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Article

Effectiveness of Electroacupuncture on Body Mass Index and Waist Circumference in Overweight Cases at Campus 1 of the Health Polytechnic of the Ministry Of Health in Surakarta

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ABSTRACT

Excess weight is the root of various non- communicable diseases that are still a health problem in Indonesia. Acupuncture can reduce weight by stimulating the satiety center in the hypothalamus and suppressing the hunger center. This study aims to determine the effectiveness of electroacupuncture therapy (Body Acupuncture and Ear Acupuncture) and electroacupuncture therapy (body acupuncture) on body mass index and waist circumference in cases of excess weight at Campus 1 of the Health Polytechnic of the Ministry of Health, Surakarta. This study used a Quasi-Experimental research design with a two-group pre-test-post-test design and a purposive sampling technique with a sample size of 42 subjects. The group consisted of 21 subjects for group 1 and 21 subjects for group 2. The results of the Wilcoxon test for electroacupuncture therapy (body acupuncture and ear acupuncture) with $\rho<0.001$, and for electroacupuncture therapy (body acupuncture) with $\rho<0.001$. It can be concluded that electroacupuncture therapy (body acupuncture and ear acupuncture) and electroacupuncture therapy (body acupuncture) significantly affect body mass index and waist circumference in cases of overweight. Conclusion Electroacupuncture therapy (Body Acupuncture and Ear Acupuncture) is effective in changing body mass index and waist circumference at Campus 1 of the Ministry of Health Polytechnic of Surakarta

I. INTRODUCTION

Nutritional problems in Indonesia are currently entering a double nutritional problem, meaning that nutritional problems have not been fully resolved, while other nutritional problems have emerged. Overweight is the root of various non-communicable diseases such as diabetes, hyper tension, and cardiovascular disease which are currently still major health problems in Indonesia. Overweight and obesity are major problems for the body because their effects will make the body move slowly (1). A study estimates that by 2030 overweight sufferers will increase to 2.2 billion people

and obesity sufferers will increase to 1.1 billion people[2].

The National Population and Family Planning Agency (BKKBN) explains the adolescent phase commonly called puberty which has an age range between 10-24 years consisting of early adolescence at 13 to 17 years and late adolescence at 17 to 21 years, namely the transition period from childhood to adulthood. Adolescents experience many changes during this period, both physically, emotionally, and in with other body functions that can affect various aspects of life[3].

The prevalence of overweight worldwide has always increased from 1975 to 2020, in 2019 adults over the age of 18 around 1.9 billion people in the world were overweight. The prevalence of overweight children in the world also increased from 4.2% in 1990 to 9.1% in 2020. The results of the Basic Health Research (Riskesdas 2018) in Indonesia showed the prevalence of adults (>18 years) overweight at 13.6% while 28.7% were obese (BMI ≥ 25), while the prevalence of overweight and obesity in Central Java Province was ranked 2nd at the age of >18 at 21.8%. Data on students in Central Java, the prevalence of overweight was 20% and in Surakarta, 9.98% were overweight[4].

Acupuncture is a therapy of choice for treatment that has long been developed in the fields of aesthetics and cosmetics. The solution to lose weight in acupuncture is an option that can provide good results. Acupuncture can lose weight by stimulating hypothalamic satiety center and suppressing the hunger center, thereby reducing food intake and reducing the number of calories entering the body[5].

One study showed that ear acupuncture can reduce the volume of fat or adipose tissue which results in a decrease in the Wast-Hip-Ration (WHR) / Waist-hip ratio and mainly affects weight loss [6]. Electroacupuncture can also cause an increase in beta-endorphin levels in blood plasma and the central nervous system. This beta-endorphin has lipolytic activity so it can trigger the breakdown of fat cells into free fatty acids and glycerol[5].

This study aims to determine the effectiveness of electroacupuncture therapy (Body Acupuncture and Ear Acupuncture) and electroacupuncture therapy (body acupuncture) on body mass index and waist circumference in cases of excess weight at Campus 1 of the Health Polytechnic of the Ministry of Health, Surakarta.

II. METHODS

This study used a Quasi Experiment research design with a two groups pre-test-post-test design and a purposive sampling technique with a sample size of 42 subjects. The group division consisted of 21 people for group 1 and 21 people for group 2. This study focused on the effecttiveness of electroacupuncture therapy on body mass index (BMI) and waist circumference before and after therapy.

The independent variables in this study were electroacupuncture therapy (body acupuncture and ear acupuncture) and electroacupuncture therapy (body acupuncture). The dependent variables in this study were Body Mass Index and Waist Circumference in Overweight Cases in students at Campus I Health Polytechnic Ministry of Health Surakarta. The tools used included ear press needles, electrostimuators, acupuncture needles, sterile cotton, alcohol, handscones, tweezers, stainless steel bends, masks, stethoscopes, nierbeken.

The research subjects were divided into two groups, namely group I.was given ear acupuncture and body acupuncture treatment with a electrostimulator, and group II was given body acupuncture therapy with an electrostimulation.

III. RESULT

The study of the effectiveness of electroacupuncture on body mass index and waist circumference in overweight

cases at Campus 1 Health Polytechnic Ministry of Health Surakarta which was conducted from February to March 2024 obtained data on the number of populations were 42 overweight students. Acupuncture therapy was carried out according to the agreed schedule. Acupuncture therapy was carried out 2-3 times a week and was carried out for 10 therapies.

Table 1. Distribution of research subjects by age (n=42)

Age	Group I		Group II	
	N	%	N	%
18	9	21.4	3	7.1
19	6	14.3	7	16.7
20	6	14.3	5	11.9
21	-	-	3	7.1
22	-	-	3	7.1

Table 1. The age is known that the research subjects in group I Electro Acupuncture Therapy (Body Acupuncture and Ear acupuncture) were mostly aged 18 years as many as 9 people (21.4%). The research subjects in group II Electro Acupuncture Therapy (Body Acupuncture) were mostly aged 19 years as many as 7 people (16.7%).

Table 2. Blood Pressure Values After Intervention

Gender	Group I		Group II	
	N	%	N	%
Male	19	45.2	18	42.9
Female	2	4.8	3	7.1

Table 2. Gender shows that the research subjects in group I Electro Acupuncture Therapy (Body Acupuncture and Ear Acupuncture) were mostly female, 19 people (45.2%) and in group II Electro Acupuncture Therapy (Body Acupuncture) the majority were female, 18 people (42.9%).

Table 3. Syndrome differentiation shows that the research subjects in groups I and II mostly had moist obstruction syndrome and spleen deficiency, as many as 13 people (31%) category as many as 16 people (35.8%).

Table 3. Distribution of research subjects based on syndrome differentiation (n = 42)

Syndrome	Group I		Group II	
	N	%	N	%
Damp obstruction and spleen deficiency	13	31.0	12	28.6
Accumulation of excess heat in the stomach and intestines	8	19.0	9	21.4

Table 4 shows the distribution of research subjects' Body Mass Index (BMI) across Group I and Group II (n = 42), presenting the mean and standard deviation (SD) values before and after the intervention. Before the intervention, Group I had a mean BMI of 25.74, while Group II had a mean of 24.69. After the intervention, the mean BMI decreased to 24.91 in Group I and to 24.35 in Group II, indicating a reduction in BMI for both groups, potentially reflecting the impact of the intervention.

Table 4. Distribution of research subjects based on BMI (n = 42)

BMI	Group I	Group II
	Mean	Mean
Before Intervention	**25.74**	**24.69**
After Intervention	**24.91**	**24.35**

Table 5 presents the distribution of research subjects' Waist Size (WS) across Group I and Group II (n = 42), with mean and standard deviation (SD) values recorded before and after the intervention. Before the intervention, the mean Waist Circumference for Group I was 88.62, and for Group II, it was 85.29. After

the intervention, the mean WS decreased to 86.52 in Group I and 84.14 in Group II, indicating a reduction in waist size in both groups, which may suggest an effect of the intervention.

Table 5. Distribution of research subjects based on Waist Circumference (n = 42)

Waist Circumference	Group I	Group II
	Mean	Mean
Before Intervention	**88.62**	**85.29**
After Intervention	**86.52**	**84.14**

Table 6 shows the results of the data normality test using the Shapiro-Wilk test. The significance value of BMI before therapy in group 1 was 0.213, while the significance value of BMI after therapy in group 1 was 0.126. The significance value of BMI before therapy in group 2 was 1.000, while the significance value of BMI after therapy in group 2 was 0.604. The significance value of waist circumference before therapy in group 1 was 0.033, while the significance value of waist circumference after therapy in group 1 was 0.011. The significance value of waist circumference before therapy in group 2 was 0.078, while the significance value of waist circumference after therapy in group 2 was 0.017. It can be concluded that the data is not normally distributed because the significance value is less than 0.05 ($p < 0.05$).

Table 6. Test of Data Normality

Variable	Category	N	Shapiro Wilk (sign)	
			Group I	Group II
BMI	Before	21	0.213	1.000
	After	21	0.126	0.604
Waist Circumference	Before	21	0.033	0.078
	After	21	0.011	0.017

Based on Table 7, the Wilcoxon test result in Asymp.Sig. (2-tailed) $p < 0.001$. This shows that the p-value <0.05. Thus Ha is accepted and H0 is rejected so that it can be concluded that there is a significant change in the results of electroacupuncture therapy on body mass index and waist circumference in overweight cases.

Table 7. Wilcoxon Test

Variable	Category	N	Wilcoxon (sign)	
			Group I	Group II
BMI	Before	21	<0.001	<0.001
	After	21	<0.001	<0.001
Waist Circumference	Before	21	<0.001	<0.001
	After	21	<0.001	<0.001

Based on table 8, the Mann-Whitney test results in Asymp.Sig. (2-tailed) $p < 0.001$. This shows that the p-value <0.05. Thus Ha is accepted and H0 is rejected. It is concluded that there is a significant change in the results of electroacupuncture therapy on body mass index and waist circumference in overweight cases.

Table 7. Mann WhitneyTest

Variable	Group	N	Mean rank	p
BMI	Group I	21	28.98	<0.001
	Group II	21	14.02	
Waist Circumference	Group I	21	28.17	<0.001
	Group II	21	14.83	

IV. DISCUSSION

According to Chinese medicine theory, the cause of being overweight or obese is because the spleen and stomach digest too much sweet and oily food. The spleen and stomach work too hard, then because it is too long, its function becomes disrupted. Overweight is included in the category of excess weight called Fei Pang or Tan Yin which means fat. In In Chinese medicine, being overweight is caused by disorders of the spleen and

stomach and disorders of the function of Qi defense (Wei Qi). Pathological changes are also caused by Qi and blood deficiency and excess Yin and Yang deficiency [7].

Micro acupuncture theory is based on Chinese medicine, Western medicine, and clinical experience. One part of the body's micro acupuncture that involves stimulating ear acupuncture points that correspond to certain areas of the body and complaints is ear acupuncture. Ear acupuncture therapy is used in the treatment and prevention of disease by stimulating certain points on the earlobe with ear needles. Some patients will feel full faster, thus reducing the amount of food eaten. This effect lasts for approximately 5 to 7 days depending on a person's maintaining mainappetite control [8].

The results of this study are in line with Hamid Abdi's research using GB 28 Weidao, ST 25 Tinashu, Ren 9 Shuifen, Ren 12 Shongwan, Ren 4 Guanyuan, SP 6 Sanyinjao, ST 40 Fenglong and LI 11 Quchi points and ear acupuncture using hunger points, Shenmen points, endocrine points, spleen points, stomach points and small intestine points which show that body acupuncture and ear acupuncture affect reducing waist circumference and body mass index [6]. The use of an electrostimulator in the abdominal area can also accelerate electrical conduction which will increase lipid and adipokine metabolism which will cause a decrease in adipocyte size and lipolysis of white fat adipose tissue [9]. The results of this study are also in accordance with one of the studies using the ST 25 (Tianshu), SP 15 (Daheng), CV 12 (Zhongwan), GB 26 (Daimai), and others points, which can effectively reduce waist circumference, visceral fat between the xiphoid and umbil icus, and body weight and body mass index in overweight cases [9].

The mechanism of action of acupuncture in overweight cases is through regulation of the nervous system, especially through stimulation of the "center “eating” in the hypothalamus. The hypothalamus has many nuclei are involved in appetite regulation, producing and receiving factors that regulate appetite, influencing energy consumption levels, regulating the secretion of hormones related to energy storage, and also playing an important role in regulating energy balance and body weight regulation, including the Ventromedial Hypothalamic Nucleus (VMH), Arcuate Nucleus (ARC), and Paraventricular Nucleus (PVN) [10].

V. CONCLUSION

The research subjects who experienced overweight were mostly 18 and 19 years old, with 37 female students and 25 students with moist obstruction syndrome and spleen deficiency. The results of the Wilcoxon test for electroacupuncture therapy (body acupuncture and ear acupuncture) showed $p<0.001$, for electroacupuncture therapy (body acupuncture) the $p<0.001$. It can be concluded that electroacupuncture (body acupuncture and ear acupuncture) and electroacupuncture therapy (body acupuncture) significantly affect body mass index and waist circumference in overweight cases at Campus 1 of the Ministry of Health Polytechnic of Surakarta. The results of. the Mann-Whitney test obtained the $\rho< 0.001$, It can be concluded that electroacupuncture therapy (body acupuncture and ear acupuncture) is more effective on body mass index and waist circumference in overweight cases compared to electroacupuncture therapy (body acupuncture) at Campus 1 the Ministry of Health Polytechnic of Surakarta.

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