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The Effect of Giving Takokak Tea and Ice Cream on the Level of Macronutrient Consumption

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Abstract: *Obesity is one of the most neglected problems in today's society. The incidence of obesity is related to diet, energy intake, physical activity, and sleep duration. Energy intake that is greater than the calories expended can be one of the triggers for obesity. Dried takokak contains high carbohydrates and low fat. Based on data from the Indonesian Central Statistics Agency in 2017, the level of ice cream consumption in Indonesia was 22.64% and increased in 2018 with the percentage to 26.38%. Ice cream made using skim milk has a lower fat content because skim milk contains 1% fat so that it can increase protein and reduce fat content in ice cream. Drinking tea is now growing in the trend of health drinks and lifestyle. Several studies state that tea is suitable for consumption by obese people. The purpose of this study was to analyze the differences in the level of consumption of energy and macronutrients (protein, fat, carbohydrates) in the control respondents with the treatment respondents and to analyze the differences in the consumption levels of the respondents before and after the intervention was given. This type of research is a Quasi Experimental study with the treatment of giving tea and takokak ice cream. The design used in this study is the Nonequivalent Control Group Design. In this study there were four treatment groups, namely P0 = control, P1 = takokak ice cream, P2 = takokak tea, and P3 = combination. Respondents in this study had an age range of 30-49 years with nutritional status >23. The consumption level of respondents was obtained from food recall data for 14 consecutive days. The difference in consumption levels before and after the intervention was given to the treated group, if the data were normally distributed, it was tested using the Paired t-test. After the Paired t-test was carried out, there were significant differences in the level of energy consumption and macronutrients (protein and carbohydrates) after the intervention was given to each group. In the four groups there was no significant difference in the level of fat consumption. After the One Way Anova test, there were no significant differences in the level of energy consumption, protein, fat, and between groups. Suggestions for this research need to do further research using appropriate targets with the given intervention.*

Keywords: Obesity, Takokak, Takokak ice cream, Takokak tea, Energy consumption level and macronutrients (protein, fat, carbohydrates)

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INTRODUCTION

Obesity is one of the problems that most people in today's society ignore. This is a problem throughout the world (Tuerah & Manampiring, 2014). In developing countries obesity has become a global epidemic in children, adolescents, adults and the elderly. The phenomenon of nutritional problems can occur at various levels (individual, household, and population) and can also be reviewed based on age groups (Mahmudiono et al., 2019). In Indonesia, the prevalence of obesity continues to increase in adult males by 19.7% while in women by 32.9% (Ministry of Health of the Republic of Indonesia, 2014).

Based on the results of Riskesdas in 2013, the prevalence of obesity in adult women is higher than adult men. The prevalence of obesity in adult women (>18 years) is 32.9%, in adult men is 19.7% (Hermawan, 2021). Obesity is closely related to age because as you get older, the metabolism that occurs in the body decreases and there will be biological changes (Novitasary, 2014). Widiantini & Tafal (2014) found that subjects aged 30-49 years had a 2.3 times greater risk of being obese than those aged less than 30 years. The incidence of obesity is related to diet, energy intake, physical activity, and sleep duration. Poor diet is a trigger for obesity (Sudargo et al., 2014). If energy intake is greater than calories expended then this can be one of the triggers for obesity (Kurniawan & Widyaningsih, 2017).

The role of nutrition in adulthood is to increase and maintain normal body weight, prevent disease and improve health status. Excess food intake can lead to overweight and obesity. One way of handling obesity therapy is by means of a low-calorie diet (Ranitadewi, Syauqi, & Wijayanti, 2018). Another alternative that can be done besides the diet is by consuming certain herbs or providing low-fat snacks that can reduce fat levels in the body so as to lose weight (Zaidah, 2020). One of the snacks that can be given to someone with more nutritional status is tea and ice cream.

According to Euromonitor (2016), ice cream consumption reaches 158 million liters annually, making Indonesia the country with the highest consumption of ice cream in Southeast Asia. Based on data from the Indonesian Central Statistics Agency in 2017, the level of ice cream consumption in Indonesia was 22.64% and increased in 2018 with the percentage to 26.38%. Jana et al, (2016) in Ma'sumah, D., Sholikhah, D. M., & Prayitno, S. A. (2021) explain that ice cream is a frozen dairy product that can be made with a suitable mixture. In this study, one of the basic ingredients for making ice cream is skim milk. According to Wijaya & Herawati (2020) skim milk is the part of milk that has been taken for fat so that it contains a lot of protein. Skim milk contains 1% fat so that the addition of skim milk can increase protein and reduce fat content in ice cream which is suitable for someone with obese nutritional status.

Quoted from Baruah (2011) in Nugraha et al., (2017) states that currently drinking tea has developed in the trend of health and lifestyle drinks. This is also supported by the results of a survey from Fitrahnurlia (2020) in Setiyadi & Helilusiatiningsih (2021) that respondents have a high level of interest in buying herbal products on the grounds that they are derived from natural ingredients of 84.1% and have no side effects of 69. ,6%. One of the herbal drinks with advantages that are beneficial for health and can also be used as a mixture in making ice cream is takokak fruit. According to Helilusiatiningsih (2021) that dried takokak showed chemical content in dried takokak to 6.92% water content containing higher carbohydrates than fresh takokak fruit. Cinnamon mixture in adult male subjects who were overweight every day for 8 weeks could significantly reduce body weight, percent body fat, and central fat.

Making tea and ice cream using takokak fruit is expected to be an alternative variety of processed products that are useful and acceptable to the community. In the study sample, respondents consumed takokak tea or ice cream as a snack that was consumed twice a day. The purpose of this study was to determine the effect of giving ice cream and takokak tea on the level of macronutrient consumption of respondents.

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METHODS

This type of research is a Quasi Experimental study with the treatment of giving tea and takokak ice cream. While the outcome (outcome) is the level of consumption of macronutrients. The design used in this study is the Nonequivalent Control Group Design (Sugiyono, 2013). This research was conducted by giving treatment to the experimental group. Determination of this type of quasi-experimental research on the grounds that this research is in the form of research that uses humans as research subjects. Respondents in this study were 24 people who were divided into 4 groups with each group consisting of 6 people. The groups were control (P0), takokak ice cream (P1), takokak tea (P2), combination (P3).

Table 1. Research Design

Group	Pre-Test	Treatment	Post-Test
Eksperiment	O1	X1	O2
Control	O3	-	O4

Keterangan:
O1 : *Pretest* in the control group
O2 : *Posttest* in the treatment group
O3 : *Pretest* in the treatment group
O4 : *Posttest* in the treatment group
X : Treatment by giving the product

Table 2. Giving Intervention

Treatment	Giving Intervention	Intervention/day	Nutritional value			
			E	P	L	KH
P0	Control	None	0	0	0	0
P1	Takokak ice cream	2 cups/day @100 g	502	6,4	4,4	108,2
P2	Takokak tea	2 tea bag/day@7 g	32,8	1	0,2	7,8
P3	Ice cream and Takokak tea	1 cups ice cream and 1 tea bag takokak tea	267,4	3,7	2,3	58

The research was conducted in August 2021 in Singosari, Malang. The study was carried out for 14 consecutive days.

The subjects in this study were 24 obese respondents. Sampling was done using a non-probability sampling technique with purposive sampling method. The sample size in this study used the Federer formula (1963) which was determined based on the group (t) used in the study so that t = 4 groups, then the sample size used:

$(t - 1)(n - 1) \geq 12$
$3(n - 1) \geq 12$
$(n - 1) \geq \frac{12}{3}$
$n - 1 \geq 4$
$n \geq 5$ respondents/group

Based on the above formula, the required sample size for each control and treatment group is n = 5 respondents. To anticipate Drop Out in the study, an increase in the number of samples was carried out so that the sample size was still fulfilled by the formula:

$$n^I = \frac{n}{(1-f)}$$
$$= \frac{5}{(1-0,1)}$$
$$= \frac{5}{(0,9)} = 6$$

Information :

n^I = Sample size Anticipating Drop Out
n = Original sample size
1 – f = estimated proportion of Drop Outs estimated at 10% (f = 0.1)

So the number of final samples needed in this study is 24 respondents.

RESULTS AND DISCUSSION

A. Respondent Characteristic

Table 3. Distribution of Respondents based on Characteristics of Respondents

Respondent Characteristic	Frequency (n)	Percentage (%)
Age		
– 30 – 49 years	24	100
Gender		
– Woman	24	100
Nutritional Status (IMT)		
– Overweight (> 23)	17	70,8
– Obesity (≥ 27)	7	29,2
Jumlah	24	100

Based on Table 3. it is known that of the 24 respondents overall with an age range of 30-49 years and all respondents with are women. At the Robbani Foundation in Singosari Malang, 24 respondents who entered the inclusion criteria

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were female with an age range of 30-49 years. According to WHO (2004) the categories of nutritional status based on BMI include underweight with BMI < 18.5, normal weight with BMI 18.5 – 22.9, overweight with BMI > 23, and obesity with BMI 27 In this study, the highest respondents had nutritional status in the overweight category (> 23) with a total of 17 respondents and 7 respondents had obesity nutritional status with BMI 27.

Age characteristics have an important role in measuring a person's nutritional status (Adha et al., 2019). Obesity is closely related to age, because as you get older, the metabolism that occurs in the body decreases and there will be biological changes, namely decreased function of muscles and increased levels of fat in the body (Sikalak et al., 2017). Based on the results of Widiantini & Tafal (2014) that subjects aged 30-49 years have a 2.3 times greater risk of being obese than those aged less than 30 years. Based on the results of Fridawanti's research (2016) that 25% of women are obese compared to men (22%). This is supported by Proverawati (2010) which states that generally obesity is found in women more than men, because women's nutritional needs are less than men. According to Kustantri et al (2021) that in the age range of 30-49 years, there is a decrease in the body's metabolic ability, the need for energy per day for maintenance and metabolism of body cells is reduced or decreased, the body does not use excessive energy to carry out metabolism, so that more fat is stored and there is an accumulation of fat in the body. Accumulation of fat in the body can lead to obesity.

B. Intake of Energy and Macro Nutrients (Protein, Fat, Carbohydrates)

Table 4. Distribution of Respondents Based on Average Energy and Macro Nutrient Consumption Levels in All Treatment Groups

Variable	Treatment	Before Intervention	Consumption rate	After Intervention	Consumption rate
Energy	P0	1143,5 kkal	53	1225,9 kkal	67
	P1	1042,5 kkal	48	1729,8 kkal	80
	P2	1078,2 kkal	50	1504,9 kkal	70
	P3	1113,9 kkal	52	1503,2 kkal	70
Protein	P0	43,3 g	72	40,9 g	79
	P1	34,3 g	57	53,98 g	90
	P2	40,9 g	68	54,52 g	91
	P3	40,5 g	67	48,72 g	81
Fat	P0	42,3 g	70	36,1 g	70
	P1	35 g	58	44,82 g	75
	P2	40,2 g	67	41,5 g	69
	P3	40,4 g	67	42,85 g	71
KH	P0	147,6 g	43	188,6 g	65
	P1	147,8 g	43	280,92 g	83
	P2	147,5 g	43	236,6 g	70
	P3	155 g	46	238,3 g	70

Based on the Ministry of Health (1996) the consumption level is divided into 5 categories, namely < 70% severe deficit, 70-79% moderate deficit, 80-89% mild deficit, 90-120% normal, above 120% above the RDA. Based on Table 8, it is known that the average consumption level of respondents after being given the takokak ice cream intervention in group P1 experienced an increase in the level of consumption of energy, protein, fat, and carbohydrates. The average consumption level of respondents after being given takokak tea intervention in the P2 group experienced an increase in the level of energy, protein and carbohydrate consumption. In the P3 group the average level of consumption after being given the intervention increased in energy, protein, fat, and carbohydrates.

Table 5. Analysis of the Average Level of Energy and Macro Nutrient Consumption in All Treatment Groups

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Variable	Treatment	Before Mean ± SD	After Mean ± SD	Difference	*P*
Energy	P0	53 ± 8,43[a]	66 ± 26,89[a]	11	0,270
	P1	50 ± 10,29[a]	84 ± 18,81[a]	34	0,003*
	P2	51 ± 10,23[a]	70 ± 24,73[a]	19	0,042*
	P3	52 ± 9,6[a]	69 ± 14,58[a]	17	0,012*
P		0,822	0,715		
Protein	P0	72 ± 18,11[a]	79 ± 37,4[a]	7	0,692
	P1	61 ± 12,38[a]	97 ± 24,3[a]	36	0,002*
	P2	68 ± 29,06[a]	91 ± 32,35[a]	23	0,002*
	P3	68 ± 17,49[a]	81 ± 23,38[a]	13	0,007*
P		0,613	0,854		
Fat	P0	70± 26,38[a]	70 ± 29,34[a]	0	0,753
	P1	64 ± 28,35[s]	79 ± 14,11[a]	15	0,131
	P2	67 ± 24,84[a]	69 ± 15,13[a]	2	0,752
	P3	67 ± 29,67[a]	71 ± 26,93[a]	4	0,221
P		0,874	0,969		
Carbohydrate	P0	43 ± 2,5[a]	65 ± 24,69[a]	22	0,067
	P1	44 ± 11,44[a]	86 ± 18,50[a]	42	0,003*
	P2	44 ± 4,23[a]	69 ± 27,59[a]	25	0,049*
	P3	45 ± 11,53[a]	70 ± 13,27[a]	25	0,027*
P		0,971	0,532		

Information:
1. * there is a significant difference after the Paired t-test
2. Similar letters show no significant difference after the One Way Anova test

Based on Table 5. After the paired t-test was carried out, the results showed that there were significant differences in the average level of energy, protein, carbohydrate consumption in the P1, P2, and P3 groups before and after being given an intervention with different interventions. However, there was no significant difference in the average level of fat consumption. While in the P0 group (control) there was no significant difference in the average level of consumption of energy, protein, fat, and carbohydrates before and after the intervention. The difference in the average level of the highest consumption of energy, protein, fat, and carbohydrates before and after the intervention was in the P1 group (takokak ice cream). However, after the One Way Anova test, there were no significant differences in the average consumption levels of energy, protein, fat, and carbohydrates between groups. This is because each group is given an intervention with a different formulation.

According to Helilusiatiningsih (2019) research results, takokak powder contains low fat and high carbohydrates. In 100 grams of takokak powder contains 22.86 grams of protein, 3.15 grams of fat, and 65.91 grams of carbohydrates. In this study, every 100 g of ice cream contained 4 grams of takokak powder so that takokak powder contributed 1 gram of protein, 0.12 grams of fat and 2.6 grams of carbohydrates. So that when the total contribution of takokak powder to 2 cups of ice cream is 2 grams of protein, 0.24 grams of fat, and 5.2 grams of carbohydrates. obtained from the manufacture of ice cream include cornstarch, tapioca flour and takokak powder. The carbohydrate content in 100 grams of cornstarch and tapioca flour, respectively, according to the Indonesian Food Composition Table (2019) is 85 g and 88.2 g, respectively. In this study, 100 grams of takokak ice cream contained 7 grams of cornstarch and 7 grams of tapioca flour. Cornstarch contributed 8.2 grams of carbohydrates and tapioca flour contributed 8 grams. So, if you add up the total carbohydrate contribution from cornstarch and tapioca flour, they are 16.4 g and 16.6 g, respectively. The protein content in takokak ice cream tends to be higher than the fat content because the ingredients for making ice cream use skim milk. This opinion is supported by the results of Hidayah's research (2018) which states that sour turmeric herbal ice cream with UHT milk as the base material contains 1.72% protein, and while sour turmeric herbal ice cream with skim milk base has a protein value of 37.04%. . According to WIJAYA & HERAWATI (2020), skim milk is the portion of milk that has been taken for fat so that it contains a lot of protein. Skim milk contains 1% fat, therefore the addition of skim milk can increase protein and reduce fat content in ice cream. The highest average level of fat consumption after the intervention was 15% higher after the intervention was given than before the intervention was given. group P1 (takokak ice cream). The fat is obtained through the ingredients in the manufacture of ice

cream, namely coconut milk. In this study, 18.6 grams of coconut milk used in 1 cup of ice cream with a fat content of 1.86 grams. According to the research results of Perdani et al (2017) that the more coconut milk content in ice cream, the higher the fat content in the ice cream so that it can increase the level of fat consumption in respondents.

Sources of carbohydrates are cereals, tubers, dry beans, and sugar. The results of these ingredients are vermicelli, noodles, bread, flours, and so on. The main function of carbohydrates is to provide energy for the body. A person when consuming excessive amounts of carbohydrates will experience obesity (Nurul et al., 2019). In this study, it can be seen that overall in the P1, P2, and P3 groups there was a significant effect after the intervention on the average level of energy, protein, and carbohydrate consumption. In groups P1, P2, and P3 the average level of carbohydrate consumption after the intervention was given the highest increase compared to the level of energy, protein and fat consumption. While the average level of consumption of fat is the average level of consumption that experienced the lowest increase compared to the level of consumption of energy, protein, and carbohydrates. According to Karmila & Fayasari (2019) the percentage adequacy of the energy value of snacks on average only contributes 10-20% of total energy needs. In this study, the percentage of energy adequacy in 100 g of takokak ice cream was 11.7%, while 1 bag of takokak tea only met 0.8% of the total energy requirement, if given both, it could meet 12.5% of the total energy requirement. Thus 1 cup of ice cream and takokak tea meet the requirements as a snack. The content in takokak ice cream and takokak tea which is high in carbohydrates and low in fat can be consumed by someone with obesity. This is because the carbohydrate content in takokak ice cream comes from complex carbohydrates, namely cornstarch and tapioca flour. According to DUHA (2019) consumption of complex carbohydrates will provide a longer feeling of fullness and also the body will take a longer time to break it down into sugar so it is good for consumption for people with degenerative diseases such as obesity and diabetes.

CONCLUSIONS

Based on the results of research that has been carried out at the Robbani Singosari Foundation in Malang, researchers can draw the conclusion that:

1. There is a significant difference in the level of consumption of energy and macronutrients (protein and carbohydrates) before and after the intervention is given in each group.
2. There is no significant difference in the level of consumption of energy, protein, fat, and carbohydrates between groups.

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