



(RESEARCH ARTICLE)



The effectiveness of auricular neuromodulation in childhood and adolescent obesity

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Abstract

Childhood obesity represents a significant public health challenge characterized by excessive accumulation of body fat detrimental to a child's health. This condition predominantly stems from an interplay of genetic, environmental, and lifestyle factors. Key contributors include unhealthy dietary habits, insufficient physical activity, and prolonged engagement in sedentary activities, such as excessive use of mobile phones, computers, and television. Childhood obesity predisposes individuals to a spectrum of health complications, including cardiovascular diseases, type 2 diabetes, and respiratory disorders. Additionally, it is associated with various psychological and social challenges. The rising prevalence of childhood obesity underscores its seriousness as a growing public health concern, with long-term implications for the health and well-being of affected children.

Results: The review identified four surveys that met the predefined outcomes. These studies provided substantial evidence supporting the use of auricular neuromodulation in addressing childhood obesity. Each of the four studies was a randomized clinical trial, focusing on children and adolescents who underwent auricular neuromodulation. This procedure involved the use of vaccaria (plant seeds), metal pellets and mustard seeds. The participants in this study were divided into two subgroups. The first group received intervention with the use of vaccaria and the second group was the control group where there was no intervention. This design facilitated the comparison of the given intervention against alternative treatments. The primary outcome measures included anthropometric parameters and assessments of body image, self-esteem, and depressive symptoms.

Conclusion: Recent studies have demonstrated that auricular neuromodulation using vaccaria seeds, mustard seeds and metal pellets yields positive results in treating childhood obesity. This conclusion is based on anthropometric outcome measures. These findings suggest that such neuromodulation techniques can be a viable option in the physiotherapeutic treatment of obesity in children and adolescents.

Keywords: Physiotherapy; Auricular Neuromodulation; Childhood Obesity; Adolescent Obesity

1. Introduction

The global epidemic of obesity is one of the most pressing public health challenges of the 21st century, increasingly affecting populations worldwide. Currently, over a billion individuals are either obese or overweight. Alarmingly, this issue extends to pediatric demographics, impacting children at various developmental stages. Research by the International Obesity Task Force reveals that approximately 22 million children under five years old are obese or overweight (Malecka-Tendera & Mazur, 2006). The escalating prevalence of childhood obesity underscores the urgency of addressing this public health dilemma.

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Obesity is a multifactorial condition, resulting from an intricate interplay of genetic, behavioral, environmental, physiological, social, and cultural elements. These factors collectively contribute to an energy imbalance, leading to excessive fat accumulation. Extensive research has explored the relative influence of each factor. While genetic predispositions play a crucial role in weight regulation, the World Health Organization's Obesity Consultation identified behavioral and environmental factors—specifically, sedentary lifestyles coupled with excessive caloric intake—as the primary drivers of the dramatic surge in obesity rates observed over the past two decades (Dominique Hansen 2016).

Television viewing among young children and teenagers has increased dramatically in recent years. Each additional hour of television viewing per day increased the prevalence of obesity by 2% (Anderson & Butcher, 2006). Childhood obesity can affect the self-esteem of young obese individuals and lead to long-term serious psychological and social consequences (Poeta et al., 2013).

In recent years, there has been a burgeoning interest in the medical applications of acupuncture, both within our country and globally. This interest is not limited to traditional medical practitioners, it extends to various health professionals, including physiotherapists, who are now incorporating acupuncture into their treatment regimens. The diversity in the application of acupuncture is indeed remarkable and underscores its growing significance in the field of alternative medicine.

Given this widespread and diverse application, emerged a clear necessity for institutionalizing acupuncture practices. This need stems from the reality of its increasing usage and the potential it holds for treatment in various medical contexts. Institutionalization would not only formalize acupuncture practices but also ensure standards of quality and efficacy, thereby enhancing its credibility and effectiveness as a viable treatment option.

Auricular acupuncture represents a specialized subset of acupuncture, focusing exclusively on the ear. Distinct from traditional acupuncture, where needles are inserted at various points across the body, auricular acupuncture typically involves the application of small vaccaria seeds at specific points on the ear. These points are selected based on the specific condition being addressed.

Auricular acupuncture is considered part of complementary medical practices. It serves dual roles, functioning both as a diagnostic and therapeutic tool. As posited in the theory, which finds support in the work of Bazzoni (2014), the auricle of the ear is a microsystem reflecting the body's various structures and functions. This concept underpins the methodology of auricular acupuncture, offering a unique perspective on treatment and diagnosis in complementary medicine.

The inception of modern auricular acupuncture, is attributed to the French physician Paul Nogier in 1957. Nogier first introduced his observations on the somatotopic correspondences of ear regions. Recent clinical research has substantiated the efficacy of this acupuncture variant, primarily in alleviating both acute and chronic pain, as evidenced by Barker et al. (2006), and in managing stress-related disorders, as noted by Wang, Peloquin, and Kain (2001).

Furthermore, the potential benefits of this technique in treating conditions such as irritable bowel syndrome, obesity, and aiding in smoking cessation, alcohol abstinence, and other forms of substance abuse are currently under investigation, as indicated in studies by D'alberto (2004) and Lacey, Tershakovec, and Foster (2003).

2. Research methodology

- Search Sources: PubMed Database.
- Study Strategy: The search for scientific publications was centered around the utilization of specific scientific terms pertinent to the study focus.
- Keywords: "Physical Therapy Intervention," "Auricular Acupressure," "Pediatric Obesity," "Quality of Life," "Children."

2.1. Search strategy and selection process for scientific publications

The research methodology for sourcing scientific publications involved the strategic use of specific scientific terms pertinent to the topic under study. The keywords selected for this search were "physical therapy intervention," "Auricular Acupressure," "pediatric obesity," "quality of life," and "children." The search parameters were deliberately narrow, excluding combinations with other terms, due to the limited scope of existing literature on the subject. Additionally, there was no imposition of time constraints on the literature search. The inclusion criteria for selecting studies were stringent: the studies needed to be clinical in nature, focus on children as subjects, and report on the

application specifically of auricular neuromodulation. A key aspect of the evaluation was the assessment of weight reduction outcomes in the participating children.

Pursuing these criteria, an initial corpus of 49 articles was identified. Following the application of stringent selection standards, 4 articles were ultimately chosen for detailed review. The methodology of the search strategy is meticulously illustrated in the accompanying flowchart.

The search results underwent a preliminary examination at the title and abstract level, leading to the elimination of duplicate records. Subsequent steps involved securing the studies that were not initially rejected. A thorough analysis of their full texts was conducted to identify those studies that satisfactorily met the inclusion criteria for this review.

2.2. Selection procedure

The selection of scientific publications was based on three stages: in the first stage, the bibliographic references were searched and the resulting titles were read. In the second stage, the selection of titles relevant to the topic and the reading of the abstracts was carried out. In the third stage, the final selection of articles was made and these are illustrated in the flow chart below.

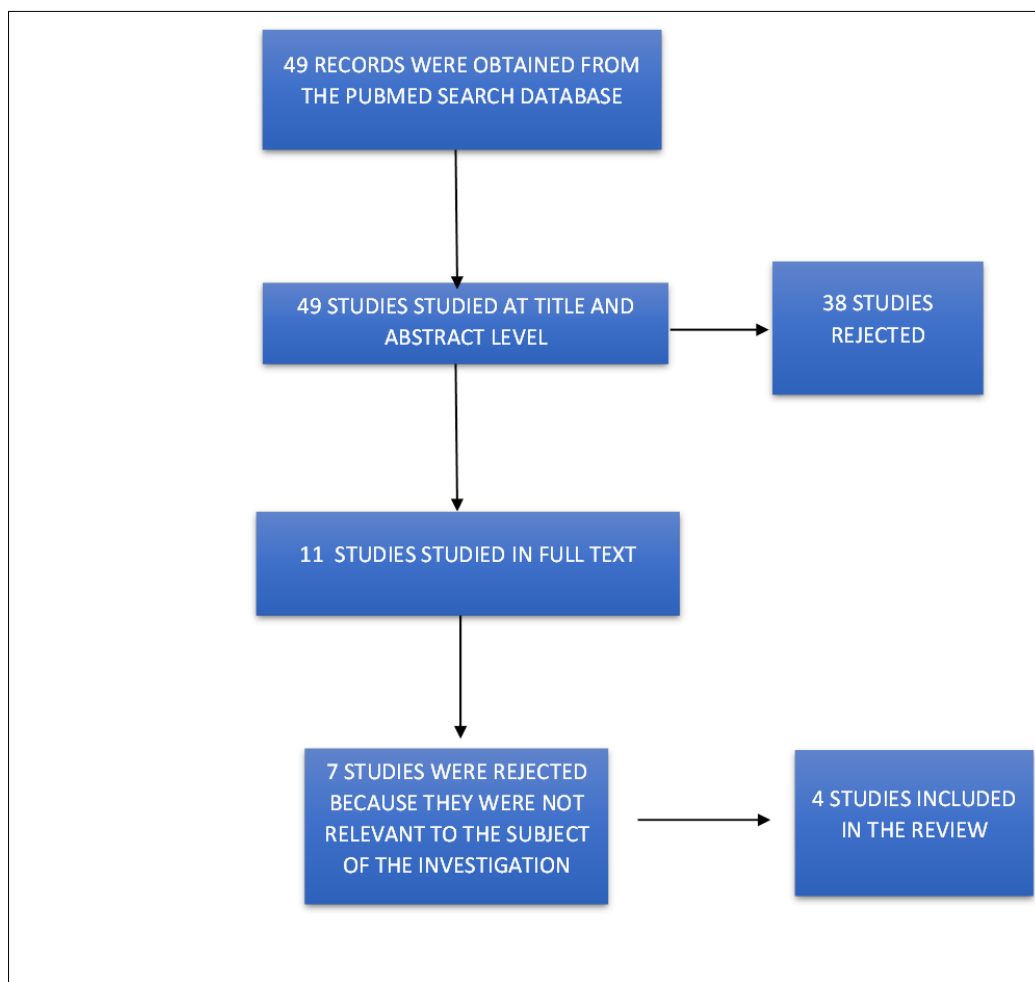


Figure 1 Study flow chart

3. Results

Below (Table 1) the characteristics of the sources included in this review are presented and then analyzed.

Table 1 Literature review data

Authors	Title	Method	Results
<p>1. Hyun Su Cha, Hyojung Park 2019 Department of Nursing, Sehan University, Yeongam, Republic of Korea College of Nursing, Ewha Woman's University, Seoul, Republic of Korea</p>	<p>Effects of auricular acupressure on obesity in adolescents</p>	<p>Randomized controlled trial on the efficacy of in the treatment of adolescent obesity. Participants N=58 obese adolescents divided into 2 groups. The experimental group n= 32 subjects and n= 26 subjects the control group. The experimental group received vaccaria seed pressure treatment at the ear sites for obesity while the control group received auricular neuromodulation applied at differential and unrelated sites for obesity. Duration of the study was 8 weeks. Outcome measures body weight, abdominal and hip circumference, hip waist ratio, BMI, body fat mass, body fat percentage, triglycerides, total cholesterol.</p>	<p>Adolescents in the experimental group showed significant improvement in total cholesterol and low-density lipoprotein levels compared to the control group adolescents $p < 0.001$. In conclusion, auricular neuromodulation using vaccaria seeds was effective in reducing total cholesterol levels and low-density lipoprotein levels in adolescents with obesity.</p>
<p>2. Hyun Su Chaa, Hyojung Parkb 2020 Department of Nursing, Sehan University, Yeongam, South Korea College of Nursing, Ewha Woman's University, Seoul, South Korea</p>	<p>Effects of Auricular Acupressure on Korean Children Who are Obese</p>	<p>A randomized controlled trial examining the application of auricular neuromodulation for the treatment of childhood obesity. The sample included 65 obese children aged 9-11 years. They were divided into 2 groups n=31 children in the experimental group and n=34 in the control group. The sessions were continued for 8 weeks. Participants in the experimental group and control group received auricular neuromodulation with metallic beads at 5 acupuncture points known to be effective in treating obesity and at 5 non-obesity acupuncture points. Outcome measures included body image score, childhood depression inventory, Rosenberg self-esteem scale and anthropometric indicators (waist circumference, hip circumference, BMI, etc.)</p>	<p>Children in the experimental group showed significant improvement in waist circumference and hip circumference after 8 weeks compared to those in the control group ($p < 0.001$). However, no statistically significant difference in body image score, depression score or self-esteem score occurred before or after auricular neuromodulation in the experimental and control groups.</p>
<p>3. Ching Hsiu Hsieh Department of Nursing, Chang Gung Institute of Technology, Chia-Yi, Taiwan</p>	<p>The Effects of Auricular Acupressure on Weight Loss and Serum Lipid Levels in Overweight Adolescents</p>	<p>Randomized controlled trial of the benefits of auricular neuromodulation cholesterol, total triglycerides, high-density lipids (HDL) and low-density lipids (LDL). Sample N = 84 obese adolescents aged 18-20 years with BMI ≥ 23. 3 groups emerged, control group A received sham treatment with tape only that did not press acupuncture points. Experimental group B received treatment with Japanese magnetic pearls and group C received treatment with vaccaria seeds. Duration of treatment was 8 weeks. Outcome measures : BMI, TC, TG, HDL, LDL.</p>	<p>BMI increased significantly in the control group by +0.0457 ($p < 0.0001$), decreased in the Japanese mangrove pearl group by -0.6982 ($p < 0.0001$) and in the Vaccaria seed group by -1.2341 ($p < 0:0001$). All three groups showed significant increases in TC, TG, HDL and LDL.</p>
<p>4. Dongwon Kim, MS, RN, Ok Kyung Ham, PhD, RN, Changwan</p>	<p>Effects of Auricular Acupressure</p>	<p>Randomized controlled trial to examine the effects of auricular neuromodulation using mustard seeds on childhood obesity and self-efficacy. Sample N=49 female</p>	<p>Students in the experimental group showed significant</p>

<p>Kang, PhD, Eunmi Jun, PhD, RN THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE Volume 20, Number 4, 2014, pp. 258–264</p>	<p>Using mustard Seeds on Obesity and Self-Efficacy in Female College Students</p>	<p>students who were overweight or obese BMI\geq25 divided into 2 groups the control group n=24 and experimental group n=25. The control group received placebo while the experimental group received auricular neuromodulation at acupuncture points for obesity with mustard seeds. Duration of treatment: 2 weeks. Outcome measures: BMI, percentage body fat, hip waist ratio and self-efficacy scale.</p>	<p>reductions in weight (t = 10.76, p < 0.001) and BMI (t = 9.60, p < 0.001) and significant improvement in self-efficacy (t = 1.85, p < 0.05) compared to the the control group. However, changes in body fat percentage (t = 1.27, p > 0.05) and waist-to-hip ratio (t = 0.60, p > 0.05) were not significantly different between the two groups</p>
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4. Literature review

O Hyun Su Cha et al., in their 2019 study examined how ear pressure on specific areas can help children who are overweight. The results showed that it did help reduce the size of their waist and hips. But there were some limitations to the study, such as not having enough children in the study and not applying the ear pressure for long enough. So, more studies with more children and for a longer period of time will have to be done to see if it really works. It would also be useful to see if the effects last even after the ear pressure is stopped. And it would be good to focus on children who are severely overweight, as the results may be different for children who have BMI (Body Mass Index) less than 30.

Hyun Su Chaa et al., in 2020 in another study tested a special type of pressure on the ears of overweight adolescents to see if it would help them. The results showed that this type of pressure can help lower their cholesterol. Based on what was found, it was understood that more studies need to be done with severely overweight people to see if this kind of intervention has good results for them. Also, there were not enough teenagers in this study, so we cannot say for sure whether it will help all overweight teenagers. It is believed that more studies with more adolescents need to be done to establish the validity and effectiveness of the intervention.

The study by Ching Hsiu Hsieh et al., 2010, found that ear acupuncture can help people lose weight. It also showed that teaching healthy habits is not enough to make them lose weight. Other studies have also found positive results with acupuncture for weight loss. However, this study did not compare different materials used in acupuncture. Based on this study, the use of vaccaria seeds for acupuncture may be the most effective. The study also found that only one group had a significant reduction in blood fat levels. This may be because the study only lasted eight weeks. However, since all the treatments showed some improvements, it seems that short-term weight loss may not affect other health factors. Obesity is a long-term problem, so acupuncture may need to be done for a long time to see results. It is important that weight loss programs also include a phase where people learn how to maintain their weight loss. The people in this study were from a college. compared to the control group. However, changes in body fat percentage (t = 1.27, p > 0.05) and waist-to-hip ratio (t = 0.60, p > 0.05) were not significantly different between the two groups

Researchers in Taiwan have studied the effects of a type of treatment called auricular acupuncture on students who were overweight or obese. They found that it helped them lose weight. However, the study only included a small number of participants, so more research is needed with larger groups of people from different backgrounds. It is also important to see if the effects of the treatment continue even after it is finished. The researchers also want to see if auricular acupuncture can help people who are not overweight or obese. They also want to know if the treatment can be used to change body mass index (BMI). Auricular acupuncture is a low-cost treatment that does not require much medical supervision and may be useful for treating overweight and obesity, especially when vaccaria seeds are used.

In this study, researchers Dongwon Kim et al., 2014, wanted to see if a particular type of treatment could help girls who were overweight or obese. They used a random selection of girls and divided them into two groups. One group received the treatment, which involved pressing on certain points in their ears with special seeds. The other group received no treatment at all. After four weeks, researchers found that the girls who received the treatment lost weight and had a lower BMI. They also felt more confident about themselves. However, the study was short, so they couldn't see if the treatment helped reduce their body fat or waist size compared to their hips. Researchers believe that this treatment could be a good way to help young adults with obesity because it is safe, does not require surgery and does not cost a

lot of money. They suggest that more studies need to be done to see if the treatment can have long term results and whether other materials could be used instead of seeds.

5. Discussion

In the present literature review, 4 clinical studies were found which supported the subject of its analysis. This review was undertaken to examine whether auricular neuromodulation is effective in children who are obese as a treatment for obesity. It was observed during its conduct that there is little data on the reliability of the method of auricular neuromodulation in the treatment of childhood obesity. However, the study presented data suggesting various tools for its application such as vaccaria seeds and mustard seeds as well as specific pressure points that based on the outcome seemed to have objective and measurable effects on the sample, such as reduction in anthropometric variables for example waist circumference of hips (Hyun Su Cha, et al., 2020, Hyun Su Cha et al., 2019). Although the research has shown that the method can be applied and has successful results, more studies are needed as well as the specialization of health professionals for the application of the method.

A multidisciplinary support system involving physiotherapists and other health professionals can be useful for obese children and adolescents. A relatively small proportion of people who lose weight are able to prevent significant weight regain. Therefore, more help and support from physiotherapists using modern techniques such as auricular neuromodulation could provide another avenue by which obese children and adolescents can achieve reduced weight maintenance for health (Dominique Hansen, 2016).

Proposals

As physiotherapists working with children, it is imperative to:

- Articulate the significance of therapy in fostering children's adherence to the treatment regimen.
- Clearly define the objectives of auricular neuromodulation to parents, ensuring their understanding and involvement.
- Regularly provide updates on the child's progress and improvements noted during therapy.
- Attend counseling programs for information and prevention.
- Offer consistent support and encouragement to both the children and their parents, fortifying their commitment to the treatment.
- Emphasize the necessity for both children and parents to adopt and maintain a healthy lifestyle as a complement to the therapy

6. Conclusion

Auricular acupuncture is a low-cost treatment that does not require medical supervision and may be useful in treating childhood overweight and obesity. It is considered necessary to carry out more studies on the reliability of the method. The specialization of health professionals is considered necessary for the application of the method in order to do it safely, effectively and to provide health to children with little money now and in the future as adults.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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