

The Effect of Addition of Tolo Bean Flour on Organoleptic Properties, Nutritional Value, and Acceptability of Pumpkin Steamed Sponge (Lakulo) as an Alternative Snack for Anemic Adolescents

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ABSTRACT

Background. Teenage girls are prone to anemia because they are at reproductive age and need three times more iron daily than young men. Anemia in adolescents can cause a decrease in body immunity, concentration, fitness, and productivity. One of the efforts that can be made to contribute to the prevention of anemia is to provide local food-based high protein and Fe snacks, namely by adding tolo bean flour to the pumpkin steamed cake. The resulting sponge contains an excellent nutritional value so that it can be an alternative snack for teenagers with anemia.

Research Methods. This research was conducted at the Food Technology Science Laboratory (ITP) of the Mataram Health Polytechnic of the Indonesian Ministry of Health in August 2021. The analysis of the nutritional content of Bolu Kukus Lakulo was conducted at the Analytical Chemistry Laboratory, Mathematics and Natural Sciences Faculty, Mataram University, and the Health Testing and Calibration Laboratory. The consumer acceptance test was conducted at SMAN 9 Mataram. This study used an experimental method with a completely randomized design (CRD). The data collected is on organoleptic properties, nutritional value, and acceptability. The processing method uses descriptive statistical analysis and one-way ANOVA at a confidence level of 95% or alpha 0.05.

Research Result. Based on the ANOVA test, it was found that the addition of tolo bean flour had a significant effect on the aroma, texture, and taste of the lactulose-steamed sponge $p < 0.05$. Based on the organoleptic test, treatment t4 (addition of 20% tolo bean flour) was the preferred treatment level by the panelists. The results of the proximate test of Laculo steamed cake with the best treatment had a water content of 43.5%, ash content of 0.90%, fat content of 13, 2%, 7.11% protein content, 35.3% carbohydrates, 17.6 mg Fe content.

Conclusion. An acceptance test was carried out on 30 young women by giving 100 grams of Laculo steamed cake and showed that 27 people (90%) belonged to good acceptance and three people (10%) belonged to poor acceptance.

BACKGROUND

Based on the 2018 Basic Health Research Data, the prevalence of anemia in women (27.2%) was higher than in men (20.3%). The majority of anemia in the age group 15-24 years is 32% (Kemenkes RI). Selaparang

Health Center In 2018, the highest anemia in adolescent girls was at SMAN 9 Mataram, with the number of anemia in teenage girls as many as 62 students.

Indonesia is famous for a wide variety of processed foods, most of which use wheat flour as the main ingredient. Various kinds of food products can be used as an alternative to snacks, namely steamed sponge cake. The steamed cake is a soft food, so it can be used as breakfast in the morning and consumed by various groups ranging from children to parents. (Klau, 2015). The sponge is one of the delicious wet cakes and is liked by many as one of the damp sponge cakes made with various variations. Steamed sponge cake made by adding pumpkin puree has a delicious color, aroma, taste, and distinctive smell of pumpkin (Radiant et al., 2020). Steamed sponge cake which is well known in the community, generally only uses wheat flour as the main ingredient without being added by others. Because it requires innovations to make this steamed sponge, namely by adding raw material peanut flour into the steamed sponge.

Tolo beans are also known as cowpeas or dada beans. They have been planted in Indonesia for a long time but have yet to be cultivated widely or used as commercial commodities by farmers. Their use is still tiny and carried out with simple technology. Tolo beans contain iron (Fe) and high protein content. The majority of people use tolo seeds only for vegetable processing. Tolo seeds have the potential to be processed into other food products (Dartika, Ali, & Pato, 2018). The addition of tolo bean flour in pumpkin steamed sponge cake is expected to be an alternative snack in anemic youth.

RESEARCH METHODS

This research was carried out at the Food Technology Science Laboratory (ITP) of the Mataram Health Polytechnic of the Indonesian Ministry of Health. The analysis of the nutritional content of the Lakulo steamed cake was carried out at the Analytical Chemistry Laboratory of the Mathematics and Natural Sciences Faculty, Mataram University, and the acceptability test of food products were carried out at SMAN 9 Mataram with the target of teenagers class X and XI a total of 30 people.

The experimental method with a Completely Randomized Series (RAL) consists of 5 levels of treatment with three repetitions each, namely:

- t1= Addition of 5% tolo bean flour
- t2= Addition of 10% tolo bean flour
- t3= Addition of 15% tolo bean flour
- t4= Addition of 20% tolo bean flour
- t5= Addition of 25% tolo bean flour

The addition of tolo bean flour in the manufacture of pumpkin steamed sponge can be seen in Table 1.

Table 1. Formulation of Addition of Tolo Bean Flour in Making Pumpkin Steamed Sponge

Material Name	Material Weight				
	t1 (5%)	t2(10%)	t3(15%)	t4(20%)	t5(25%)
Basic material :					
Tolo bean flour (g)	7	14	21	28	35
Flour (g)	65	65	65	65	65
Pumpkin (g)	75	75	75	75	75
Chicken eggs(g)	120	120	120	120	120
Sugar (g)	50	50	50	50	50
Butter (g)	50	50	50	50	50
SP (g)	2.5	2.5	2.5	2.5	2.5
Baking soda (sdt)	2.5	2.5	2.5	2.5	2.5
Baking powder (sdt)	2.5	2.5	2.5	2.5	2.5
Vanila (sdt)	1.25	1.25	1.25	1.25	1.25

Description:Lakulo Steamed Sponge Formula uses half the recipe from the recipe Standard

RESULTS AND DISCUSSION

Organoleptic Properties

The organoleptic test was a hedonic test with experimental parameters such as color, aroma, texture, and taste of Laculo steamed sponge cake. The organoleptic test was carried out at the Food Technology Science Laboratory of the Mataram Ministry of Health on August 31, 2021, with 20 panelists. The following is the significance of the effect of adding tolo bean flour on the organoleptic properties of Bolu Kukus Lakulo in Table 2.

Table 2. The Significance of the Effect of Adding Tolo Bean Flour on the organoleptic properties of Lakulo Steamed Sponge Cake

Parameter	Significant	Notation
Color	0,620	NS
Scent	0,036	S
Flavor	0,008	S
Texture	0,000	S

Category : S = Significant
NS = Non Significant

Based on Table 2 above, it can be seen that the color parameter has a p-value > 0.05. This shows that the addition of tolo bean flour does not have a significant effect on the color of the Lakulo Steamed Cake. Meanwhile, the aroma, taste, and texture have a p-value of 0.05, so it is known that adding too bean flour affects the aroma, taste, and texture of the Lakulo Steamed Cake. Based on the results of the organoleptic test on the five levels, the following data were obtained.

Color

Based on the results of statistical tests, the probability value of the Bakulo Kukus Lakulo is 0.620 ($p > 0.05$), which means that there is no effect of adding tolo bean flour to the color of the Bakulo Kukus Lakulo. Between 3.6 to 4.0, which is included in the category of somewhat like to like

The color of the Bolu Kukus Lakulo is influenced by the raw material, namely pumpkin. In the five treatments, the amount of pumpkin puree used is the same weight. In treatments t1 to t5, the color produced from the steamed sponge is the same, namely yellow. This is because pumpkin contains carotenoid pigments that can produce a yellow to reddish color (Syafutri & Lidiasari, 2014) (Radiant et al., 2020).

Scent

Based on the results of statistical tests, the probability value of the aroma of Bolu Kukus Lakulo is 0.036 ($p \leq 0.05$), which means that there is an effect of adding tolo bean flour on the aroma of Bolu Kukus Lakulo. – 4.0, which is included in the category of somewhat like to like.

The aroma produced from the Laculo Steamed Sponge in this study is the distinctive aroma of the Laculo Steamed Sponge. The steamed sponge produced has a different aroma in each treatment, and with the addition of tolo bean flour, the aroma of the steamed cake produced will be more pungent and more distinctive than the tolo bean flour. The addition of different tolo beans resulted in a significant effect on the aroma of steamed sponge because the higher the addition of tolo bean flour and the lower the use of wheat flour, the steamed sponge product produced had a more pungent aroma of tolo bean flour. (Irianti, 2020)

Texture

Based on the results of statistical tests, the probability value of the texture of the Bakulo Kukus Lakulo is 0.000 ($p \leq 0.05$), which means that there is an effect of adding tolo bean flour on the aroma of the Bakulo Kukus Lakulo 2,95 – 4,10 which is included in the category of somewhat like to like. In this study, the texture of the different lactulose steamed cakes at each treatment level was influenced by the addition of tolo bean flour so that the steamed cake produced had a dense texture. Research (Irianti, 2020) The addition of different tolo beans had a significant effect on the texture of the steamed sponge. The substitution of tolo bean flour increasingly affected the density and brittleness of texture. Protein can increase gelation ability so that it can form flexibility or protein ability to be denatured and form a network by cross-linking. Texture has

an important influence on the product, for example, from the level of crispness, surface type, hardness, and so on. (Yusasrini, 2019).

Flavor

Based on the results of statistical tests, the probability value of Rasa Bolu Kukus Lakulo is 0.008 ($p \leq 0.05$), which means that there is an effect of adding tolo bean flour on the aroma of Bakulo Kukus Lakulo 3.20 – 3.95 which is included in the category of somewhat like to like. In this study, the taste of the different lactulose steamed cakes at each treatment level was influenced by the addition of tolo bean flour so that the steamed cake produced had a more dominant taste of tolo bean flour in steamed sponge, sweet and savory taste of sponge.

Research (Irianti, 2020) The more substitutions of tolo bean flour will affect the sweetness level of the steamed sponge. This is presumably because cowpeas contain compounds that cause an unpleasant taste. In the manufacture of bean flour, an unpleasant taste often arises namely an unpleasant taste. This unpleasant taste is caused by a reaction assisted by the lipoxygenase enzyme found in nuts. A study (Ryandoko, 2017) showed that the more mixing of tolo bean flour in the given steamed brownies, the more dominant the taste of tolo beans would be.

The Average Value of Panelists' Preferences for the Overall Lakulo Steamed Sponge can be seen in Table 3.

Table 3. Average Panelist Preference Score

Treatment level	Test parameters				Total	Average
	Color	Scent	Texture	Flavor		
t1(5%)	3,75	3,25	4,10	3,55	14,65	3,66
t2(10%)	3,60	3,40	3,33	3,20	13,50	3,37
t3(15%)	3,75	3,60	3,55	3,35	14,25	3,56
t4(20%)	4,00	4,00	3,50	3,95	15,45	3,86
t5(25%)	3,70	3,75	2,95	3,40	13,80	3,45

Based on table 3 above, the average value of the panelists' overall preference for bolu steamed Bakula was treatment t4 (20%) with the highest average value of 3.86 so that treatment t4 was selected, then a proximate analysis or nutrients were carried out including water content, ash content, fat content, protein content and Fe content in the product. They will be tested for the acceptability of the lactulose steamed cake product in anemic adolescents.

Nutritional Content

Nutrient analysis of the lactulose steamed sponge cake was carried out at the best treatment level, namely at treatment t4 (20%). Proximate analysis was carried out at the Faculty of Mathematics and Natural Sciences Analytical Chemistry which consisted of testing water, ash, fat, protein, and carbohydrate content by different and at the Health Laboratory Testing and Calibration, which consisted of testing for Fe levels. The results of the Bolu Kukus Lakulo nutrition test showed that the nutrients contained in the t4 treatment (20%) were: The nutritional content of the Lakulo Steamed Sponge can be seen in Table 4.

Table 4. Nutrient Content of Steamed Sponge Lakulo Best Treatment

Parameter	Satuan	Metode Uji	Hasil Rata-rata (%)	SNI (%)
Water content	% bb	Oven	43,50	Maks.40%
Ash content	% bb	Dry Ashing	0,90	Maks.3,0%
Protein content	% bb	Kjeldhal	7,11	Min. 2,70
Fat level	% bb	Soxhlet	13,28	Min. 5,01
Carbohydrate	% bb	Differences	35,3	
Fe level	mg	AAS	17,6	

Water content

The water content in a food ingredient is very important to know, especially if the food will be processed into a product that will be consumed. Water content plays a very important role in determining the texture, especially in terms of the softness of a food product (Hidayati, 2017). The results of the water content test on the Lakulo Steamed Sponge have a total water content of 43.5%. Based on the National Standards Agency in 1995 and 1996, for the quality requirements of the water content, it is a maximum of 40% so that the water content contained in the Lakulo steamed cake is said to not meet the requirements or exceeds the maximum quality requirements of the steamed sponge. Kadar air pada Bolu kukus lakulo yang tinggi dipengaruhi oleh lamanya proses pengukusan dan bahan-bahan yang digunakan seperti adanya pure labu kuning dan tepung kacang tolo yang digunakan tidak banyak sekitar 28 gram didalam bolu kukus yang menyebabkan kadar air menjadi tinggi. Proses pembuatan bolu kukus adalah dengan cara dikukus. Tujuan mengukus adalah untuk mematangkan produk dengan melakukan proses pengukusan kandungan air dalam bahan secara otomatis meningkat karena uap air terperangkap di dalamnya bersama dengan spons. Kandungan air dapat mempengaruhi degradasi kimia dan mikrobiologis kualitas pangan (Yanti, 2019).

Ash content

Ash content is the inorganic residue left after the organic material is burned. The more mineral content, the higher the ash content, and vice versa if the mineral content is small, the ash content of the material is also small (Hidayati, 2017). The results of the ash content test on the Lakulo Steamed Sponge were 0.90%. Based on the National Standards Agency in 1995 and 1996, for the quality requirements of the ash content of a maximum of 3.0% so that the ash content contained in the Laculo steamed cake was said to have met the maximum quality requirements of steamed sponge cake.

Fat level

Fat in food gives satisfaction to the taste, gives rise to taste and aroma in food, as an emulsifier such as lecithin, besides that fat in food is a source of essential fatty acids that are important for the body, namely linoleic acid and essential fatty acids that are important for the body..(Hidayati, 2017). The results of the fat content test on the Lakulo Steamed Sponge were 13.2%. Based on the National Standards Agency in 1995 and 1996, the fat content quality requirement was a maximum of 3.0% so that the fat content contained in the Laculo steamed cake was said to be inappropriate or exceeding the maximum requirements. The quality of the steamed sponge cake. High fat content in the Laculo steamed cake is influenced by the addition of liquid margarine and chicken eggs used in the Laculo steamed cake. This study is in line with Sahri Yanti et al. milk (Yanti, 2019).

Protein content

Protein is a source of amino acids that contain elements such as carbon, hydrogen, oxygen, and nitrogen. Chemical analysis of protein content aims to determine the percentage of protein content contained in steamed sponge (Resthi & Zukryandry, 2021). The results of the protein content test in Lakulo steamed cakes were 7.11%. Based on the National Standards Agency in 1995 and 1996, for the quality requirements of the protein content, namely a minimum of 5.03% so that the protein content contained in the Laculo steamed cake is said to have met the minimum quality requirements of the steamed cake. tolo beans showed that there was an effect on the results of laboratory tests for steamed cake with tolo bean flour substitution because the more substitution of tolo bean flour in steamed cake, the higher the protein.(Irianti, 2020).

Carbohydrate

Carbohydrates are the main components of foodstuffs that have important functional properties in the food processing process (Yenrina, 2015). The results of the carbohydrate content of the Bolu Steamed Lakulo were 35.3% which was obtained by calculating the by difference method. Based on the National Standards Agency in 1995 and 1996, when compared to SNI, the carbohydrate content of steamed sponge cake cannot be ascertained.

Iron level (Fe)

Iron plays an important role in supporting growth, some of the functions of iron are as oxygen transport to body tissues, lipid and protein oxidation and cell growth. The addition of iron in some food products can be used as an alternative to overcome the problem of anemia (Zaku et al., 2015) in (Angelina et al., 2021). The result of Fe content in Laculo steamed cake is 17.6 mg. Mixing ingredients that have a high iron content in a

product can increase the iron content of the product (Ryandoko, 2017). Based on the National Standards Agency in 1995 and 1996, when compared to SNI, the level of Fe in steamed cake cannot be ascertained.

Receptivity

The acceptance test on the Bolu Kukus Lakulo product was carried out on January 27, 2022 to 30 anemic adolescent girls aged 16-18 years. At SMAN 9 Mataram. The nutritional value of the Laculo Steamed Sponge is 100 grams, namely Energy 274 kcal, protein 6.75 g, fat 12.54 g, carbohydrates 33.53 g and Fe 16.72 mg. Acceptance Test Results In Figure 1.

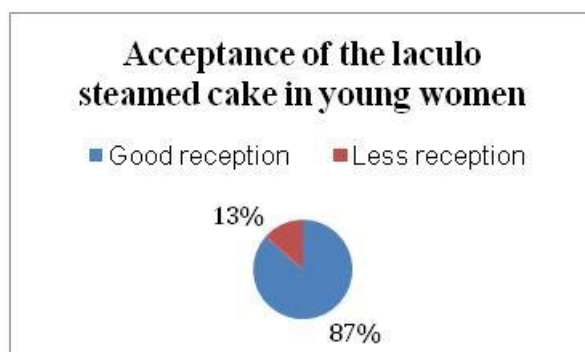


Figure 1. Acceptance Diagram of Lakulo Steamed Sponge

Based on research carried out on 30 young women, it was found that the percentage of acceptability of the Laculo steamed cake product, which was categorized as good, was 86.67% (26 people), and 13.33% (4 people) was categorized as poor acceptance. So it can be concluded that the acceptability of the Lakulo Kukus Bolu is categorized as good because 26 young women gave responses related to products that have a delicious, savory taste and are easy to chew, while four young women with poor acceptance, although only able to spend half a portion (48 grams) because they had previously eaten. Hence, they still felt full, and some responded that they did not like eating snacks such as sponge cake and some did not like food made from nuts.

CONCLUSIONS

The addition of tolo bean flour had a significant effect on the aroma, taste, and texture of Bolu Kukus Lakulo ($p < 0.05$). Meanwhile, the color does not significantly affect ($p > 0.05$).

The results of the test for the nutritional content of the Laculo steamed cake that has been carried out on the tested parameters and have met the SNI standard of steamed cake, namely the ash content parameter (0.90%), protein content (7.11%), for fat content (13.28%), and water content (43.49%), carbohydrate content (35.3%) and Fe (17.6 mg).

The results of the acceptance test of the Lakulo Steamed Sponge can be seen from 30 high school students towards the product, given that as many as 26 people (86.67%) show good acceptance of the product given.

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