

## Effect of auricular acupuncture on weight reduction in a sample of obese children

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## Abstract

**Introduction:** Growing evidence that obese children are at greater risk for several metabolic disturbances, including glucose intolerance, insulin resistance, hyperlipidemia, the metabolic syndrome, and diabetes mellitus, as well as for cardiovascular disease and nonalcoholic fatty liver disease. There are numerous therapies for obesity, including pharmacotherapy, acupuncture therapy, dietary therapy, exercise therapy, and surgical therapy. The auricular acupuncture therapy is one of the regional acupuncture therapies which have treated various diseases through a needle insertion on the auricle. Its effects can be explained by a relationship between the original functions of nerves distributed on the auricle and internal organs. Recent studies have indicated that acupuncture can reduce body weight in patients with simple obesity, as well as lower their Body Mass Index (BMI) and waist- to- hip ratio.

**Objective:** The objective of this study is to study the effect of auricular acupuncture on weight reduction, BMI, BMIP, lipid profile, fasting insulin and lepin levels, in a sample of obese children.

**Sample:** The study was conducted on 34 obese children (6- 12) years attending the outpatient\_s clinics of the National Research Center, these subjects were divided randomly into 2 groups Group A, were subjected to auricular acupuncture, balanced low caloric diet. Group B, were subjected to sham auricular acupuncture, balanced low caloric diet. In both groups, acupuncture and sham acupuncture were given twice weekly over the course of 12 weeks.

**Results:** There were significant reductions in weight, BMI, HC, WC, Cholesterol, triglycerides, LDL and insulin resistance in group A after treatment and they were more than reduction in group B (p value <0.001). There were significant reduction in insulin and leptin in group A after treatment and they were more than reduction in group B (p value 0.005), (p value 0.09) respectively. So acupuncture therapy in combination with diet restriction was found to be effective for weight loss and also reduction of the obesity- associated risks factors, such as dyslipidemia.

**Keywords:** Auricular Acupuncture, Weight Reduction, Obesity.

## تأثير الإبر الصينية الأذنية على انقاص الوزن في عينة من الأطفال البدناء

**مقدمة:** أصبحت السمنة وباءاً عالمياً ومشكلة صحية شائعة الحدوث في جميع أنحاء العالم وخاصة في البلدان النامية والدول الصناعية. وهناك أدلة متزايدة على أن الأطفال البدناء أكثر عرضة لخطر الإصابة بالاضطرابات الأيضية العدة بما في ذلك مرض السكر ومقاومة الأنسولين وارتفاع الدهون في الدم وأمراض القلب والشرايين لذلك أصبح من الضروري الوقاية والعلاج من السمنة لتجنب الإصابة بهذه المخاطر، ويوجد العديد من أنواع علاج السمنة مثل المعالجة الدوائية والعلاج بالوخز والعلاج بالحمية والعلاج بالترتيبات الرياضية بالإضافة إلى العلاج الجراحي، وقد مورس العلاج بالوخز بالإبر لأكثر من ٥٠٠٠ سنة حيث أن لها تأثير إيجابي في الحد من السمنة.

**الغرضية:** يمكن استخدام الوخز بالإبر الصينية الأذنية وتعديل نمط الحياة لعلاج الأطفال البدناء.

**العينة:** وقد أجريت الدراسة على أطفال بدناء في العيادة الخارجية بالمركز القومي للبحوث، تم تقسيم الأطفال عشوائياً إلى مجموعتين المجموعة الأولى خضعت للعلاج بالوخز بالإبر الصينية الأذنية بالإضافة إلى النظام الغذائي المتوازن مع ممارسة النشاط البدني، والمجموعة الثانية خضعت للعلاج بالوخز بالإبر الصينية الأذنية (بدون سن) بالإضافة إلى النظام الغذائي المتوازن وممارسة النشاط البدني. تم التعامل مع الأطفال وتقييمهم ومتابعتهم في العيادة الخارجية للمركز القومي للبحوث.

**الخطوات الإجرائية:** أخذ التاريخ المرضي والفحص الكليني الشامل، وتم قياس الطول وتقريبه إلى أقرب ملليمتر وقياس الوزن بالكيلوجرام باستخدام موازين الكترونية وتم احتساب معدل كتلة الجسم ومحيط الخصر والورك، وتم قياس الدهون في الدم بما في ذلك الكوليستيرول والدهون الثلاثية، البروتين الدهني عالي الكثافة وقليل الكثافة والأنسولين ومقاومة الأنسولين واللبتين ومستوي السكر في الدم قبل وبعد العلاج.

**النتائج:** كان هناك نقص ملحوظ في الوزن ومعدل كتلة الجسم ومحيط الخصر والكوليستيرول والدهون الثلاثية والبروتين الدهني قليل الكثافة والأنسولين ومقاومة الأنسولين واللبتين وكانت نسبة النقص أكثر في المجموعة الأولى عن الثانية.

**الخلاصة:** استخدام الإبر الصينية الأذنية كان له تأثير واضح على انقاص الوزن ومعدل كتلة الجسم وانقاص الكوليستيرول والدهون الثلاثية والبروتين الدهني قليل الكثافة وعلى انقاص الأنسولين ومقاومة الأنسولين واللبتين.

## Introduction:

Obesity is becoming a global epidemic and a common health problem. The incidence and prevalence of obesity are increasing worldwide, especially in developing and newly industrialized nations. (Lissau et.al 2004). Results of the most recent National Health and Nutrition Examination Survey estimate that 20.6% children (2- 5) years of age, 30.3% of children (6- 11) years of age, and 30.4% of adolescents and young adults (12- 19) years of age are overweight or are at risk of becoming overweight. (Hong et.al 2011) There also is growing evidence that obese children are at greater risk for several metabolic disturbances, including glucose intolerance, insulin resistance, hyperlipidemia, the metabolic syndrome, and diabetes mellitus, as well as for cardiovascular disease and nonalcoholic fatty liver disease. (Eckel et.al 2005). Therefore, the prevention and treatment of obesity have become major problems facing medical professionals. At present, there are numerous therapies for obesity, including pharmacotherapy, acupuncture therapy, dietary therapy, exercise therapy, and surgical therapy.

The auricular acupuncture therapy is one of the regional acupuncture therapies used commonly in the Oriental medicine, which have treated various diseases of body through a needle insertion on the auricle. The therapeutic effects of the auricular acupuncture therapy can be explained by a relationship between the original functions of nerves distributed on the auricle and internal organs. (Abdi et.al 2012).

The results of many studies investigating the use of acupuncture for weight control provide preliminary evidence of the potential effect of acupuncture on weight loss (Wang et.al 2007). Recent studies have indicated that acupuncture can reduce body weight in patients with simple obesity, as well as lower their Body Mass Index (BMI) and waist- to- hip ratio (He et.al 2006).

## Subject And Methods

### Subjects:

The study was conducted on 34 obese children (6- 12) years attending the outpatients clinics of the National Research Center from September 2013 to June 2015.

Obesity was defined according to Cole et.al, in children with BMI> 95th percentile for age and sex. (BMI Egyptian growth reference chart percentile were used). (Ghali et.al, 2008)

- ✎ They neither had received any other weight control measures nor had any medical and/ or drug history within the last 3 months before their participation in the study. These subjects were divided randomly into 2 groups.
- ✎ Group A: were subjected to auricular acupuncture, balanced low caloric diet and physical activity- based lifestyle intervention for 12 weeks.
- ✎ Group B: were subjected to sham auricular acupuncture, balanced low caloric diet and physical activity- based lifestyle intervention for 12 weeks.

In both groups: acupuncture and sham acupuncture were given twice

weekly over the course of 12 weeks. Auricular points that were used include; Spiritual Gate (TF2), Hunger Point (TG3), Stomach (CR1), and Endocrine point (IT2).

The auricular points were detected by means of the acupuncture point detector, or identified directly with reference to the chart of auricular points. In group A, special stainless steel auricular acupuncture needles were used, while in group B, subjects were given sham auricular acupuncture using placebo needles (needles with no needle points).

The children were treated, assessed and followed up at the outpatients clinics of the National Research Center.

### Methods:

All patients were subjected to the following:

1. Detailed personal and medical history.
2. Thorough clinical examination.
3. Anthropometric measurements was taken. Height was measured and rounded to the nearest millimeter, using a Harpenden Stadiometer. Weight in kilograms was recorded using electronic balance. Body mass index, waist circumference and hip circumference were calculated at base line and after auricular acupuncture therapy. Standing height was measured without shoes, to the nearest 0.1 cm, using Harpenden stadiometer, and weight was measured using a digital scale, to the nearest 0.1 kg, wearing light clothing and without shoes. BMI was calculated using the formula  $\text{kg/m}^2$ . Waist and hip circumferences were measured using a flexible tape to the nearest 0.1 cm. Waist circumference (WC) was measured at the end of expiration midway between the lower rib margin and the iliac crest, and hip circumference (HC) was measured at the level of greater trochanter.
4. All patients were instructed to walk fast for at least 30 minutes for 5 days/ week.
5. All patients were instructed to follow balanced diet, the energy intake is reduced to be 1300- 1500 calories according to recommended dietary allowance. Nutrient content remains balanced with 15 percent of energy derived from protein, 30- 35 percent from fat and 45- 50 percent from carbohydrates. Generally, those diets do not need supplementation with minerals and vitamins. It was also important to recommend sufficient fluid intake (1.5- 2 L/ day).
6. Biochemical Assessment: Blood samples were taken from each patient for analysis after 12 hour fasting, twice during the study (at the beginning, and and 12 weeks later). A full fasted lipid profile comprising total cholesterol, triglycerides, high- density lipoprotein cholesterol(HDL- C) and low density lipoprotein cholesterol (LDL- C) was determined for each subject. Serum lipid and fasting blood sugar concentrations were measured enzymatically with the use of commercial kits. Plasma insulin and leptin levels were measured using a commercially available RIA (Linco Research, Inc.). Homeostasis Model assessment for insulin resistance (HOMA- IR) were calculated using the following equation:  $\text{HOMA- IR} = \text{Fasting}$

insulin ( $\mu\text{IU}/\text{ml}$ ) Fasting glucose ( $\text{mg}/\text{dl}$ ) / 405.

7. Auricular acupuncture treatment was given twice weekly over the course of 12 weeks.
8. Inclusion Criteria:
  - a. Both Sexes Were Included.
  - b. Age (6- 12) years.
9. Exclusion Criteria: Patients who suffer from, diabetes, hypertension, heart disease, endocrine abnormalities, congenital metabolic diseases, genetic diseases, liver and kidney disease, or have a history of using drugs that affect lipid metabolism.
10. Ethical Consent: Written consents were obtained from the parents to enroll their children in the study.

#### Results:

There were significant reductions in weight, BMI, HC, WC, Cholesterol, triglycerides, LDL and insulin resistance in group A after treatment and they were more than reduction in group B (p- value < 0.001). There were significant reduction in insulin and leptin in group A after treatment and they were more than reduction in group B (p- value 0.005), (p- value 0.09) respectively.

#### Discussion:

Pediatric obesity is increasing world wide public health problem. Obesity and abdominal adiposity may be associated with serious complications. Insulin resistance or hyperinsulinemia, in obese subjects, are associated with an increased risk for type 2 diabetes and metabolic syndrome. It has been reported that obese children have a double risk to have diabetes than children with normal weight (Lee et.al, 2006).

The study was conducted on 34 obese children (6- 12) years attending the outpatient\_s clinics of the National Research Center from September 2013 to June 2015.

They neither had received any other weight control measures nor had any medical and/ or drug history within the last 3 months before their participation in the study. These subjects were divided randomly into 2 groups.

There were significant reduction of weight after treatment in group A (that received true auricular acupuncture) and it is more than decrease in weight in group B (that received sham auricular acupuncture) (p- value < 0.001) these results agreed with Ghroubi et.al (2009) as they showed that stimulation of mouth, Shenman, stomach, spleen, and hunger auricular points for 2 to 6 weeks resulted in weight loss varied from 2- 16 pounds in these patients, as acupuncture stimulates the auricular branch of vagus nerve and increases serotonin levels, both of which have been shown to increase tone in the smooth muscles of the stomach, thus suppressing the appetite which leads to weight loss in overweight patients.

In the present study, there was a significant decrease of of BMI in group A and (that received true auricular acupuncture) and it was more than decrease in BMI in group B (that received sham auricular acupuncture) (p value < 0.001) value and these results matched with Abd Elkader and Khalifa (2012), whose results showed a significant reduction

in BMI of group (A) received physical training and dietary measures with acupuncture and group (B) received physical training and dietary measures with electroacupuncture, while the difference between both groups after therapy was not a significant.

Our study matched with Yeh et.al study (2008) as they studied effect of acupress for 9 weeks and there were significant reduction in BMI.

In this study, the decrease of WC after treatment in group A was more than decrease in WC in group (B) (p value < 0.001) and the decrease of HC after treatment in group A was more than decrease in HC in group B (p value < 0.001).

Abdi et.al (2012) compared auricular acupress (group A) and diet intervention with sham auricular acupress and diet (group B) for 6 weeks and found that BW, BMI, WC, HC < 0.001. (in group A than group B) and these results matched with our study in the significant decrease in BMI, and comparison between cases and controls showed that real acupuncture is more effective in reducing the levels of anthropometric factors. while in Darbandi et.al study (2012), p values of BW, BMI reduction were < 0.01 and Hsieh et.al study (2010) p value of BW, WC, HC reduction were < 0.001.

#### Conclusion:

In conclusion, acupuncture therapy in combination with diet restriction was found to be effective for weight loss and also reduction of the obesity- associated risks factors, such as dyslipidemia. However, these effects can be achieved by other interventions, but due to lack of adverse events and continued effects after the therapy, acupuncture could be used as a preferred or synergic treatment option for obesity control.

#### References:

1. Abd- Elkader S M and Khalifa D A. Impact of Weight Loss on Psychological Well Being and Biochemical Modulation in Obese Patients: A Comparison of Two Treatment Protocols. **Eur J Gen Med** 2012; 9(2): 104- 110.
2. Abdi H, Abbasi- Parizad P, Zhao B, Ghayour- Mobarhan M, Tavallaie S, Rahsepar AA, Parizadeh SM, Safariyan M, Nemati M, Mohammadi M, Darbandi M, Darbandi S, Ferns GA. Effects of auricular acupuncture on anthropometric, lipid profile, inflammatory, and immunologic markers: a randomized controlled trial study. **J Altern Complement Med**. 2012 Jul; 18(7): 668- 77.
3. Darbandi M, Darbandi S, Mobarhan MG, Owji AA, Zhao B, et.al. (2012) Effects of auricular acupressure combined with low- calorie diet on the leptin hormone in obese and overweight Iranian individuals. **Acupunct Med** 30: 208- 213.
4. Eckel RH, Grundy SM, Zimmet PZ. The metabolic syndrome. **Lancet** 2005;365:1415\_1428.
5. Ghalli I, Salah N, Hussien F, et.al. **Egyptian growth curves for infants, children and adolescents**. In: Satorio A, Buckler JMH, Marazzi N, Crecere nel mondo. Ferring Publisher, Italy, 2008.
6. Ghroubi S, Elleuch H, Chikh T, Kaffel N, Abid M, Elleuch M. Physical training combined with dietary measures in the treatment of

- adult obesity. A comparison of two protocols. **Ann Physic Rehab Med** 2009;52:394- 413.
7. Hong Z, Yun P, Zuxiang L et.al. Effects of Acupuncture Therapy on Abdominal Fat and Hepatic Fat Content in Obese Children: A Magnetic Resonance Imaging and Proton Magnetic Resonance Spectroscopy Study. **The Journal of Alternative and Complementary Medicine** 2011;17(No5): 413- 420.
  8. He Q, Horlick M, Thornton J, et.al. Sex and race differences in fat distribution among Asian, African American, and Caucasian prepubertal children. **J Clin Endocrinal Metab** 2002; 87:2164- 70.
  9. Hsieh CH. The effects of auricular acupressure on weight loss and serum lipid levels in overweight adolescents. **Am J Chin Med** 2010;38:675\_682.
  10. Hsu CH, Hwang KC, Chao CL et.al. The effect of auricular acupuncture in obese women: a randomized controlled pilot study. **J Womens Health**. 2005;14(5): 434- 440.
  11. Lee J, Okumura M, Davis M, Herman W, Gurney J. Prevalence and determinants of insulin resistance among US adolescents. A population based study. **Diabetes care**. 2006; 29:2427- 2432.
  12. Lissau I, Overpeck MD, Ruan WJ, et.al. Body mass index and overweight in adolescents in 13 European countries, Israel, and the United States. **Arch Pediatr Adolesc Med** 2004;158:27\_33.
  13. Yeh CH and Yeh SC. Effects of ear points\_pressing on parameters related to obesity in non- obese healthy and obese volunteers. **J Altern Complement Med** 2008; 14: 309- 314.