

Biscuit Made Of Torbangun Leaves (Coleus Amboinicus Lour) As Dietary Supplement: An Alternative For The Treatment Of Stunting By Local Wisdom In Batak Pakpak Community, Indonesia

Donal Nababan, Rizabuana Ismail*, Wirsal Hasan, Evawany Aritonang, Urip Harahap,
Albiner Siagian, Kintoko Rochadi, Zulhaida Lubis
Universitas Sumatera Utara, Medan, Indonesia
*Correspondence Author: rizabuana@usu.ac.id

Abstract

Stunting caused by malnutrition, poverty and other environmental factors still exists in Indonesia. According to WHO, Indonesia ranks fifth in the number of children with stunting conditions. In the Batak ethnic group, local wisdom was found in the community where torbangun leaves (Coleus Amboinicus L.) was used to increase the quality of breast milk given to infants aged 12-24 months. Various studies show that torbangun leaves contain elements that can increase the baby's height and nutrition. The objective of this paper is to show that torbangun leaves are very feasible to be consumed by children aged 12-24 months, in a practical, comfortable and healthy form of food according to the decision of the health ministry of the Republic of Indonesia, namely in the form of biscuits. Methods: The research was conducted experimentally to obtain biscuits from torbangun leaves based on the aroma, texture, taste and color of the leaves, and then the nutritional content of the torbangun leaf biscuits were analyzed. Next, biscuits with torbangun leaves and biscuits without torbangun leaves are given to mice to find out the effect on their body length. The last method is to make intervention in stunted children aged 12-24 months. These children are put into two groups: children who are given torbangun leaf biscuits and children who are given regular biscuits without torbangun leaves for 3 months everyday. The findings from the organoleptic test results showed that the most suitable biscuits given to children aged 12-24 months were biscuits with the addition of torbangun leaf flour. When torbangun leaf biscuits were given to mice, there was a significant difference in their body length, compared to mice that consumed regular biscuits without torbangun leaves.

Keywords: Torbangun leave, coleus Amboinicus Lour, Stunting, Batak Pakpak Ethnicity.

1. Introduction

Stunting can be interpreted as a short or very short height condition that exceeds the -2 deficit below the median length or body height [1]. The study from Vilcins [2] suggests that environmental factors also influence the occurrence of stunted children, such as poor sanitation [3][4][5], solid waste disposal [6], flooring [7], aflatoxin [8][9][10][11], cooking Biomass fuel [12]. However, most studies mention the determinant factor of stunting is malnutrition. [13][14][15][16]. Stunting can be diagnosed through an anthropometric index of height according to age, which reflects the linear growth achieved in prepartum and postpartum with an indication of long-term malnutrition. Stunting prevention can be done by providing good nutrition since the pregnancy. Several studies have shown that malnutrition has increased rapidly in various parts of the world, especially in developing countries. Chronic and acute malnutrition is very common in children under 24 months, compared to persons aged 24-59 years in India [17]. These malnutritions are related to maternal nutrition, food security, poverty status, water and sanitation facilities, control infections and address regional disparity. Furthermore, in Bostwana, Kenya, malnutrition was found in children aged <3 years. The conditions of the children are as follows: very thin (5.5%), short (38.7%) and malnourished (15.6%) [18]

Data from Basic Health Research in Indonesia (2010) shows that the national prevalence of stunted toddlers, based on the height for age index, is 35.6%. It consists of toddlers with very short height (18.5%) and short height (17.1%). These numbers raise huge concern because it exceeds the tolerance level of World Health Organization (WHO). The limit on nutritional problems is no more than 20%, thus it makes Indonesia in fifth place for the number of children

with stunting conditions [19]. Moreover, the number of stunting prevalence in the area of study is also very high, which is 42.3%, based on regional grouping determined by WHO.

The Ministry of Health of the Republic of Indonesia [20] decided upon the biscuit intake for children aged 12-24 months as a substitute for ASI (breast milk), in order to increase the nutritional status of children. Biscuit is a crunchy snack product made by roasting and it can fulfill the nutritional requirements of infants. Biscuits are made into various types and mainly distinguished by the balance between the main ingredients of flour, sugar, fat and eggs. Additional ingredients such as chocolate, fruits, vegetables and spices also make biscuits have various taste [21]. In Batak Pakpak communities, breastfeeding mothers have a habit of consuming torbangun leaves (*coleus amboinicus lour*). In addition to maintain the health balance of the mothers who have just given birth, torbangun leaves can improve the quality and quantity of breast milk [22]. The nutritional needs of children aged 12-24 months are fulfilled by utilizing the potential of local food, which is usually consumed in accordance with the customs and traditions of the local community. Aside from the cheap price of the leaves and its availability, the community empowerment can also go hand in hand because the utilization of torbangun leaves has become their own culture [23]. Moreover these plants grow a lot in the forest belonging to the community, because this forest is maintained as ulayat right [24]. Most of the time, this leaf is consumed in cooked soup, where the torbangun leaf will be mixed with chicken stew and eggs. Torbangun soup is made by boiling leaves in coconut milk which are added with various complementary spices. Synthetic compounds are put into it as preservation, such as butylhydroxytoluene which is also an antioxidant. Nutrient content contained in torbangun leaves per 100 grams [25][26][27], including: iron 13.6 mg, vitamin C, vitamin B, energy 27.0 calories, protein 1.3 g, 0.6 g fat, charcoal hydrate, calcium, phosphorus, total carotene and water, which are very useful for the growth of the baby. However, products in the form of biscuits are not yet on the market. This paper, suggests how torbangun leaves (*coleus amboinicus lour*) are presented in the form of biscuits, so that they are more practical, comfortable and hygienic to give to babies aged 12-24 months.

2. Methodology

This research was carried out systematically on 3 stages. The first stage is experimental research, which consists of making biscuits from torbangun leaves based on the aroma, texture, taste and color of the leaf, and analyzing the nutritional content of the biscuit itself. For the purposes of this test, there are three choices of torbangun leaf biscuits: torbangun leaf are made into flours with concentration of 10%, 20% and 30% , then each of them are added into 100gr of biscuit. The flour is obtained by these steps: fresh torbangun leaves will be sorted and washed. Next, they are dried using oven for 1 hour before they are ground with a blender. The torbangun leaf flour is obtained after the sieving process. At this stage, the flour made from fresh torbangun leaves would be mixed with biscuit-making ingredients. Making biscuits with the addition of torbangun leaves is done through organoleptive tests with a hedonic rating test and analysis of the nutrient content of the biscuit produced. The process of making biscuits includes preparation of ingredients of dough (flour, skim milk, sugar, margarine, baking powder and egg yolk), mixing dough ingredients and leaf flour torbangun, forming and creating dough sheets, and baking with oven to produce torbangun leaf biscuits. The second stage is the experimental study to determine the effect of torbangun leaf biscuits on the body length of mice. The experiment was carried out for 28 days. Mice were given torbangun leaf biscuits and regular biscuits without torbangun leaves. This stage would end with the measurement of the body length of the mice.

The last stage was intervention in stunting children aged 12-24 months. These children are organized into two groups: children who are given torbangun biscuits and children who are given regular biscuits with no torbangun leaves, for 3 months every day. There are 238 children in the study area, consisting of 82 stunted children and 156 children without stunting condition. Then 68 children with stunting condition were chosen before they were given biscuits. 34 children were given biscuits with torbangun leaves and the other 34 were given biscuits without torbangun leaves. Determination of the sample is based on the willingness of parents after signing an informed consent. This study is an experimental study with the trial of 'single blind randomized controlled', meaning that the sample does not know whether they are in the

treatment group or in the control group. It is because the biscuit given is packaged in the same way without distinguishing the form of biscuit. The difference between the two is only known by special officers who have been trained. They are the trained officer who intervenes and performs Body Measurements before and after giving torbangun leaf biscuits.

3. Result and Findings

3.1. Analysis of nutritional content in biscuits with torbangun leaves and biscuits without torbangun leaf.

After going through the process of making biscuits mixed with torbangun leaves and without torbangun leaves, an analysis of the nutritional value of biscuits below is performed:

Table 1: Composition, Method of Analysis and Nutritional Value of Biscuits With Torbangun Leaves and Biscuits Without Torbangun Leaves.

No.	Nutritional Compositions	Method	Quantity	
			Biscuits Without Torbangun Leaves	Biscuits With Torbangun Leaves
1.	Energy (kkal/100 g)	Atwater Factor	366.21	457.68
2.	Protein (g/100 g)	Kjedahl	5.72	7.41
3.	Fat (g/100 g)	Soxhlet extraction	19.50	24.73
4.	Carbohydrate (g/100 g)	AOAC 2005	53.44	61.59
5.	Vitamin C (mg/100 g)	AAS	0.36	0.58
6.	Ash (g/100 g)	Gravimetric	0.85	1.20
7.	Water (g/100 g)	Gravimetric	4.30	5.13
8.	Iron (mg/100 g)	AAS	5.28	7.49
9.	Calcium (g/100 g)	Spectrophotometer	4.07	4.65
10.	Soluble Fibre (g/100 g)	SNI 01.2891.1992	0.65	0.91
11.	Insoluble Fibre (g/100 g)	SNI 01.2891.1992	0.84	1.10

Based on the results above, it is known that torbangun leaf biscuits have higher nutritional value compared to the biscuits without torbangun leaves, which are used as controls.

3.2. Analysis of the Effect of Torbangun Leaf Biscuits on the Length of Mice

The samples used in this section were 12 mice. The mice were divided into two groups; one group was given biscuits with torbangun leaves and it was called the treatment group. Another group was given biscuits without torbangun leaves, which was called the control group. Through this experiment, the differences in the body length of the laboratory mice in both groups were obtained. The results are as follows:

Table 2: Descriptive Analysis of Mice's Body Length and Difference in The Length Increase

The Body Length of Laboratory Mice	Treatment			Control		
	Minimum (mm)	Maximum (mm)	Average (mm)	Minimum (mm)	Maximum (mm)	Average (mm)
Before						

Intervention	105.80	118.90	114.65	102.40	114.60	108.66
After Intervention	155.40	161.30	157.75	140.00	155.80	147.70
Difference	36.50	52.90	52.90	35.80	45.90	39.03

After the experiment, it was found that the average body length of mice in the treatment group was higher than the average body length of mice in control group. From the table, it is known that the mean body length in both groups experienced an increase. However, from the difference in body length increase, the mean body length in treatment group (43.10) is higher than body length in the control group (39.03).

3.3 Analysis of the Effect of Torbangun Leaf Biscuits on Nutritional Status of Stunted Children Aged 12-24 Months.

This section outlines the results of research on the characteristics of children and the average food consumption in stunted children on groups before intervention. This analysis was shown to ensure that the initial conditions in the intervention group and the control group were not different. Children’s characteristics are independent variables which consist of history of low birth weight, mother's education, source of drinking water, ownership status of toilets, kitchen boundaries within house and income every month.

Table 3: Frequency Distribution of Characteristics of Children in the Control Group AndThe Treatment Group

No.	Characteristics of Children	Group				p Value
		Control		Treatment		
		N	%	N	%	
1.	Low birthweight history					
	a. No	18	52.9	16	47.1	0.628
	b. Yes	16	47.1	18	52.9	
	Total	34	100	34	100	
2.	Mother’s Education					
	a. Elementary School	22	64.7	20	58.8	0.618
	b. SecondaryandUniversity	12	35.3	14	41.2	
	Total	34	100	34	100	
3.	Source of Drinking Water					
	a. Unsafe	22	64.7	20	58.8	0.139
	b. Safe	12	35.3	14	41.2	
	Total	34	100	34	100	
4.	Ownership Status of Toilet					
	a. No Toilet	11	32.4	10	29.4	0.793
	b. Own Toilet	23	67.8	24	70.6	
	Total	34	100	34	100	
5.	Kitchen Boundaries within House					
	a. No border	11	32.4	10	29.4	0.074
	b. Bordered	23	67.8	24	70.6	
	Total	34	100	34	100	
6.	Monthly Income					
	a. 1.500.000	9	26.5	10	29.4	0.742
	b. 1.500.000 - 2. 500.000	19	55.9	16	47.1	
	c. > 2.500.00	6	17.6	8	23.5	
	Total	34	100	34	100	

Based on the table above, it was found that in the control group, most children did not have a history of LBW, or 18 children (52.9%). But, most children in the treatment group had a history of LBW, or 18 people (52.9%). Based on the statistical tests results, it was known that there was no significant difference in history of LBW between the treatment group and the control group ($p > 0.5$). Likewise, there were no significant differences between the treatment and control groups ($p > 0.5$) in other characteristics, namely: based on maternal education, sources of drinking water, ownership status of toilets, kitchen boundaries within house space and monthly income.

Furthermore, the average food consumption of stunted children aged 12-24 months before the intervention was observed and analyzed through its nutritional compositions, such as: energy, protein, fat, carbohydrates, vitamin C, iron, calcium and soluble fibre. The data sources are from food recall data, then it was processed using the nutry survey program. After that, it was tested using the SPSS program to see the difference in food intake from the two groups:

Table 4: The Average Food Consumption of Stunted Children Aged 12-24 Months Before And After The Intervention.

No.	Nutritional Compositions	Consumptions		p Value
		Intervention	Control	
1.	Energy (kkal/100 g)	749.21	821.43	0.128
2.	Protein (g/100 g)	22.92	25.26	0.053
3.	Fat (g/100 g)	20.83	23.32	0.439
4.	Carbohydrate (g/100 g)	121.54	110.92	0.192
5.	Vitamin C (mg/100 g)	16.35	14.04	0.271
6.	Iron (mg/100 g)	3.38	3.60	0.439
7.	Calcium (g/100 g)	151.29	191.22	0.156
8.	Soluble Fibre (g/100 g)	2.62	3.00	0.211

Based on the table above, it can be seen that there was no difference in food consumption in stunted children aged 12-24 months in the intervention group or in the control group before the intervention was implemented. This can be seen from the p value of each nutrient composition, which is > 0.00 meaning that H_0 is accepted. However, compared with the number of nutrition adequacy in children aged 1-3 years, the nutritions needed for stunted children aged 12-24 months are still lacking (Regulation of the Minister of Health of the Republic of Indonesia, No. 75 of 2013). Nutrition deficiency in children is expected to be resolved by supplementary nutritions contained in torbangun leaf biscuits.

Table 5: Descriptive Analysis of Child Body Height in Treatment and Control Groups Before and After Intervention and The Difference in Height Increase, with The Consumption of Torbangun Leaf Biscuits As Many As 6 pieces (60 grams)

Height	Treatment			Control			t	p Value
	Minimum	Maximum	Average	Minimum	Maximum	Average		
Before Intervention	67.00	76.00	72.10	69.40	76.00	72.68	-	-
After Intervention	70.70	79.00	75.25	69.80	76.80	73.21	-	-
Difference	02.00	04.00	03.23	01.50	03.30	02.60	5.128	0.001

Based on the table, it is known that the heights of the children in the treatment group and in the control group are both increased. However, the mean height of children in the treatment group (03.23) was higher than in the control group (02.60). The t test found the value of p which equalled to 0.001 ($p < 0.005$). Thus, there is a difference in the increase of height in the treatment

group compared to the control group. In other words, it can be interpreted that consuming torbangun leaf biscuits contributes more to the increase in the height of stunted children, compared to consuming only regular biscuits without torbangun leaves.

4. Conclusion

From the results of the organoleptic test, it is showed that the most suitable biscuits given to children aged 12-24 months are biscuits with the addition of torbangun leaf flour. The mean body length of laboratory mice was higher in the group that were given torbangun leaf biscuits, compared to other group where the mice were fed regular biscuits without torbangun leaves. The nutritional content of torbangun leaf biscuits is higher than biscuits without torbangun leaves. Therefore, the increase in height will be bigger if torbangun leaf biscuits are consumed. Prevention and treatment of stunting condition on children can be done by utilizing local food ingredients, namely torbangun leaves which are made into biscuits as supplementary food to substitute breast milk.