THE EFFECTIVENESS OF GIVING EDAMAME AND PORANG FLOUR COOKIES ON CHANGES IN FAT PERCENTAGE AND BODY WEIGHT OF OVERWEIGHT FEMALE STUDENTS AT STIKES BANYUWANGI

Anisatul Mujahidah[1], Alfian Abdul Rajab[2], Efina Amanda[3]
[1] Undergraduate Program in Nutrition, STIKES Banyuwangi, Indonesia
[2] Lecturer of STIKES Banyuwangi, Indonesia.
[3] Lecturer of STIKES Banyuwangi, Indonesia.
Email: anisatulmujahidah1@gmail.com[1], alfianabdulrajab@gmail.com[2], amanda.efina03@gmail.com[3]

ABSTRACT
Being overweight is abnormal or excessive body weight that can have a bad impact on health. The issue of overweight among children and adolescents has become a significant health problem in society, both in developed countries and particularly in urban areas. The prevalence rate for males is 11%, while for females is 12%. The impacts of being overweight are varied, including chronic diseases, type 2 diabetes, etc.This research is quasi-experimental with two groups, an intervention group and a control group, using a pretest-posttest control group design. The sampling technique is total sampling, with 18 samples. The Intervention and control groups were measured for weight and body fat percentage before and after the intervention. Statistical tests showed that the body fat percentage in the Intervention group (P=0.020) and the weight in the Intervention group (P=0.011) had a significant effect. There were differences in the intervention group after the administration of cookies edamame and porang has no effect for body fat percentage and weight of overweight female students at STIKES Banyuwangi. The conclusion is that cookies edamame and porang can reduce body fat percentage and weight in overweight female students at STIKES Banyuwangi. Further research with a larger sample size and longer duration is needed to determine the effective timing for reducing body fat percentage and weight.

Keywords: **Cookies; Overweight; Porang**

ABSTRAK
Overweight didefinisikan sebagai berat badan yang tidak normal atau berlebih yang dapat mengganggu kesehatan. Permasalahan overweight pada anak-anak maupun remaja sudah menjadi permasalahan kesehatan yang besar di masyarakat baik di negara maju maupun di negara berkembang, terutama terjadi di daerah perkotaan. Angka prevalensi laki-laki sebesar 11%, dan angka prevalensi perempuan sebesar 12%. Dampak overweight bermacam-macam diantaranya yaitu, penyakit kronis, diabetes mellitus tipe 2, dan lain-lain. Jenis penelitian ini yaitu kuantitatif dengan menggunakan metode Quasy Eksperimen dan menggunakan dua kelas eksperimen atau kelas perlakuan dan satu kelas kontrol, dengan desain Pretest – Posttest Control Group Design. Teknik pengambilan sampel menggunakan tenknik total sampling dengan 18 sampel. Kelompok perlakuan dan kelompok kontrol diukur berat badan dan persentase lemak sebelum dan setelah diberi perlakuan. Hasil uji statistik diketahui persentase

lemak pada kelompok perlakuan (P = 0,020), dan hasil uji statistik berat badan kelompok perlakuan (P = 0,011) dari hasil uji statistik diketahui bahwa terdapat pengaruh .Terdapat perbedaan pada kelompok kontrol setela pemberian cookies tepung edamame dan porang terhadap persentase lemak dan berat badan mahasiswi overweight STIKES Banyuwangi Kesimpulannya cookies tepung edamame dan porang dapat menurunkan persentase lemak dan berat badan mahasiswi overweight di STIKES Banyuwangi. Perlu penelitian lebih lanjut dengan menggunakan jumlah sampel lebih banyak dan durasi lebih panjang agar dapat diketahui waktu efektif penurunan persentase elmak dan berat badan.

Keywords: **Cookies ; Berat Badan Lebih; Porang**

INTRODUCTION

Being overweight is an abnormal or excessive body weight that can harm health (Vaamonde and Álvarez-Món, 2020). Overweight is a condition of body fat or excessive accumulation of body fat based on the Body Mass Index (BMI) value (Daulay and Akbar, 2021). Being overweight is one of the health problems in Indonesia, which is caused by excess fat accumulation and can cause excess weight (Ministry of Health, 2012). The problem of overweight children and adolescents has become a significant health problem in society both in developed and developing countries, especially in urban areas (WHO 2021).

Overweight is a public health problem that occurs in many countries. The World Health Organization (WHO) stated that from 2016 to 2019, 1.9 billion people over 18 were overweight. The prevalence rate for men was 11%, and the prevalence rate for women was 12%. The highest prevalence rates occurred in developed countries such as the United States and Europe, with overweight rates of 62% and obesity rates of 26% (WHO, 2020). Basic Health Research (Riskesdas) data shows that the overweight rate in Indonesia for people aged 18 and over is around 21.8%. The prevalence data for overweight in Indonesia tends to increase from 10.5% in 2007 to 11.5% in 2013 and 21.8% in 2018 (Ministry of Health of the Republic of Indonesia, 2020). Meanwhile, East Java Province has a higher prevalence of overweight than national data, namely the nutritional status of overweight adolescents of 11.3% and obesity of 5.1% (Indonesia Basic Health Research, 2018). Based on the latest information, it is known that overweight and obesity have not been resolved in Indonesia; based on data from (SIRKESNAS 2016), overweight with BMI ≥ 25 is 33.5% (Ministry of Health of the Republic of Indonesia 2017). The prevalence rate of overweight at STIKES Banyuwangi, especially in the STIKES Banyuwangi female dormitory, is 18 female students out of 99 female students living in the dormitory (Primary data, 2023).

A high-fiber diet plays a role in weight management and weight loss efforts. This is related to the effect of its consumption, which can increase the feeling of fullness (Nabila et al., 2021). A more prolonged feeling of fullness and a decrease in nutrients absorbed by the body can impact weight loss because body fat will decrease (Janah, Nur and Nugroho, 2021). Consuming water-soluble fibre also influences weight loss and body fat percentage because water-soluble fibre will retain water and form a thick fluid in the digestive tract. In addition, water-soluble fibre in the small intestine is helpful for binding bile acids, which affect fat absorption. Fat cannot be reabsorbed, so it will continue to be excreted through faeces in the large intestine (Septiyanti and Seniwati, 2020).

Foods that are high in flavonoids and good fibre for overweight people are edamame and porang. Edamame soybeans are known as Glycine max L. MERILL, one type of legume included in the category of vegetable plants (Green Soybean Vegetable) (Darmawan 2018). Isoflavones in edamame are amino acids that contain vitamins and nutrients in soybeans and form flavonoids. Flavonoids are pigments, such as green leaf substances, that usually smell. The benefits of flavonoids

for the body are especially as a source of antioxidants. They can maintain digestive tract health to avoid constipation and reduce the risk of obesity in adolescents/adults (Safitri 2018).

Meanwhile, foods high in glucomannan, a high source of dietary fibre, can be found in porang tubers. Porang is a tuber plant from the Amorphophallus muelleri species. Porang tubers have a high fibre content, especially soluble fibre, which is 64% of its dry weight, so porang tubers can meet individual needs for quality food sources with high fibre (Utami. N, 2021). The nutritional content of pouring tubers in 100 grams is glucomannan of 45%, a high amount of fibre of 2.6%, and a low-fat content of 1.22% (Wicaksani, 2023).

Based on this background, the researcher is interested in conducting a study entitled The Effect of Giving Edamame Flour and Porang Cookies on Changes in Fat Percentage and Body Weight of Overweight Female Students of Stikes Banyuwangi.

METHODS

The design used in this study is quantitative because this study uses numerical data that can be processed using statistical methods. While the method used is the Quasy Experiment method, using two experimental classes or treatment classes and one control class to see the difference in fat percentage and body weight from the results of giving edamame and porang cookies, the Pretest - Posttest Control Group Design design is used. The pretest measures the percentage of fat and body weight before being given cookies, and the posttest measures the percentage of fat and body weight after being given cookies.

RESULTS

Table 1. Results of SQ-FFQ Data on High-Fat Food Intake Levels

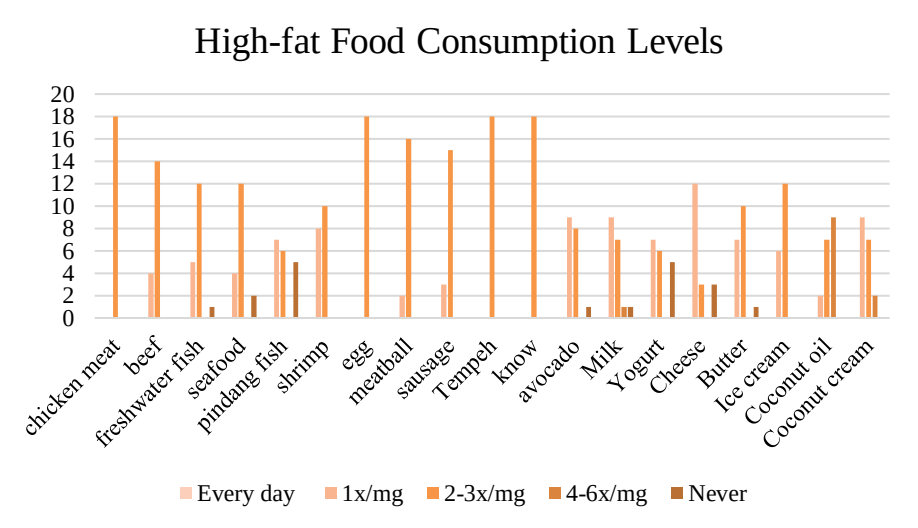

Table 2. Results of Flavonoid Content Tests on Edamame and Porang Flour Cookies

Test results	U1	U2	U3	Average
*Cookies*edamame and porang	0.1851	0.1827	0.1863	0.1848

Table 3. Fibre Content Test Results in Edamame and Porang Flour Cookies

Test results	Contents	U1	U2	U3	Average
*Cookies*edamame and porang	Insoluble fiber	7,4710	7,5584	7,4074	7,479
	Soluble fiber	0.4189	0.4385	0.4831	0.447
	Total fibre	7,8900	7,9969	7,8905	7,926

Table 4. Statistical Test Results of the Effect of Giving Edamame Flour and Porang Cookies on Changes in Fat Percentage and Body Weight

Group	*Mean*±SD (%)			
	Before Being Given Cookies	After Being Given Cookies	Δ (%)	P1
P	33.78±1.978	33.56±1.971	-0.22	0.040
K	32.24±3.945	32.21±4.020	-0.03	0.453
P23	0.310	0.402	-0.092	

Note: P (Treatment group, given*cookies*100 grams/day)

K (Control group, given mineral water)

Δ (Difference between before and after being given *cookies*)

P[1](Wilcoxon test results for fat percentage before and after being given cookies)

P[2](Mann-Whitney test results for a fat percentage before giving *cookies*)

P[3](Mann-Whitney test results for fat percentage after being given cookies)

Group	*Mean*±SD (kg)			
	Before Being Given Cookies	After Being Given Cookies	Δ (kg)	P1
P	63.28±3.721	62.98±3.674	-1	0.020
K	61.00±4.830	60.98±4.821	-1	0.155
P23	0.565	0.536	-0.029	

Note: P (Treatment group, given*cookies*100 grams/day)

K (Control group, given mineral water)

Δ (Difference between before and after being given *cookies*)

P[1](Wilcoxon test results of body weight before and after given *cookies*)

P[2](Mann-Whitney test results: body weight before being given *cookies*)

P[3](The results of the Mann-Whitney test on body weight after being given *cookies*)

Figure 1. Image caption (*times new roman, 9pt, space 1.15*)

DISCUSSION

1. SQ-FFQ Data Results on High-Fat Food Intake Levels

The results of the consumption level based on the SQ-FFQ show that, on average, respondents consume foods high in fat. Fat is a nutrient that contributes the most calories in food; 1 gram of fat will produce nine calories. Consuming foods high in fat will cause excess fat storage in the body. Fatty foods will provide a more significant energy contribution because fatty foods contain twice as many calories as protein (MM Rahman et al., 2021). High-fat consumption in the long term can increase the risk of obesity and can increase body weight, so the fat content in food needs to be considered (Praditasari and Sumarmik, 2018).

2. Results of Fiber and Flavonoid Content Tests in Edamame and Porang Flour Cookies

The flavonoid content in edamame and porang flour cookies in the 1st repetition was known to be 0.1851, the 2nd repetition 0.1827, and the 3rd repetition 0.1863, it can be seen that the highest flavonoid content was in the 3rd repetition, which was 0.1863. The results of a study of cookies with the addition of red spinach flour and carrot flour conducted by Anis Wahyu Sari showed that the flavonoid content was 0.013 mg/ml. In contrast, the flavonoid content of edamame flour and porang flour cookies was more significant (0.185) compared to red spinach flour and carrot flour cookies (Gizi Mandiri Volume et al., 2023).

The fibre content in edamame and porang flour cookies was tested using the multienzyme testing method (AOAC, 1995); the fibre content tested was insoluble dietary fibre, soluble dietary fibre, and total dietary fibre. The average insoluble fibre content after three repetitions was (7.479), soluble dietary fibre (0.447), and total dietary fibre (7.926). The results of the study conducted by Mardika Sari Puspita (2024), namely, the manufacture of cookies using growol flour has a fibre content of (0.88 grams), while the fibre content in edamame and porang flour cookies is more significant (7.926 grams), it can be concluded that the fibre content of edamame and porang cookies is higher compared to growl flour cookies (Mardika Sari Puspita, 2024).

3. Statistical Test of the Effect of Giving Edamame and Porang Flour Cookies on Changes in Fat Percentage and Body Weight

The results of data analysis using the Mann-Whitney test, the percentage of fat before being treated in the treatment and control groups obtained a value of (P = 0.310), the results of the Mann-Whitney test after being treated (P = 0.402). The results of data analysis using the Mann-Whitney test Body weight before being treated in the treatment and control groups obtained a value of (P = 0.565), the results of the Mann-Whitney test after being treated (P = 0.536). The results of the Mann-Whitney test show no significant difference between the percentage of fat before and after being treated. The insignificant results of the Mann-Whitney test are caused by the difference values being very small or approaching 0, so the prediction becomes insignificant (Edelsbrunner and Thurn, 2024).

The results of the Wilcoxon test of the percentage of fat in the treatment group before and after the intervention have a value (P <0.05), which means there is a change in the treatment group before and after the intervention. In contrast, in the control group, the percentage before and after the treatment has a value (P> 0.05), which means that there is no significant change in the fat percentage before and after the intervention. The results of the Wilcoxon test of body weight before and after the intervention in the treatment group obtained the result (P = 0.011), which means that there is a significant difference between before and after treatment in the treatment group. The results of the Wilcoxon test of body weight before and after treatment in the control group obtained the result (P = 0.107), meaning there is no significant difference in body weight before and after treatment in the control group. The absence of a change in the control group was caused by a change whose value was too small, so there was no statistical change.(Edelsbrunner and Thurn, 2024).

The flavonoid content in edamame can reduce the percentage of fat. Edamame soybeans are a food ingredient that contains high amounts of isoflavones, such as genistein and daidzin, which are released in the form of β-glycosides (Toraldo, 2019). Lipase, α-amylase, and α-glucosidase are the main digestive enzymes whose inhibition can be used as targets for antidiabetic and antiobesity treatments (Irondi, 2021). A study conducted in Korea on 23,118 adults proved that flavonoid intake was associated with a lower prevalence of abdominal obesity and body fat percentage in women (Ham & Joung, 2021).

The content of soluble fibre in porang can reduce weight; this is due to the effect of its consumption, which can increase the feeling of fullness (Nabila et al., 2021). A more prolonged feeling of fullness and a decrease in nutrients absorbed by the body can impact weight loss because body fat will decrease (Janah, Nur and Nugroho, 2021). In addition,

water-soluble fibre in the small intestine is helpful for binding bile acids, which affect fat absorption. Fat cannot be reabsorbed, so it will continue to be excreted through faeces in the large intestine (Septiyanti and Seniwati, 2020).

CONCLUSION

There is an effect of giving edamame flour and porang cookies on the percentage of fat and body weight of overweight female students at STIKES Banyuwangi. There is a difference in the Intervension group after giving edamame and porang flour cookies to the percentage of fat and body weight of overweight female students of STIKES Banyuwangi. The community expects to consume processed products such as edamame and porang flour cookies. They can be used as an alternative to a snack to help reduce weight and fat percentage due to the fibre and flavonoid content in cookies.

ETHICS OF STUDY

This research has received ethical approval from the STIKES Banyuwangi Health Research Ethics Commission (ethics approval number 196/01/KEPK-STIKESBWI/V/2024).

REFERENCE

Edelsbrunner, P. A., & Thurn, C. M. (2024). Improving the utility of non-significant results for educational research: A review and recommendations. Educational Research Review, 42(December 2023), 100590.https://doi.org/10.1016/j.edurev.2023.100590

Ham, D., & Joung, H. (2021). Understanding the associations between dietary antioxidants and obesity. Journal of Obesity and Metabolic Syndrome, 29(3), 163–165.https://doi.org/10.7570/jomes20070

Gizi Mandiri Volume, J., Wahyu Sari, A., Rizky Fitriyanti, A., Sulistyaningrum, H., & Ilmu Keperawatan Dan Kesehatan, F. (2023). Antioxidant Activity, Flavonoid Levels and Sensory Characteristics of Cookies with the Addition of Red Spinach Flour and Carrot Flour. Jurnal Gizi Mandiri, 1(1), 1–8.

Janah, Nur & Nugroho, P. (2021). Behavioural Risks of Lack of Physical Activity and Consuming Fruits on the Incidence of Obesity in Adolescents. Borneo Student Research (BSR), 3(1), 546–551.https://journals.umkt.ac.id/index.php/bsr/article/view/2297

Mardika Sari Puspita. (2024). Original Research Original Research Original Research. SAGO: Nutrition and Health, 5 (2) 446-, 446–455.

Septiyanti, S., & Seniwati, S. (2020). Obesity and Central Obesity in Indonesian Urban Communities. Scientific Journal of Health (JIKA), 2(3), 118–127.https://doi.org/10.36590/jika.v2i3.74

Toraldo, ESMG (2019). Role of Diet in Chronic Obstructive Pulmonary Disease Prevention and Treatment. Egeria Scoditti 1,*, Marika Massaro 1 , Sergio Garbarino 2 and Domenico Maurizio Toraldo, 1–32.https://www.mdpi.com/480686

Wicaksani, NPRC (2023). Substitution of Porang Flour in Healthy Cookies. Culinary Journal, 3(2), 118–131.https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf

Widiyawati, A., Kartika, RC, & Ayu, DP (2023). Podam cookies source of fiber and high protein based on porang glucomannan flour (amorphophallus oncophyllus) and edamame flour (glycine max (l) merrill). IOP Conference Series: Earth and Environmental Science, 1168(1).https://doi.org/10.1088/1755-1315/1168/1/012032