



Effect of Modisco-Cookies Combined with Auriculopuncture therapy on Increment of Body Weight

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Abstract

Being underweight is a common problem in developing countries, including Indonesia, that may cause infections, including viral ones. The solution to this problem is to provide Modisco cookies and auriculopuncture therapy with seed-pressing methods. Auriculopuncture is a traditional Chinese therapy using the seed-pressing method at the auricular point stimulating to relieve other body pathologies. While Modisco cookies have energy-dense, high-calories, digestible cookies that aim to help accelerate weight gain. This study aims to determine the effect of Modisco cookies compared to a combination of Modisco cookies with auriculopuncture on the increase of body weight among male adolescents. This study observed 22 male teenagers with low body weight for three weeks. The subjects are categorized into two treatment groups: (1) the Modisco cookies group and (2) the combination of Modisco cookies and the auriculopuncture treatment group every day for three weeks (26 days). This study compared the mean of the pre-test and posttest of the weight changes using a T-test. Furthermore, the average weight changes between the two groups were compared using Manova repeated measured test. The Modisco cookies have nutrient-dense and easy to digest, while Auriculopuncture may stimulate to a certain point in the ear. The hypothalamus has a role in the production of the ghrelin hormone. The therapy may increase hormone appetite and reduce the use of fat reserves. It may increase the body weight of underweight adolescents significantly ($p=0.00$). A combination of Modisco cookies and auriculopuncture therapy gave a significant increase in adolescent body weight compared to modisco cookies.

Introduction

Indonesia, like other developing countries, faces multiple nutrition problems among the adolescent age group. Underweight, overweight, or obesity problem may affect the growth and development of adolescence. Therefore they are more susceptible to chronic diseases such as cardiovascular disease, cancer, and osteoporosis which may lead to an increase in mortality in adulthood. Based on the research and development data, on the assessment of the nutritional status of early adolescents aged 12-14 years, based on body mass index by the age

of prevalence on underweight are 11.1% (3.3% skinny and 7.8% thin) (Islam & Biswas, 2020)

According to the data on the status of BMI by the age of prevalence on the low nutrition status of adolescents aged 13-15 years old in Pamekasan district during 2013 were 0.7% skinny and 14,7% underweight. Pamekasan has the highest prevalence among other districts in East Java (Dinkes Jawa Timur, 2020). The prevalence of malnutrition in Pamekasan District illustrates that the implementation of the nutrition problem management program is still not as expected because it focuses on

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pregnant women and toddlers while adolescents have not been touched, whereas, in the 12-14 age year group which is adolescence, nutritional needs are much higher because in at this age, there is an increment in body size which causes an increase in the metabolic rate, so the body requires more energy for activities (Christian & Smith, 2018)

In addition, energy is also needed for the synthesis of new tissues, and body development so it is necessary to pay attention to the nutrition problems in the adolescent group. The health effects of being underweight on adolescents are susceptibility to infectious diseases due to a decreased immune system, loss of body muscle mass, hair loss, irregular hormonal regulation (thyroid gland disorders), and fatigue. In the long term, being underweight can cause osteoporosis and anemia. Being underweight also has the potential to cause stunted growth (Kumar et al., 2021). The problem of stunting in adolescence needs to be a concern because it is a reflection of the quality of human resources in the future. Several studies have shown a link between stunting and impaired cognitive function (Andersen et al., 2016; Sokolovic et al., 2014), and stunting may cause a decrease in the body's immune system and increases the risk of developing infectious diseases (Arini & Ike, 2020; Mardiana et al., 2022).

Improving nutrition in the adolescent group is a strategic step to overcoming nutritional problems. The predisposing factors of low body weight are physical health, psychological health, lifestyle, and low nutrient intake. A condition that interferes with the individual's ability to absorb food can cause growth disorders. It may lead to stunting problems (Arini & Ike, 2020; Mardiana et al., 2022). In traditional Chinese medicine, low body weight is caused by the loss of appetite due to the limited energy in the spleen and stomach (Li & Xu, 2011).

One of the solutions to the problem of low body weight is by consuming modisco. "Modisco" is an acronym for modified dried skimmed milk and cotton sheet oil. It is an energy-dense, high-digestible energy drink. Modisco is digestible, easily made, and able to process in a variety of food and beverage recipes. It was first discovered by May and

Whitehead in 1973 (Maryanto et al., 2020). Modisco is a highly nutritious food or drink. Modisco is firstly tried on children with severe nutritional disorders in Uganda (Africa) and showed very satisfying results. Modisco aims to help accelerate weight gain (Maryanto et al., 2020). Researchers modify Modisco in the form of cookies. The purpose of presenting Modisco in the form of cookies is to make it more attractive for teenagers and more practical to consume. Besides, the product is more durable. Therefore, there is no need to make modisco every day.

Another alternative treatment is particular acupuncture, called auriculopuncture. The practice has existed since ancient China. It was also investigated by a French doctor in the 1950s, Dr. Paul Nogier and his team. The result stated that specific areas of the ears could be associated with particular body parts, including the spleen and stomach (Oleson, 2014). Auriculopuncture is a therapy on the outer surface of ears (also called the auricle), which is stimulated to relieve other body pathologies. The mechanism of auriculopuncture therapy is balance. The principle is inhibiting the function of hyperactive organs. Promote the hypoactive function organs while being harmless on healthy tissues and organs. This therapy applies a seed pressing method (pressing using seeds) at the auricular point that is easily applied. It is less expensive, the self-done stimulation, and does not need the insertion of needles, so it is more suitable to overcome the underweight problem among adolescents (Oleson, 2014). Researchers think there is a need for research on the effect of modisco-cookies combined with auriculopuncture therapy on the increment of body weight, because the results of this study allow giving new insight into the method of increasing body weight and it may solve underweight problems.

Methods

This study used statistical comparative analysis with experimental quantitative research design and data collection methods with repeated measurements Pre-test-Post-test Group Design. The study was conducted for three weeks on male adolescents with low BMI enrolled at SMPN 2 (Junior High School)

Pamekasan. Sampling in this study applies a purposive random sample using the Slovin Formula.

BMI is obtained from the comparison between body weight and height or is formulated as (Nuttall, 2015)

$$BMI = \frac{\text{weight (Kg)}}{\text{Height}^2(m)}$$

An adolescent with a BMI of less than 18.5 will be included as sample. Approximately 22 subjects were collected and divided into two treatment groups. The combination of Modisco cookies (two cookies after breakfast and two cookies after dinner) and auriculopuncture (pressed once a day for 1 minute) group and modisco cookies only (two cookies after breakfast and two cookies after dinner). We gave treatment every day for three weeks (21 days). The inclusion criteria in this study were: male adolescent aged 12-14 years old, registered as a student at SMPN 2 Pamekasan, low BMI, and had no history of chronic and acute illnesses. They were willing to work together as research subjects and filled out the informed consent. The subjects' guardians were also willing to work together to support research activities, and filled out informed consent. The procedures, possible discomforts or risks, and possible benefits, were explained fully to the human subjects involved. Their informed consent was obtained before to the investigation. Data analysis was performed by interpreting the treatment results and then comparing the difference between pre (before) and post (After) treatments using the next paired T-test, comparing two treatment groups single treatment of modisco cookies and combination treatment of modisco cookies and auriculopuncture with the Manova repeated the measured test. It is an institutionally approved study by the Universitas Airlangga faculty of dental medicine health research ethical clearance commission.

Result and Discussion

The 22 adolescents male aged 12-14 years with low body mass index are chosen as the sample of SMPN 2 Pamekasan. Male is chosen as the subject because Gender affects body weight because there are differences in the amount of energy needed during adolescence. This is due to differences in body composition and growth rate between men and women (Lauretta et al., 2018). While adolescents are chosen as the subject because the number of nutritional needs of adolescents are relatively large. It is due to higher physical activity than at other ages. In addition, male adolescents aged 12-14 years need more nutrients for growth because at this age growth spurt occurs in males (Pineau & Ramirez-Rozzi, 2021).

Figure 1 illustrates that each treatment group was weighted four times during the study, a pre-test (before treatment), first monitoring a week after treatment, second two week after treatment, and post-test three weeks after the first treatment. From observation, we found that in Modisco-only treatment, there was a decrease in the average weight on first monitoring by 0.02 kilograms. But then we found an increase in body weight of 0.31 kilograms in the second monitoring, then 0.29 kilograms in the post-test. Meanwhile, in combination of cookies Modisco with the auriculopuncture therapy group, we found a stable increase in body weight since the first week of treatment. From the comparison of the pre and post-test, both groups experienced an increase in the percentage increase in the average weight of cookies Modisco only treatment group of 1.91% while the combination of cookies Modisco with auriculopuncture therapy group was 4.71%. The combination of cookies Modisco with auriculopuncture therapy group had 2.79% higher than cookies Modisco only treatment.

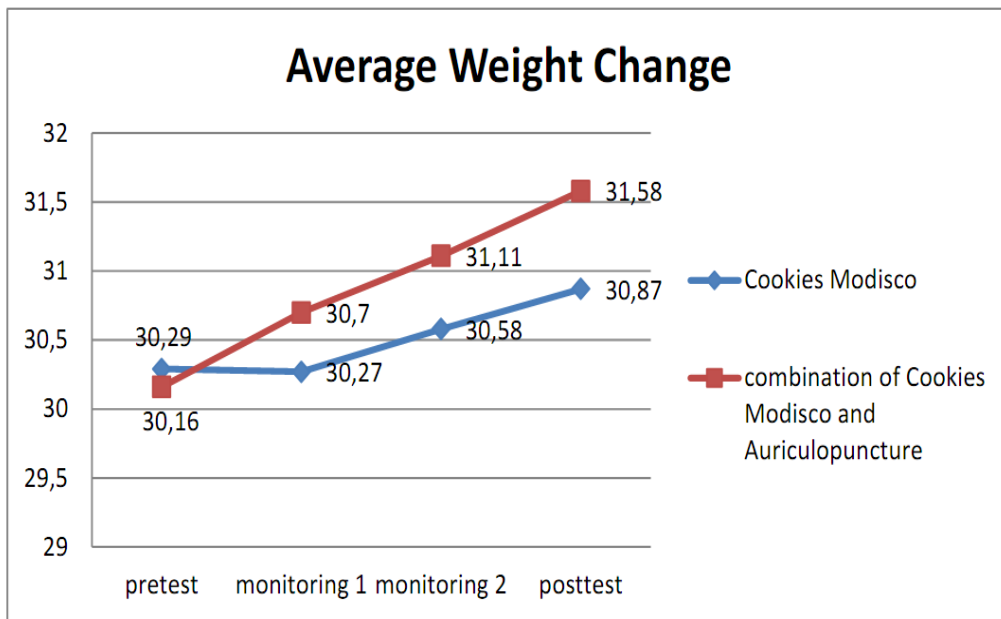


FIGURE 1 Average Weight Change Graphic

According to the t-test of pre and post-weight in a Modisco cookies group was significant ($p = 0.000$) with an average increase in value of 0.58. While the t-test of pre and post weight in the combination treatment group has a significant result ($p=0.000$) with an average increase of 1.41. The results of the statistical tests are presented in Table 1

Table 1 Comparison of Pre and Post Body Weight

variable	Mean	SD	Df	P*
Cookies Modisco	0.58182	0.19400	10	.000
Cookies Modisco & Auriculopuncture	1.41818	0.76134	10	.000

*value of p comes from t pre-post test of the single treatment group

Both groups show that cookies Modisco only and a combination of cookies Modisco with auriculopuncture therapy may increase body weight significantly. But the combination shows better mean results than the cookies Modisco-only group. Statistical tests for weight gain aim to discover the significance of weight change in the Modisco cookies group and the combination of Modisco cookies and Auriculopuncture. The research applies the Manova Repeated Measured Test technique to the Modisco Cookies group and the Modisco

Cookies and Auriculopuncture groups. The calculation result of the Manova Repeated Measured Test shows a significant difference in body weight change between the modisco cookies group and the combination treatment group with P-value = 0.023. Based on the research results for 26 days to increase the body weight of adolescents male aged 12-14 years with low body mass index, we found there were different results between the combination of Modisco cookies with auriculopuncture and the treatment of modisco cookies. However, the treatment group of the combination Modisco cookies and auriculopuncture had a higher significant result. Several things affect weight gain in this study, both conventionally and traditionally.

Conventionally, Modisco Cookies can increase body weight even with small portions because the food is nutrient-dense, has high calories and high protein, and is easy to digest. The main ingredient of Modisco cookies is the Modisco formula which was modified from the Disco 150 formula. Formula 150 consists of milk, sugar, and cottonseed oil. This formula is firstly given to underweight children in Uganda (Africa) and shows excellent results. Cottonseed oil in Indonesia is expensive and contains toxic substances. Because considering it is not practical, hereupon a modification

is required to replace cotton seed oil with margarine. Intake of high energy, protein, fat, and carbohydrates significantly influence changes in anthropometric indicators of body height and height/age and it has a significant effect on body weight, BMR, BMI, and muscle arm of adolescent (Mardiana et al., 2022). Besides, the sweet taste may increase appetite and help to elevate dopamine hormones (Han et al., 2018). Dopamine mediates the rewarding effect of food and may increase eating behavior, while proteins needed to repair and increase body cells so that adolescents may have better growth (Arsenault & Brown, 2017; Han et al., 2018).

The effort to make Modisco more practical and attractive for consumption is processing it into food products such as cookies (Maryanto et al., 2020). Researchers chose the form of cookies as the Modisco modification because cookies are easy to make, and the ingredients are easy to obtain. More, cookies are more durable. Thus, it is not always necessary to make Modisco every time it needs to be consumed.

Auriculopuncture is a specific therapeutic method in which the earlobe becomes the object of therapy to treat other parts of the body. Stimulation given to the ear usually uses a needle. But with the development of the era, it has been able to use seeds (Seed pressing), laser radiation, and magnetic seeds (Oleson, 2014). The main principle of auriculopuncture is balance. The principle inhibits the hyperactive

while promoting the hypoactive. Yet, no effect on healthy organs. For example, a person with complaints of hypertension doing auriculopuncture therapy with stimulation of several points can lower blood pressure. This therapy has no effect when given to healthy people, in contrast to pharmacotherapy, which will have a blood-lowering effect on objects receiving it even though the person is in a normal condition (Oleson, 2014).

The auricles are rich with nerves. The auricular skin contains various neuroreceptors. For example, sensory nerve endings, nerve endings of sensory follicles, and corpuscle lamellose. Within the tendons and muscles of the auricle, there are both simple and complex sensory plexiform nerve endings, Golgi tendon organs, Ruffini nerve endings, and muscle spindles. Therefore, the auricular points are very sensitive to various stimuli (Oleson, 2014).

Auriculopuncture Research by Shiraishi T (1995), proved that there is a sign to the hypothalamus through the vagus nerve when it gives stimulation to a certain point in the ear (Shiraishi et al., 1995). It has a role in the production of the ghrelin hormone. The hormone addition results in increasing appetite and reducing the use of fat reserves. Ito, et al (2015) provides researchers with the results that auriculopuncture can affect the amount of ghrelin in the body. To find out more significant results, further research is necessary. A brief explanation is presented in the picture below (Ito et al., 2015).

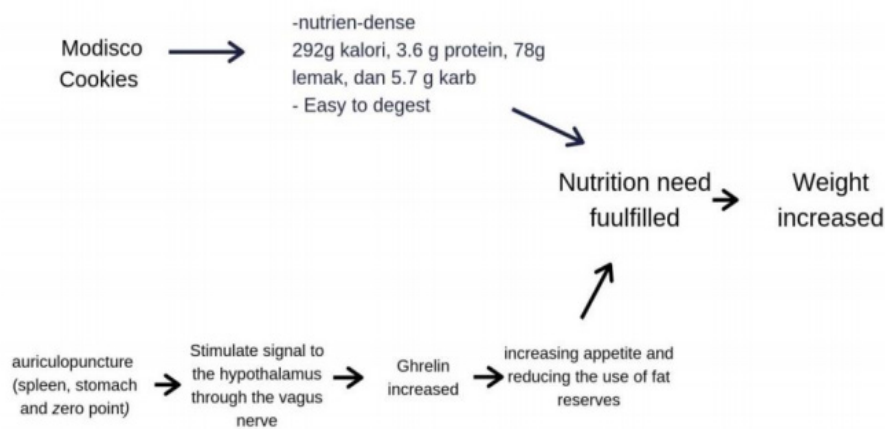


FIGURE 2 Schema of Conventional Factor

According to traditional Chinese medicine (TCM), a person with low body weight correlates with energy weakness in the spleen and stomach (Li & Xu, 2011). The spleen and stomach are organs with earth elements that work together in the processing, accommodating, and transformation of food and drink (Jie, 2008). In the same case, when someone is eating irregularly or under-eating, overeating, being too hungry or consuming too much acidic, fatty and spicy food, these things will weaken or harm the spleen (Jie, 2008). A weak stomach can not digest food properly. And as a consequence, the stomach is not stimulated and replenished. In conclusion, the loss of appetite may appear (Jie, 2008).

The loss of appetite causes the input-energy in is lower than the output one. Adolescents require more energy to do and handle many more activities. Besides, they also need energy for growth. When it is not controlled, it leads to a worse nutritional status. Researchers combine the modification of modisco and auriculopuncture therapy to overcome the underweight problem in adolescents as the previous theories stated.

Following TCM, all ingredients of Modisco cookies are included in the food substance with a sweet taste. The sweet taste is the taste characteristic of the earth element. Consuming

sweet foods influences the function of organs of the earth elements, like the spleen and stomach. Moreover, Modisco cookies are a type of food called Ying. Ying enters the body through the mouth and is then processed in the stomach. From the stomach, the nutrients are transferred by the spleen to the lungs. In the lungs, food nutrient is purified with air into qi (energy). Then the qi is carried out by blood to the heart, and some part is stored in the heart. The heart then spreads qi throughout the body. Sufficient energy is capable to increase body weight (Ito et al., 2015; Li & Xu, 2011; Shiraishi et al., 1995).

Principally, auriculopuncture is to gain body balance. It is achieved by controlling the speed of hyperactivity and promoting hypoactive as long as it is harmless to healthy organs. Hence, it is a very safe therapy (Bradford et al., 2010; Oleson, 2014; Yao et al., 2019). The seed pressing method at the spleen and stomach points as the primary point and zero point as the supporting point are intended to support the therapeutic principle of regulating the qi spleen and stomach. If the qi in the spleen and stomach is normal, the work of the spleen and stomach will also be normal in transforming and transporting food (He et al., 2012). So, the weight will get increase. A brief explanation is described in the picture below.



FIGURE 3 Schema of Traditional Factor

Conclusion

Based on the results of research through data analysis and discussion, the authors conclude that the combination therapy of Modisco cookies with auriculopuncture increases the body weight among male adolescents more significantly compared to the Modisco cookies-only group.

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