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The Effect Of Biscuit Made With Mung Beans *(Vigna Radiata)*, And Star Gooseberry *(Sauropus Androgynous)* Leaves On Infant Weight

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ABSTRACT:** Star gooseberry (Sauropus androgynous) leaves contain several sterol compounds. Mung beans (Vigna radiata) are known well as protein and vitamin B1 source. Both are effectively affected milk production to increase the baby's weight. This study aims to determine the effect of biscuits made from star gooseberry leaves and mung bean flours on baby weight. This type of research used a quasi-experimental design non-equivalent control group design. The sample was taken by using the purposive sampling technique. The research was conducted at the Managaisaki City Health Center and the Baolan Tolitoli Health Center from November 2020 to January 2021. The samples were breastfeeding mothers who had babies aged 30 days. The intervention group consisted of 28 people who consumed mung bean combined with star gooseberry leaves biscuits, and 27 people as control groups consumed mung bean biscuits only. The biscuit given was about 85 grams/day for 30 days. Data were analyzed using the Mann-Whitney test, Paired t-test, and independent t-test. Generally, respondents in both groups were 20-35 years old. The income tended to be less than the Tolitoli Regency Minimum Wage. All respondents did a light physical activity and were mostly highly educated. Most of the respondents were multiparous and had adequate nutritional intake (> 80%) RDA 2013. In the intervention group after treatment, there was an increase in baby weight 1078.57 g while the control group was 1003.70 g with p-value <0.05. The difference in the increase in body weight of babies in the two groups was 74.87 g. Thus, giving biscuits of mung bean combined with gooseberry leaves would increase the baby's weight more than biscuit made of mung bean only. It concludes that there was an effect of giving biscuit developed from mung bean and star gooseberry leaves on baby weight.

***Keywords:** Biscuits, Vigna radiata, Sauropus androgynous, Baby Weight*

1. INTRODUCTION

Breast milk is the most complete and balanced nutritious food to support babies' growth and development in the first six months (Czosnykowska-łukacka *et al.*, 2018). Breastfed children performed better on intelligence tests, were less likely to be obese, and were less at risk of developing diabetes later in life (Bzikowska-Jura *et al.*, 2018). In collaboration with the World Health Organization (WHO), the National European Pediatric Association continues to support the promotion of breastfeeding during the current Covid 19 pandemic in reducing infant morbidity and mortality (Williams *et al.*, 2020).

Globally, data on exclusive breastfeeding are only about 44% given to babies aged 0–6 months (Unicef, 2019). Meanwhile, in Indonesia, in 2018, data on exclusive breastfeeding mothers was only around 68.74% (*Profil Kesehatan Indonesia 2018*). On average, the percentage of coverage for infants aged less than six months who received exclusive breastfeeding in Central Sulawesi Province in 2018 was 57.7%, but in 2019 it decreased to 54.7% (Dinkes, 2019). Exclusive breastfeeding data in Tolitoli Regency in 2019 is only 59.4%. Especially in the Tolitoli City Health Center, exclusive breastfeeding was only 26.4% in 2018 to 46.9% in 2019, while at the Baolan Community Health Center, it was only 32.9% in 2018 to 40.3% in 2019. Despite an increase in exclusive breastfeeding coverage in 2019, this figure is still far from the expected national target of 80% (Dinkes, 2019). This data analysis proves the low coverage of exclusive breastfeeding, which will have implications for high morbidity and mortality of infants and children. It is known that babies are very susceptible to various diseases, including infections, and most of these diseases occur in infancy. Breast milk is the best food with high protection against disease because of its various benefits.

The process of breastfeeding (lactation) has two definitions, namely milk production (prolactin reflex) and milk production by oxytocin (letdown reflex), which is influenced by the mechanism of hormones and many other factors. During pregnancy, the hormones estrogen and progesterone have an important role in preparing breast tissue for the breastfeeding process. Estrogen causes maximal ductal development, and progesterone stimulates the formation of lobules and alveoli to produce milk. Prolactin has also been produced to stimulate the enzymes needed to enlarge the tissue in the mother's breast and produce breast milk, but because of the presence of estrogen and progesterone, it blocks the stimulatory effect of prolactin on milk secretion.

Reflex milk secretion (oxytocin) occurs by the influence of the baby's suction on the nipples, thereby releasing the hormone oxytocin, which causes the myoepithelial cells around the alveolus to contract and push the milk into the lactiferous ducts and then into the baby's mouth (Forinash *et al*., 2012). Problems that arise during breastfeeding are due to insufficient milk production, so the mother stops the breastfeeding process (Sutanto, A, 2018). Inadequate milk production is due to lack of milk glands in the mother's breast, hormonal imbalance, and poor breastfeeding techniques (Sim *et al*., 2015). The solution to low milk production is using a breast milk booster to stimulate, maintain, and increase milk production (Yohmi, 2017). Breast milk booster is divided into two kinds, synthetic and herbal. The use of synthetic boosters such as domperidone, metoclopramide, and oxytocin, while breast milk boosters from herbs such as fenugreek, torbangun leaves, star gooseberry leaves, moringa leaves, and nuts (Susu et al., 2019).

The leaves of star gooseberry (*Sauropus androgynous),* also called katuk or sweet leaf can significantly increase lactation (Zhang et al., 2020). *Sauropus androgynous* plants contain sterol compounds, increasing the synthesis and secretion of milk due to the working mechanisms of the hormones prolactin and oxytocin (Aulianova, 2016). *Sauropus androgynous* contains steroid compounds, namely saponins and flavonoids, that play a role in stimulating alveolar epithelial proliferation to form new alveoli in breastfeeding breasts (Noach *et al*., 2020).

Besides, mung beans *(Vigna Radiata)* are also consumed by postpartum mothers in general. It is based on (Mariati et al., 2019) that mung bean extraction affects breastfeeding mothers' milk production. Mung beans *(Vigna radiata)* are a type of legume with better nutritional quality than cereals because they contain excellent sources of vegetable protein, bioactive compounds, minerals, and vitamins (Khaket *et al*., 2015). Mung beans are a source of energy, protein (14.6–33.0 g / 100 g), and iron (5.9–7.6 mg / 100 g), so it may be suitable for vegetarian consumption (Dahiya *et a*l., 2015). The content of minerals, vitamins, protein, and essential amino in mung beans also has detoxifying abilities, a mental calming effect, and reduces heat stroke (Tang et al., 2014).

Various studies related to star gooseberry leaves and mung beans as a breast milk booster have been carried out in Indonesia in food, beverages, extracts, and biscuits. This research referred to the formulation of the mung bean biscuit with the combination of star gooseberry leaves by (Sasaka, 2018) and the formulation of mung bean biscuit by (Fathonah, 2018) which would be given to breastfeeding mothers and then the effect on the baby's weight.

2. MATERIALS AND METHODS

Location and Research Design

The research was conducted at the Health Centre of Managaisaki City and the Health Centre of Baolan Tolitoli, Central Sulawesi. The research type was a Quasi Experiment (Pre- and post-test non-equivalent control group) (Sugiyono PD, 2016).

Population and Sample

The population was all primiparous and multiparous postpartum mothers in the Tolitoli City Health Center's working area, with a total of 75 people and 36 people at the Baolan Tolitoli Health Center. This study's sample was primiparous and multiparous postpartum mothers who had babies aged <30 days using the purposive sampling technique. Samples were divided into two groups. About 28 samples of the intervention group were given the mung bean combined with star gooseberry biscuits. The control group was only given the mung bean flour biscuits totaling 27 people.

The mother's inclusion criteria were a history of pregnancy at term (37-42 weeks); primiparous and multiparous mothers had babies aged 3 to 30 days who breastfed their babies; the condition of the mother's breasts and nipples were normal and willing to follow the study protocol. The inclusion criteria of infants were single infants; birth weight ≥ 2500 grams; the baby's sucking reflex was good, and the baby's physical condition was healthy. The exclusion criteria of mothers were mothers with anemia, a history of allergies, a history of diabetes mellitus, experienced symptoms of psychiatric disorders, mothers who used hormonal contraceptives, mothers who smoked or drank alcohol, and mothers who consumed Ergot and I Dopa drugs. The infants' exclusion criteria were preterm or LBW (Low Birth Weight) babies and had congenital abnormalities.

Method of Collecting Data

The data collection instruments were questionnaire sheet for potential respondents, consent sheet or informed consent, respondent characteristic datasheet, Baecke physical activity questionnaire sheet, 24-hour food recall sheet, sheet to monitor compliance with consumption of the biscuits, Baby weight Scale, as well as a questionnaire sheet of pre and post-treatment baby weight observation.

Data Analysis

To analyze the differences in pre and post babies' weight in both the intervention and control groups was using the paired sample t-test. Analyzing the differences in baby weight between the intervention and control groups was using the independent sample t-test.

3. RESULTS

A. Univariate Analysis

Univariate analysis was conducted to determine the characteristics of the respondent's data: age, income, physical activity, education, parity, and nutritional intake. The data obtained are as presented in the following table (Table 1):

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics	Frequency (%)		p-value*
	Intervention (n=28)	Control (n=27)	
Age			**0.455**
High Risk	4 (14.3)	6 (22.2)	
Low Risk	24 (85.7)	21 (77.8)	
Income			**0.158**
Insufficient	18 (64.3)	22 (81.5)	
Sufficient	10 (35.7)	5 (18.5)	
Physical activity			**-**
Light	28 (100.0)	27 (100.0)	
Medium			
Education			**0.933**
Low	8 (28.6)	8 (29.6)	
High	20 (71.4)	19 (70.4)	
Parity			**0.478**
Primipara	8 (28.6)	7 (25.9)	
Multiparous	20 (71.4)	19 (70.4)	
Nutritional intake			**0.188**
Inadequate	7 (25.0)	3 (11.1)	
Adequate	21 (75.0)	24 (88.9)	

**test homogeneity of variance*

Data in Table 1 shows respondents' age in the intervention and control groups, mostly aged 20-35 years. The respondents' income in both groups tended to be below the average of Regional Minimum Wage of Tolitoli City (Rp. 2,345,095), where the intervention group was 64.3%, and the control group was 81.5%. Physical activity of all respondents in both groups had a Baecke index score of 6.5-7.25 (light activity) since the mother limits her activities during the postpartum period. Highly educated respondents in the intervention group were 71.4%, and the control group was 70.4%. Most of the multiparous respondents in the intervention and control groups were about 71.4% and 70.4%, respectively. Generally, respondents had adequate nutritional intake (> 80%) RDA, specifically was 75.0% in the intervention group and was 88.9% in the control group. In the homogeneity test, all two groups' characteristics were equivalent to a p value> 0.05.

Table 2. Adequacy Level of Macronutrients and Micronutrients in the Intervention and Control Groups Before Treatment

Nutrient	Average RDA	Mean ± SD				Average Differences	*p*-Value
		Intervention	% RDA	Control	% RDA		
Calori (kkal)	2580	2512.9±941.7	97.40	2714.3± 1307.9	105.21	201.4	0.859[b]
Protein (g)	76	113.5±38.7	149.34	102.9±41.7	135.39	10.6	0.332[a]
Fat (g)	86	54.6±45.8	63.49	43.6±27.3	50.70	11	**0.013[b]**
Carbohydrate (g)	354	443.5±228.2	125.28	355.6±228.7	100.45	87.9	0.116[b]
Calcium (mg)	900	842.4±496.3	93.60	939.9±641	104.43	-97.5	0.939[b]
Phosphorus (mg)	750	1291±531.6	172.13	1400.7± 580.4	186.76	-109.7	0.572[b]
Fe (mg)	28	20.2±5.9	72.14	20.6±8.3	73.57	-0.4	0.980[b]
Vitamin A (µg)	850	1693.2±3355	199.20	1863.7± 2450.1	219.26	-170.5	0.583[b]
Vitamin B1 (mg)	1.3	1.3±1.07	100.00	1.02±0.4	78.46	0.28	0.476[b]

an *Independent t-test;* [b] *Mann-Whitney test*

The data in Table 2 shows that the average nutritional content of breastfeeding mothers before being given treatment in both groups. Almost all nutritional components, including calories, protein, carbohydrates, calcium, phosphorus, vitamin A, and vitamin B1 were above 80% of the prescribed RDA. Even so, the fat and iron nutrients in both groups were still below 80% of the recommended RDA. Vitamin B1 in the control group was only 78.46%, categorized as <80% RDA. Different tests showed that there was no difference in the average nutrition of calories, protein, carbohydrates, calcium, iron, phosphorus, vitamin A, and vitamin B1 (p-value ≥ 0.05). It showed that before being treated, the intervention group and the control group had high nutritional intake or equivalent, except for the fat content was a significant difference, $p \leq 0.05$.

Table 3. Distribution of Adequacy Levels of Macronutrients and Micronutrients in the intervention and control groups after treatment

Nutrient	Average RDA	Mean ± SD				Average Differences	*p*-Value
		Intervention	% RDA	Control	% RDA		
Calori (kkal)	2580	2872.9± 920.7	111.35	3127.1± 1239.5	121.21	-254.2	0.613[b]
Protein (g)	76	118.5±38.8	155.92	115.4± 38.8	151.84	3.1	0.767[b]
Fat (g)	86	74.5±45.8	86.63	59.5± 27.2	69.19	15	**0.005[b]**
Carbohydrate (g)	354	479±228.2	135.31	419± 215.3	118.36	60	0.511[b]
Calcium (mg)	900	870.9± 446.9	96.77	1020.9± 631.3	113.43	-150	0.685[b]

Phosphorus (mg)	750	1352.9± 530.7	180.39	1495.4± 588.7	199.39	-142.5	0.350[b]
Fe (mg)	28	21.2±5.9	75.71	22.8±8.4	81.43	-1.6	0.320[b]
Vitamin A (μg)	850	8172.4± 7921.2	961.46	2783.8± 3410.8	327.51	5388.6	**<0.001[b]**
Vitamin B1 (mg)	1.3	1.4±1.07	107.69	1.1±0.4	84.62	0.3	0.879[b]

[a] *Independent t-test; [b] Mann-Whitney test*

Table 3 showed that breastfeeding mothers' average nutritional level after being given treatment in the two groups. Almost all nutritional components in the intervention group were above 80% of the prescribed RDA except for iron nutrition, only 75.71% (<80% RDA). In the control group, the fat nutrients component was only 69.19% (<80% of the RDA. The results of different tests showed there were differences in the average nutrients of fat and vitamin A with a p-value ≤ 0.05. It meant that after being treated, the intervention group and the control group had different fat and vitamin A content. The intervention group had a higher fat and vitamin A component than the control group.

B. Bivariate Analysis

Table 4. Distribution of differences in baby Weight before and after treatment in the intervention group and the control group

Group	**Baby weight (g) Mean ± SD**		**Average differences**	***P-value***
	Pre	**Post**		
Intervention	3378.57±377.4	4457.14±565.9	1078.57	**<0.001[a]**
Control	3525.93±479.2	4529.63±562.1	1003.70	**<0.001[a]**
p value	0.210[b]	0.636[b]	**<0.001 [b]**	

[a]*Paired sample t-test;* [b]*Independent sample t-test*

After the paired sample t-test was carried out, it was seen in the intervention group that the pre-baby body weight (BW) was 3378.57 g and the post-baby weight was 4457.14 g (Table 4). There was an increase in the baby's BW of 1078.57 g. The increase in infant body weight was statistically significant with a p-value <0.05. It meant a difference in baby weight before and after giving biscuit made from mung bean *(Vigna Radiata)* and star gooseberry leaves *(Sauropus Androgynus)*.

In the control group before treatment, baby weight was 3525.93 g, and after treatment was 4529.63 g (Table 4). There was an increase in baby weight by about 1003.70 g. The increase in infant body weight was statistically significant with a p-value <0.05. It showed that there was a difference in baby weight before and after giving mung bean biscuits.

The difference in the increase in baby weight in the intervention and control groups showed a significant difference of 74.58 g. It meant that consuming a biscuit of mung bean with a combination of star gooseberry leaves may substantially increase the baby's weight compared to mung bean alone.

Table 4 above shows that after the independent T-test was carried out, the pretest value between the control and intervention groups obtained p-value = 0.210b, where p => 0.05. It meant that the pretest value between the two groups was not a significant difference. In the post-test score between the two groups after the analysis test, the value of p = 0.636, where p => 0.05. It showed that there was no significant difference in the post-test results of the two groups. However, after the independent sample t-test analysis test was carried out on the difference between the mean pre and post values of the two groups, p = <0.001, where the value of P = <0.05. It meant a significant difference in the increase that occurs between the intervention and control groups.

4. DISCUSSION

This study was divided into two groups, the intervention group consisted of 28 respondents, and the control group consisted of 27 respondents. The intervention group was having 85 grams of biscuit made from mung bean *(Vigna Radiata)* combination with star gooseberry leaves *(Sauropus Androgynus)* (5 pieces of biscuits/day) for 30 days. Biscuits containing mung bean flour with a combination of star gooseberry leaf flour per chip have an energy of 78.73 kcal. A total nutritional content based on the calculation of the List of Food Ingredients of 1 piece of mung bean flour with a combination of star gooseberry leaves flour has 78.3 kcal of energy, 1.03 g, 3.98 g fat, 7.09 g carbohydrates, and 0.02 mg vitamin B1. The control group was given 85 grams of mung bean *(Vigna Radiata)* biscuits (5 pieces of biscuits/day) for 30 days. Mung bean flour biscuits per chip have 68.27 kcal of energy, 1.44 g protein, 3.02 g fat, 9.11 g carbohydrates, and 0.03 g vitamin B1.

According to table 1, most of the respondents aged 20-35 years old. The age of the breastfeeding woman can influence the composition of breast milk. The highest protein concentration was found in the breast milk of mothers aged 20-30 years (Prentice, 2018). The intervention and control groups have an average income of less than the 2020 Minimum Wage for Tolitoli Regency, amounting to Rp. 2,345,095. Family economic income will affect the purchasing power of the variety and quality of foodstuffs, especially during the Covid 19 pandemic, the economy is very difficult, and the price of foodstuffs is above average (Loa, 2020). Diversity in food consumption plays an important role in improving the nutritional status and nutritional needs of nursing mothers.

Changes in sleep schedules in mothers who have just given birth due to caring for and breastfeeding their babies every 2 hours, making the mother's body tired and tired, affecting milk production (Rahayu & Sudarmiati, 2012). If the mother lacks rest and is too tired, it can affect the production and lack of breastfeeding (Tauriska & Umamah, 2018). However, because 100% of respondents only did a light activity in the intervention group and the control group based on the Baecke physical activity index measurement, the energy spent by breastfeeding mothers was not much, and the rest time was more at home.

Most of the respondents were multiparous mothers, namely mothers who had given birth more than once. It can affect the amount of milk production in breastfeeding mothers because the more often a woman gives birth, the better the breastfeeding experience will be so that as soon as the baby is born, she will breastfeed her baby soon. On the other hand, mothers who breastfeed for the first time adjust to learning the methods and processes of breastfeeding to take longer to breastfeed the baby (Umamah, 2014).

Based on Table 2 data, it shows that overall the two groups had protein, carbohydrate, calcium, phosphorus, vitamin A, vitamin B1 more than 80% of the prescribed RDA, except for fat and iron nutrients, which were still <80% minimum RDA, for the control group nutrient B1 also only 78.46% <80% RDA. It can be said that the average nutritional content of breastfeeding mothers in the two groups before the treatment was mostly sufficient for daily nutritional needs.

In Table 3, in the intervention group after being given the treatment, it showed that of all the nutrients, most of them have > 80% of the prescribed RDA, only Fe had not fulfilled (75.71%). Whereas in the control group after treatment, almost the nutritional components fulfilled >80% of the RDA prescribed except for the fat component, only 69.19%. <80% RDA. Vitamin B1 in the control group before treatment was only 78.46%, had increased to 84.62%. So, it was sufficient for >80% of the maximum prescribed RDA. Different tests showed there was a difference in the mean of fat nutrients with p = 0.001. Vitamin A was found p = 0.005 after being treated. The intervention group and the control group had significantly different vitamin A content vitamin A nutrients were higher in the intervention group than in the control group.

The fulfillment of adequate nutritional intake during the lactation process can affect the hormone prolactin production after eating (Suksesty, 2017). The milk composition influences the breastfeeding period, and a diet with a high intake of red meat, cereals, and eggs is associated with a higher protein, total dry matter, and energy content in breast milk. These findings suggest that breastfeeding women's diet can influence the macronutrient composition of breast milk and provide a basis for promoting growth and development in children's health. (Huang & Hu, 2020).

The parameter used to measure the baby's growth is bodyweight for age used to check its nutritional value (Paramashanti, 2019). Change in body weight is an indicator that is very low than it should be, the child's growth is disturbed, and the child is at risk of experiencing malnutrition. Based on the growth curve published by the National Center for Health Statistics (NCHS), babies who are exclusively breastfed at two weeks of age will increase and grow according to or even above the graph until the age of 3 months. At the age of several days, bodyweight will experience a normal decrease, about 10% of birth weight. Generally, the bodyweight will return to birth weight on the tenth day. Babies who get enough breast milk have an average weight gain of 500 grams per month if breastfeeding frequently, every 2-3 hours or 8-12 times a day. The increase in body weight of babies who get enough breast milk in the first week is between 200-250 grams. According to the baby's request (on-demand) (Erlinawati et al., 2019). The production of breastmilk that does not affect the quality of the baby's health can disrupt the growth of the baby's weight, thus increasing the incidence of infant morbidity and mortality (Erlinawati et al., 2019).

Based on the data in table 4, by consuming 85 grams (5 pieces) of mung bean flour biscuits combined with star gooseberry leaf flour per day for 30 days, a paired sample t-test was carried out. It was seen that in the intervention group, there was an increase in baby weight by 1078.57 grams; in the control group, there was an increase of 1003.70 grams with a p-value <0.05. There was a difference in pre and post-treatment infants' body weight in the intervention and control groups. The difference in the increase in baby weight in the intervention and control groups showed a significant difference of 74.87 grams. The provision of mung bean biscuits with the combination of star gooseberry leaf *(Sauropus Androgynus)* increased the baby's weight more than giving mung bean biscuits only.

Table 4 shows that after the independent T-test, the pre-test and post-test values between the control and intervention groups obtained p-value ≥0.05, which means that the pretest and post-test scores of babies' weight between the two groups were not significant. However, after the independent sample t-test analysis test was carried out on the difference between the mean pre and post in the two groups, it was found that the value of p ≤ 0.001 where the value of P ≤0.05. There was a significant difference in the increase in infant weight in the intervention group and the control group. The difference in the increase in infants' weight in the intervention group and the control group showed a significant difference of 74.87 grams. Giving mung bean biscuits with a combination of star gooseberry leaves *(Sauropus Androgynus)* increased the baby's weight compared to giving mung bean biscuits alone.

The increase in breast milk production, which increases the baby's weight, is influenced by biscuits made with mung bean flour and star gooseberry leaf flour, which contain quite many calories, protein, calcium, iron, phosphorus, and vitamins needed by the human body. Star gooseberry leaves also contain Androstan-17-one, 3-ethyl-3-hydroxy-5 alpha compounds, which function as precursors to produce steroid hormones in the ovarian glands, namely progesterone, and estradiol. Through prostaglandins and steroid hormones, there is direct stimulation of the secretory cells of the mammary glands by increasing their population and synthetic activity. Steroid hormones, especially the hormone estrogen, are hormones that function to spur the synthesis and release of prolactin by the pituitary. This high dose content causes stimulation of prolactin receptors on lactotrophic cells to stimulate neurohormones that will stimulate the release of Prolactin Releasing Factor (PRF). Papaverine in star gooseberry leaf extract plays a role in blocking dopamine receptors so that it stimulates the release of the hormone prolactin and a vasodilator, which helps increase blood flow so that the circulation of prolactin and oxytocin increases (Soka et al., 2010). An indirect mechanism also occurs when the increased concentration of steroid hormones in the bloodstream indirectly stimulates the anterior and posterior pituitary glands' cells to release the hormones prolactin, growth hormone, and oxytocin. These three hormones are directly involved in the synthesis of milk in the udder's mammary glands. Sterols in star gooseberry leaves have a role in increasing milk production in a hormonal manner. Sterol compounds have a role in increasing milk production in a hormonal manner by stimulating the hormone estrogen, a growth hormone. The compound androstane-17-one, 3-ethyl-3-hydroxy-5 alpha can also stimulate growth hormone, which is an anabolic steroid. This growth hormone is thought to stimulate cell growth and increase the bodyweight of young mice (Agik et al., 2015).

Research in line, namely the provision of star gooseberry leaf decoction and star gooseberry leaf extract, has effectiveness in meeting the adequacy of breast milk. It is just that the decoction of star gooseberry leaves in this study has been shown to increase the weight gain of babies, with the average difference of weight gain in boiling star gooseberry leaves 259 grams. Simultaneously, the star gooseberry leaf extract obtained an average baby weight gain of 182 grams (Juliastuti, 2019).

Another similar study was conducted by Suksesty (2017) on 15 respondents for the group given mixed mung bean and fennel leaf juice and 15 respondents for the group that was not given the juice. The juice administration is carried out on the first to the 14th day postpartum with a recommendation to consume two times a day per 300 ml of juice. There was a difference in the baby's weight gain on day 15 in the two treatment groups. The breastfeeding process determines the baby's weight gain. Breastfeeding is recognized as one of the most influencing factors for body weight. Estimates of adequate nutritional intake for the first year of life are based on measurements of breast milk intake's adequacy, which generally depends on the milk's volume and composition. Inadequate breastfeeding increases the risk of low-calorie intake, dehydration due to decreased fluid volume, and decreased gastrointestinal motility (Suksesty, 2017).

Nuts can help facilitate fetal growth in pregnant women and optimize breastfeeding and the density of milk color in nursing mothers (Ritonga et al., 2019). The largest component of mung beans contains 62-63% carbohydrates, and protein is the second main constituent after carbohydrates, which functions to compose the structure and functional components of the body (Anggraeny & Ariestiningsih, 2017). Protein is a nutrient that plays a role in growth, the formation of important tissues and organs, and body defense. At the beginning of human growth, we get protein from breast milk (Kiran D. Dhawale, Nitin M. Thorat, 2018). Among legumes, mung beans are easy to digest and have a low potential for flatulence. Mung beans are the main source of energy and protein in developing countries, especially for vegetarian populations, and increasing the bioavailability of iron in mung beans can significantly increase their nutritional value. (Barakoti & Bains, 2007). Apart from vitamins and minerals, protein deficiency has been reported to reduce milk production. Rats fed a diet deficient in arginine (protein) had impaired growth of the mammary glands (Lee & Kelleher, 2016).

The amino acid tryptophan in mung beans functions to increase serotonin production and calm nerves (Anggraeny & Ariestiningsih, 2017). The vitamins reported in mung beans are thiamine, riboflavin, niacin, pantothenic acid, and nicotinic acid. (Dahiya et al., 2015). Vitamin B1 in mung bean seeds is found in the aleurone layer, which is easily soluble in water so that the small intestine is rapidly absorbed into the mucosal tissue. Vitamin B1 in mung beans makes the mother feel calm and happy so that the oxytocin hormone can work properly to make the cells around the alveoli contract so that the milk is pushed towards the nipple (Mariati et al., 2019). The content of vitamin B1 (Thiamin) in mung beans makes the nervous system mechanism better. It also makes nerve impulses stimulate the hypothalamus to form the hormones prolactin and oxytocin. (Widia & Putri, 2019). Vitamin B1 converts carbohydrates into energy because breastfeeding mothers require more energy than during pregnancy. When a Thiamin deficiency, the mother becomes irritable, has difficulty concentrating and is less enthusiastic.

5. CONCLUSION AND SUGGESTION

Based on the research results that have been conducted on giving biscuit of mung bean with a combination of star gooseberry leaf and mung bean biscuits on baby weight. It can be concluded that there was a significant difference in the value of baby body weight in the intervention group and the control group. The combination of mung bean and star gooseberry leaves was significantly effective in increasing the infant's weight.

Breastfeeding mothers can increase their nutritional intake by utilizing star gooseberry leaves and mung beans as an alternative. It may help fulfill nutrients that are important for breastfeeding mothers to increase milk production to increase their weight. For further research, it can develop research on mung bean flour biscuits combined with star gooseberry leaves through blood analysis to see an overview of the levels of the hormones prolactin and oxytocin in nursing mothers.

6. REFERENCES

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