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ANALYSIS OF NUTRITIONAL CONTENT OF TORBANGUN (*Coleus amboinicus* Lour) LEAF BISCUIT

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ABSTRACT

Background: One of the local food ingredients that can be utilized as a complementary food is a torbangun leaf. Torbangun leaf is usually consumed in the form of torbangun leaf soup or served as vegetables with main meal. Torbangun is rich in iron, vitamin C, energy, protein, fat that is very beneficial for infant growth and is widely available in the market with cheap price. Torbangun leaves, especially when made into powder, can be processed into a wide range of food products such as biscuit, but needs several intervention trials to search its long shelf life with high energy density.

Methods: The purpose of this research is to study the formulation of torbangun leaf biscuit and to analyze the nutrient content in meeting the nutritional requirements of child stunting aged 12-18 months. Organoleptic test was conducted with 5 point hedonic rating test. This study used Anova test to see the mean difference in the assessment of leaf biscuits torbangun.

Results: With the addition of 10% (A), 20% (B), and 30% (C) torbangun leaf powder in every 100 gr biscuit, the organoleptic test showed that biscuit with 20% of torbangun flour had the highest organoleptic score on taste, flavor, texture and color. The biscuit contents energy and protein similar to the commercial fortified (PMT) biscuit with high content of iron and calcium. Compared with the PMT biscuits, the torbangun leaf biscuit meets the energy criteria (at least 400 kcal/100gr) but slightly having lower protein (less than 8gr/100gr). However iron content of torbangun biscuit equals the upper range of the PMT biscuit (4-7.5 mf/100gr) and very high calcium content (almost 10 times higher than the PMT biscuit).

Conclusions: The selected biscuits with 20% torbangun leaf powder will be used in the following intervention study promoting complementary food recommendation with fortified biscuits.

Keywords: Torbangun leaf, organoleptic test, biscuit.

INTRODUCTION

Stunting (low height-for-age) can be defined as a short and very short body state that exceeds the deficit below the median length or height [1]. Malnutrition will lead to disruption to physical growth, increased morbidity, mortality, cognitive development, reproductive health and physical work capacity [2]. Stunting is caused by inadequate nutrition and or health and therefore can be prevented with good nutrition during pregnancy and early life (the first 1,000 days of life).

Many factors can cause stunting, for example, a farmer may experience a disruption of food intake because of his work related to pesticides. Pesticides affect the health of exposed workers. The results of the systematic review of Donal Nababan (2014), entitled "Prevention and Control of Pesticide Poisoning of Vegetable Farmers in Karo District" indicate that pesticides have an impact on human

health such as vomiting and poisoning. This condition will affect the food intake of parents and children so that children have nutritional problems [3].

The Indonesia Basic Health Research 2010 showed that North Sumatra is one of the provinces in Indonesia with the highest prevalence of stunting (42.3%) (Ministry of Health, 2013). Pak-Pak Bharat District is the district with the second highest prevalence of stunting in North Sumatra province ie [4]). Exclusive breastfeeding in North Sumatra was only 25,7% (national 46,7%) but adequacy of energy and protein amongst underfive children were higher than the national figures ie 91.8% and 11.6% respectively (national 83.2% and 107% respectively). This suggest that there is potential of food availability in the area which is contrary to the high stunting prevalence amongst the under-two children.

The result of the systematic review concludes that Reducing of Stunting is needed by exploring protective factors of stunting [5]. This will be easier if in the area there are found specific local foods, such as the habit of consuming torbangun. In North Sumatra, torbangun leaf has been well known for its use among breastfeeding mothers to improve the quality and quantity of breast milk [6]. Torbangun leaf is usually consumed in the form of torbangun leaf soup or served as vegetables with main meal. Torbangun is rich in iron, vitamin C, energy, protein, fat that is very beneficial for infant growth [7] and is widely available in the market with cheap price. Torbangun leaves, especially when made into powder, can be processed into a wide range of food products such as biscuit. Biscuits is often used in several intervention trials given its long shelf life and high energy density. Torbangun leaf soup is consumed by the mother who has just given birth, usually the torbangun leaf soup is also distributed to all family members including children to be made a side dish at mealtime. The purpose of Making Torbangun leaf biscuit products is to make it easier for children to eat, especially the age of 12-24 months.

Provision of local supplemental food in quasi experimental studies to under-five children with less nutritional status in Sambiloto, Semarang has improved the nutritional status of children under five. Food provided in the form of food interludes with the energy range of 200-300 kcal and 5-8 grams of protein by utilizing local food and enriched vegetable or animal protein [8].

The aim of this study is to develop torbangun leaf biscuit formulation and assess its nutrient content for use in an intervention study to prevent stunting amongst stunted children aged 12-18 months in North Sumatra.

MATERIALS AND METHODS

Design

The research is an experimental research to assess organoleptic properties of the torbangun biscuits which include color, flavor, taste, and texture, and the nutrient content of biscuits with and without torbangun leaf which will be used in further in the intervention study. The biscuit was formulated at culinary study program, Faculty of Engineering, State University of Medan and the nutrient content was analyzed at Integrated of Health Polytechnic of The Health Ministry in Surabaya.

Data analysis

The manufacture of torbangun biscuits is used in the intervention activities. The organoleptic test used in this study is the hedonic rating test. For organoleptic test purposes, there are three choices of leaf biscuit of torbangun: biscuit with the addition of 10%, 20%, and 30% torbangun leaf powder in every 100 gr biscuit. The panelists used were 30 trained panelists. The scale used in this test is the scale of 5 point category with the following description: 1 = strongly dislike, 2 = dislike, 3 = somewhat like, 4 = like, and 5 = like very much. To indicate differences among means, the Tukey's HSD test was used. Statistical significance was expressed as $p < 0.05$ unless otherwise indicated.

Analysis of Nutritional Content of Torbangun leaf biscuit and Leafless Biscuit

Analysis of nutritional content of biscuits with and without torbangun leaf was conducted at the Laboratory Health Polytechnic of The Health Ministry in Surabaya. Method of analysis can be seen in Table 1.

Table 1. Methods of nutrient content analysis of biscuits

No.	Nutrition Composition	Method
1	Energy (Kcal / 100 g)	Factor Atwater
2	Protein (g / 100 g)	Kjedahl
3	Fat (g / 100 g)	Socket Extraction
4	Carbohydrates (g / 100 g)	AOAC 2005
5	Vitamin C (mg / 100 g)	AAS
6	Ash (g / 100 g)	Gravimetri
7	Water (g / 100 g)	Gravimetri
8	Iron (mg / 100 g)	AAS
9	Calcium (g / 100 g)	Spectrophotometry
10	Insoluble dietary fiber (g / 100 g)	SNI 01.2891.1992
11	Insoluble food fiber (g / 100 g)	SNI 01.2891.1992

Schematically the research stages can be seen in the following flow diagrams:

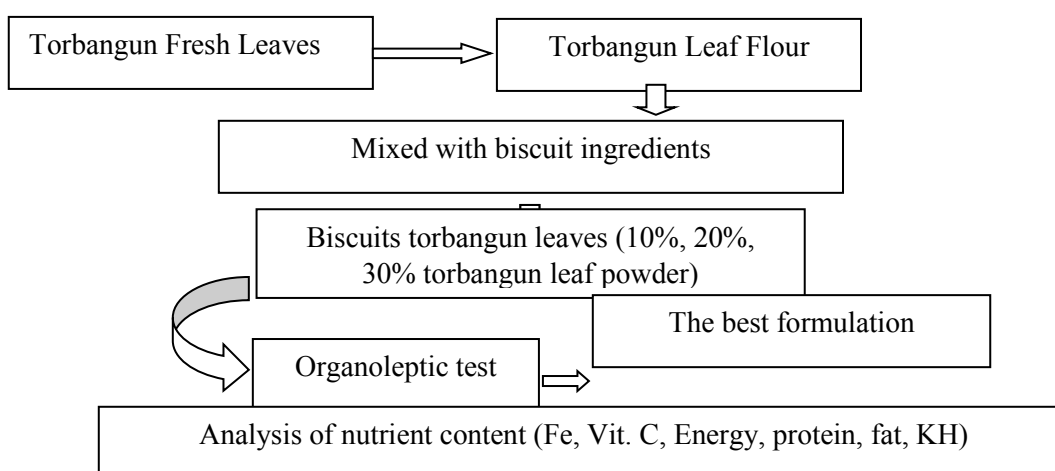


Figure 1. Flow chart of the study

RESULTS AND DISCUSSION

Result of the organoleptic test on taste, flavor, texture and color of torbangun leaf biscuits is shown in Table 2.

Table 2. The average score of organoleptic test score on taste, flavor, texture, and color

No.	Sample of Biscuits	Mean of score (n=30)			
		Taste	Flavor	Texture	Color
1	A (10%)	3,87 ^a	3,87 ^a	4,03 ^a	3,97 ^a
2	B (20%)	4,27 ^b	4,27 ^b	4,43 ^b	4,33 ^b
3	C (30%)	3,90 ^a	3,90 ^a	3,97 ^a	3,90 ^a
	Signif	0.032	0.027	0.037	0.012

Based on the organoleptic test, it can be seen that biscuits B (with 20% of torbangun leaf) had the highest score on taste, favor, texture, and color. This biscuit will be used in the intervention with control group receiving biscuit without torbangun leaf.



Figure 2. Control Biscuits



Figure 3. Torbangun Leaf Biscuit (addition of 20% torbangun leaf powder)

The results of nutrient content analysis of torbangun leaf biscuits with and without torbangun leaves can be seen in Table 3.

Tabel 3. Nutrient Content per 100 g Biscuits with addition of 20% Torbangun Leaf powder and control biscuits (with no torbangun leaf powder)

No.	Nutrition Composition	Amount	
		Control Biscuits	Torbangun Biscuits*
1	Energy (Kcal / 100 g)	366.21	457.68
2	Protein (g / 100 g)	5.72	7.41
3	Fat (g / 100 g)	19.50	24.73
4	Carbohydrates (g / 100 g)	53.44	61.59
5	Vitamin C (mg / 100 g)	0.36	0.58
6	Ash (g / 100 g)	0.85	1.20
7	Water (g / 100 g)	4.30	5.13
8	Iron (mg / 100 g)	5.28	7.49
9	Calcium (mg / 100 g)	4,070	4,650
10	Insoluble dietary fiber (g / 100 g)	0.65	0.91
11	Insoluble food fiber (g / 100 g)	0.84	1.10

*20% torbangun leaf powder

Based on the results above, it can be seen that the leaf torbangun biscuit have higher nutritional value compared with the nutritional biscuits used as control.

Currently in Indonesia fortified (PMT) biscuits is used as complementary foods to improve nutritional status of undernourished children [9]. Compared with the PMT biscuits, the torbangun leaf biscuits meets the energy criteria (at least 400 kcal/100gr) and slightly has lower protein (less than 8gr/100gr). However iron content of torbangun biscuits equals the upper range of the PMT biscuits (4-7.5 mf/100gr) and very high calcium content (almost 10 times higher than the PMT biscuits). The selected biscuits with 20% torbangun leaf powder will be used in the following intervention study promoting complementary food recommendation with fortified biscuits.

Nutritional content contained in Torbangun Biscuit is expected to prevent the occurrence of nutritional problems in children. Several studies have shown that malnutrition is increasing sharply in different parts of the world, especially in developing countries. Chronic and acute malnutrition is very high in children aged <4 years in India, ie 52% stunted, 54% underweight (17% wasted) and 17% wasted. Based on the severity of malnutrition, found 29% of children in the category of malnutrition (severely underweight). This indicates that Indian children typically have chronic malnutrition. Furthermore, in Botswana-Kenya, malnutrition was found in children <3 years old, very thin, 5.5%, short of 38.7% and malnutrition 15.6% [10].

CONCLUSION

Organoleptic test results showed that the most suitable biscuits given in children 12-24 months is a biscuit with the addition of torbangun leaves 20%. The leaf torbangun biscuit have higher nutritional value compared with the nutritional biscuits used as control. The value of nutritional content of leaf biscuits torbangun was higher than fortified biscuits currently used in the program mainly for iron and calcium.. Evidence from effectiveness trial of this biscuits in combination with optimized complementary feeding recommendation is needed.

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