the depletion of fat depot caused by hydrolysis and clearance of TG stored in AT into glycerol and FFA by the action of lipoprotein lipase (LPL)[25]. Results of previous studies showed that more than a 10% reduction in body weight in a three months period of diet regimen[26].Other studies have reported similar weight losses in the range of 10 to 13 kg in obese women undergoing 16 weeks diet programs and it was also reported that significant body weight losses, 14.5% compared to baseline over 16 week diet regimen[27].Our findings are consistent with those of previous studies like[28], who found effects on AT after ultracavitation application. The results were identified average weight loss of 2.310 kg and average loss of 2.5 cm per cm of treatment area.UC procedure reduced significantly the WC. This reduction was caused by a reduction in fatthickness. Interestingly,the reduction in fat thickness could not be ascribed to Wt. loss, since no statistically significant immediately weight reductionwas observed in any of the subjects treated after the application UC session. Interpretation of Wt. loss was due to low calorie balanced diet (1200 kcal/day) and auricular acupuncture.This suggests thatthe application of UCsession can trigger only discrete and has a localized effects in the target regionin whichrevealed significant perimeter reduction in the treated area, but did not alter the values of weight and BMIconcerningto the fat released from the treated adipocyte, but after 1 week and at the end of the study, there was a significant improvement of weight and BMI values. It is importantto underline the fact that clinically significant modificationswere registered at the end of the treatment protocol inany of the known metabolic pathways of fat metabolism. Indeed, it is well known that thebody is able to move water-insoluble fat.Other studies that agree with this study found a significant lower fat thickness with higher WHR and WC reduction on women in intervention group after treatment by UC compared to women in control group[29,30,31,32and  14].Another study reported that the combination of UC and low-calorie diet characterized by a higher efficiency than a low-calorie diet alone in lowering anthropometric, total body composition and plasma lipoprotein variables; that supported the findings of this study[33]. On the other hand, it was found that no significant change in weight lossby comparing groups[29,30,31,32and14].In our study there was average Wt. loss about3.13 kg, but we used low calorie balanced diet (1200 kcal/day) and auricular acupuncture beside UC.Our findings are contradicted withother studies[31,32,34and14]results,which showed that no significant differences between two groups regarding serum lipid profile including TC, HDL and LDL levels as well as weight loss at the end of the study. That might be their two groups received a balanced healthy diet for weight maintenance and treated locally by UC, but in our study, the subjects received low calorie balanced diet; auricular acupuncture and treated locally by UC.In our study electrolipolysis groupwas associated with average Wt. loss after 4 weeks of electrolipolysis application was 3.35 kg; average WC loss at iliac level was 2.35 cm, at 2cm below umbilicus was 2.65 cm and at 2cm above umbilicus was 3.15 cm; average skin fold loss at umbilical site was 1.94 mm and at supra-iliac site was 2.78 mm.Our results were in accordance with that obtained byMelo, et al.who have demonstrated the effectiveness of electrolipolysis in reducing fat in the abdominal region. Even with the small number of patients who completed treatment (four patients sedentary and four patients did not sedentary).They observed a reduction of 6.75% of the measures, however with increased measures of iliac crest in patients engaged in physical activity. Despite having obtained good results from the loss of AT[35].Our study supported by Hsu et al., who showed that abdominal EA stimulation reduced BW, WC and HC by 5.3%, 4.6% and 4.0%, respectively. Under the premise that WC is related to the subcutaneous fat tissue of the abdomen, abdominal EA might help

redistribute or lyse abdominal fat tissue directly and also other body AT[36].On the current study it was noticed that there was a highly significant decrease in WC (at iliac level, 2cm below umbilicus and 2cm above umbilicus) which supported by the work that concluded that electrolipolysis is an effective technique in the treatment of fat, showing a significant reduction in the abdominal perimeter.Our findings are consistent with those of previous studies like[24,37and38]who observed in the experimental groups compared to the control group, a tendency to decrease in fat mass estimated by skinfolds (abdominal folds and suprailiac), hip circumference and BMI with minimal changes in lean body mass, which supports an effect of adjuvant electrolipolysis in mass reduction fat overall.Our study were in accordance with(Mekawy and Omar)[39]who concluded that the combination of electrolipolysis and low caloric diet has a positive effect on reducing central obesity and improving lipid profile in premenopausal obese women. The noticed lowering in plasma lipids may be related to the postulated decreased synthesis of VLDL, which in turn lowers the formation of LDL in the plasma compartment or increase hepatic B/E receptor. The increase in HDL is related to the strong negative association exists between plasma TG-rich lipoprotein and HDL cholesterol, manipulations that modify plasma TG will also affect HDL cholesterol concentration[40]. On the other hand, the results of this study contradict other studies reporting a negative correlation between BML WHR and blood lipids or between BMI and TC[41].Also the results of the current study were contradicted with the results achieved byMachado *et al.*[42] who have analyzed the mean values of body weight, BMI and WHR, before and after treatments instituted; there was no statistically significant difference between them, but in our study there was statistically significant difference between Wt., BMI, WC, skin fold and lipid profile parameters that perhaps to the combination therapy with different resources of the low calorie balanced diet (1200 kcal/day) and auricular acupuncture with electrolipolysis. This suggests that electrophysical resources use can trigger only discrete and localized effects in the target region, which comes from studies meeting withPaula *et al.*[24], in which the application of perimeter electrolipolysis revealed significant reduction in the treated area, but did not alter the values of weight and BMI.For lipid profile parameters electrolipolysis group was associated with a significant reduction of TC, TG and LDL-C. There was a significant increase in the HDL-C values one week after the 4th the treatment compared to the pretreatment values.Another study revealed significant difference in BMI, WHR, and Lipid

profile measurements. As there were a significance decrease in BMI,WHR, TGs, TC and LDLc with significant increase in HDLc in the study group (electrolipolysis, diet restriction regimen and aerobic exercises) more than that in the control group (diet restriction regimen and aerobic exercises)[43] and that supported the findings of this study.UC and electrolipolysis group was associated with a significant reduction of BW, BMI; WC at iliac level, 2 cm below umbilicus, 2 cm above umbilicus and skin fold in the umbilical site, suprailiac site after 1 week of treatment and after 4 weeks of treatment compared to the pretreatment values. UC and electrolipolysis group © was associated with average Wt. loss was 6.6 kg; average WC loss at iliac level was 13.6 cm, at 2cm below umbilicus was 13.85 cm, at 2cm above umbilicus was 14.4 cm and average skin fold loss at umbilical site was 5.68 mm and at supra-iliac site was 5.47 mm after 4 weeks of UC and electrolipolysis application.The change in fat mass may be due to several possible mechanisms including, shifting in substrate utilization, decrease in proteolytic counter regulatory hormones and increase in lipo-protein lipase activity which could explain the change in fat mass[42].Our results were contradicted with study that concluded the application of both the therapeutic US and electrolipoforese showed no statistically significant difference in girth, skinfold and BIA after their treatments. In their photographic evaluation was no improvement in visual appearance of EGF in 68.18% of the participants[42].Stimulation of mouth, shenman, stomach, hunger and spleen auricular points resulted in weight loss in these patients varied from 2-16 pounds. Waist and hip circumference, lipid metabolism and the levels of cyclic adenosine monophosphate (cAMP) can be regulated by acupuncture as acupuncture stimulates the auricular branch of vagus nerve and raises serotonin levels, both of which have been shown to increase tone in the smooth muscles of the the appetite which leads to weight loss[17].The work of the physiotherapist specialist in Functional--Dermatology has been going through major changes and grows its interdisciplinary importance in all areas of aesthetic medicine.The findings of the current study demonstrated that UC and electrolipolysis should be included in aesthetic and dermato-functional physiotherapy as essential in terms of human health and obesity management.

## 5-Conclusion

It was concluded that UC or electrolipolysis plus low calorie balanced diet and auricular acupuncture an effective methods for management of obesity. But, combination of UC and electrolipolysis plus low

calorie balanced diet and auricular acupuncture was more effective than each method alone in improving the WC, SFT and metabolic parameters.

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