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Test of Acceptance and Iron Content of Dim sum "Lori" as an Alternative Snack to Prevent Anemia in Adolescent Girls

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ABSTRACT

The prevalence of anemia is common among young women. Anemia can be prevented by consuming animal protein foods that are high in iron content, namely anchovies with a content of 3.9mg/100g and vegetables that have a high iron content, namely Moringa leaves. This study aims to determine the acceptability and iron levels of dim sum Lori as an alternative snack to prevent anemia among adolescent girls. Experimental research with 3 formulations were done. Formulation ratio between chicken meat: anchovy: moringa leaf flour, 100g:0g:0g, 0g:97g:3g, 0g:94g:6g was used. Acceptance test was done by 25 trained panelists. ICP-OES method was employed to test for iron levels, Data analysis technique, Kruskal Wallis statistical test and continued with the Man Whitney test. Research results shows acceptability test F1; 3.86 (likes), F2; 3.37 (likes), and F3; 3.03 (regular). The results of the iron content of the control formulation; 1.96mg/100g. Meanwhile, the most preferred formulation; 2.32mg/100g. In conclusion, the dim sum treatment formulation meets the needs of Fe in one snack of 2.3mg (F2); 2.5mg (F3) of the RDA requirement for adolescent girls for one snack of 1.27mg.

INTRODUCTION

Anemia is a condition that occurs when the body has few red blood cells in the blood or hemoglobin levels below normal values[1–6], due to a lack of nutrients needed for the preparation of hemoglobin[7]. Young women are one of the most sensitive groups affected by anemia[8]. Hence, young women should pay attention to this condition, considering their likelihood of becoming mothers[9].

Based on findings from the 2018 Basic Health Research, the prevalence of anemia increased to 48.9% compared to 37.1% in 2013. The prevalence of anemia is seen among adolescent girls between age group of 15-24 years being 84.6%. This shows the risk of anemia in adolescence is more prone to occur especially among adolescent girls compared to young men[10]. This issue occurs due to menstruation, poor and imbalance diet, lack of physical activity, and low-socioeconomic family status[11]. Eventually, this causes low endurance, increase the risk of giving birth to premature babies, low birth weight babies, babies born with low iron supplies which lead to anemia, and bleeding before and after childbirth which can potentially endanger the welfare of a mother and child. To overcome this issue, it is crucial to meet the needs of hemoglobin formation[12–14], which can be improved through proper nutrition.

Dim sum is a typical food from China that is quite popular in Indonesia[15]. Dim sum is a Cantonese cuisine known as steamed snack[16]. Most dim sum, is generally filled with meat, chicken, fish, shrimp, and vegetables[17]. In a preliminary study conducted among respondents aged 10-19 years, on their preference of 4 types of snacks shows 62.9% highly preferred dim sum followed by 14.3% risoles,14.3% nuggets and 8.6% least preferred spring rolls.

One of the ways to prevent anemia is to consume high iron food products, namely anchovies. Due to its small shape, anchovies are high demand, having an iron content of 3.9 mg per 100 g, easy to cook, affordable price, and widely available[18]. In addition, there are other foods rich in iron, namely Moringa leaves also known as ‘’Lori’’ which are famous for their medicinal properties[19]. However, the leaves are highly perishable, which can be improved by processing it into flour to extend the shelf life. Moreover, studies show Moringa flour contains iron 28.2mg per 100g. These flour can be added to various dishes to enhance nutritional content which is higher than fresh Moringa leaves[20]. From several previous studies, processed food products have been made by utilizing Moringa leaf flour to make nuggets[21], and brownies[22]. A person suffering from anemia is advised to consume Moringa leaves regularly to meet iron requirements and prevent symptoms of anemia[23].

Based on this description, this study has developed anchovy dim sum incorporated with Moringa leaf flour as an alternative snack to prevent anemia for young women. The consideration of choosing this dim sum is because Young Women like this type of food, so researchers are interested in adding Moringa leaf flour to dim sum.

MATERIALS AND METHODS

The type of research is experimental research. In this study contained 1 control and 2 treatments, namely in the ratio of formulation 1 between chicken meat: anchovies: moringa leaf flour which is 100 g: 0 g: 0 g, formulation 2 with the ratio of chicken meat: anchovies: moringa leaf flour which is 0 g: 97 g: 3 g, formulation 3 with the ratio of chicken meat: anchovies: moringa leaf flour which is 0 g: 94 g: 6 g of 100-gram total of each formulation.

The study was conducted from October 2022 to June 2023. The manufacture and acceptability test of Dim sum Lori was carried out at the Laboratory of the Department of Nutrition Poltekkes Kemenkes Surabaya, Jalan Pucang Jajar Selatan No. 24 B, Gubeng District, Surabaya City. Meanwhile, iron content testing was carried out at PT Saraswanti Indo Genetech Surabaya, AMG Tower, 12th Floor, Jalan. Dukuh Menanggal No. 1-A, Gayungan, Surabaya, East Java, Zip Code 60234. The panelists used in this study were 25 students of the Department of Nutrition Poltekkes Kemenkes Surabaya.

The sample of this study was tested twice, namely by testing acceptability in the form of liking or disliking the color, texture, aroma, and taste of dim sum and iron content test with ICP-OES test

including 1 control and 2 treatments with 2 repetitions and if there is a significant difference further tests are carried out. Meanwhile, the results of the acceptability test covering color, texture, aroma, and taste were also tested using the Kruskall Wallis Test with an error rate of 0.05 (α = 0.05). If there is a discrepancy, a continuation test must be carried out with the Whitney Man Test to see if the hypothesis is accepted or rejected p <0.05.

RESULTS

The results of the study include the characteristics of the Dim sum Lori formulation, the average acceptability test of the Dim sum Lori formulation, the results of the crucal wallis dim sum Lori test, the results of the man whitney Dim sum Lori test, and the results of the Dim sum Lori iron content test.

Table 1. Characteristics of Dim sum Lori Formulation

Indicator	Dim sum Formulation		
	F1 (Control)	F2	F3
Color	Yellowish white	Green	Slightly dense green
Texture	chewy	Slightly chewy and slightly dense	Slightly chewy and slightly dense
Aroma	Typical dim sum	Typical anchovies and a little langu Moringa leaves	Typical anchovies and a little langu Moringa leaves
Taste	Savory	Typical anchovies and a little taste of Moringa leaves	Typical anchovies and a little taste of Moringa leaves

Source: Primary data, 2023

Image

Image 1. Dim sum Lori

The difference in the characteristics of the Dim sum Lori formulation (Moringa Leaf Flour and Anchovies) is that the F1 control formulation produces a yellowish-white color with a chewy texture, distinctive dim sum aroma, and savory taste. The F2 treatment formulation produces a green color with a slightly chewy and slightly dense texture, a distinctive aroma of anchovies and a little langu of Moringa leaves as well as a distinctive taste of anchovies and a slight taste of Moringa leaves. The F3 treatment formulation produces a slightly concentrated green color with a slightly chewy and slightly dense texture, the distinctive aroma of anchovies and a little langu of Moringa leaves as well as the distinctive taste of anchovies and a little taste of Moringa leaves.

Table 2. Average Dim sum Lori Acceptability Test Results

No.	Indicator	Dim sum Formulation		
		F1 (Control)	F2	F3
1.	Color	4.12	3.36	3.12
2.	Texture	3.52	3.32	3.24
3.	Aroma	4.0	3.32	2.92
4.	Taste	3.8	3.32	2.84
Average		**3.86**	**3.37**	**3.03**

Source: Primary data, 2023

Value Score Categories: (1) Really dislike, (2) Dislike, (3) Usual, (4) Like, (5) Really like it

According to the table above with the three dim sum formulations with a total acceptability test assessment, the favorability results can be known based on color, texture, aroma, and taste. According to the average preference for warma, texture, aroma, and taste most liked by panelists, namely the F1 control formulation which has the highest average score of 3.86 and is included in the category of likes and for the treatment formulation preferred by panelists, namely the F2 formulation which has an average of 3.37.

Based on the color indicator on Dim sum Lori (Moringa Leaf Flour and Anchovies), the highest average score among the three formulations is the F1 formulation with a score value of 4.12 which is included in the like category. Conversely, the lowest is the F3 formulation with a score of 3.12 which is included in the usual category.

Based on the texture indicator in Dim sum Lori (Moringa Leaf Flour and Anchovies), the highest average score among the three formulations is the F1 formulation with a score value of 3.52 which is included in the like category. Conversely, the lowest is the F3 formulation with a score of 3.24 which is included in the usual category.

Based on the aroma indicator in Dim sum Lori (Moringa Leaf Flour and Anchovies), the highest average score among the three formulations is the F1 formulation with a score value of 4 which is included in the like category. Conversely, the lowest is the F3 formulation with a score of 2.92 which is included in the usual category.

Based on the taste indicators in Dim sum Lori (Moringa Leaf Flour and Anchovies), the highest average score among the three formulations is the F1 formulation with a score value of 3.8 which is included in the like category. Conversely, the lowest is the F3 formulation with a score of 2.84 which is included in the usual category.

Table 3. Kruskal Wallis Dim sum Lori Test Results

No.	Indicator	Kruskal Wallis *Test Values*
1.	Color	0.001
2.	Texture	0.621
3.	Aroma	0.000
4.	Taste	0.003

Source: Primary data, 2023

According to the table above, the results of the Kruskal Wallis test with color, aroma, and taste indicators have a p value of < 0.05 which shows that there are differences in warma, aroma, and taste between 3 formulations of Dim sum Lori (Moringa Leaf Flour and Anchovies). While the results of the Kruskal Wallis test on the texture indicator have p > 0.05 which shows that there is no difference in texture and taste between the 3 formulations of Dim sum Lori (Moringa Leaf Flour and Anchovies).

Table 4. Man Whitney Dim sum Lori Test Results

NNo.	Indicator	Whitney's Man *Test Value*		
		F1: F2	F1: F3	F2: F3
1.	Color	0.003	0.000	0.415
2.	Aroma	0.007	0.000	0.152
3.	Taste	0.031	0.000	0.074

Source : Primary data, 2023

Based on the table above, the results of the Man Whitney test on the color indicator in the F1 control formulation: F2 treatment formulation and F1 control formulation: F3 treatment formulation has a p value of < 0.05, that H0 is rejected which means there is a difference in color between the two formulations, while in the F2 treatment formulation: F3 treatment formulation has a p value of > 0.05, that H0 is accepted which means there is no difference in color between the two formulations.

In the aroma indicator in the F1 control formulation: F2 treatment formulation and F1 control formulation: the F3 treatment formulation has a p value of < 0.05, that H0 is rejected which means there is a difference in aroma in the two formulations, while in the F2 treatment formulation: the F3 treatment formulation has a p value of > 0.05, that H0 is accepted which means there is no difference in aroma between the two formulations.

In the taste indicator in the F1 control formulation: F2 treatment formulation and F1 control formulation: the F3 treatment formulation has a p value of < 0.05, that H0 is rejected which means there is a difference in taste between the two formulations. While in the F2 treatment formulation: the F3 treatment formulation has a p value of > 0.05, that H0 is accepted which means there is no difference in taste between the two formulations.

Table 5. Dim sum Lori Iron Content Test Results

No.	formulation	Iron content (mg/100g)		
		Simplo	Duplo	Average
1.	F1	1,96	1,96	1,96
2.	F2	2,31	2,33	2,32
3.	F3	2,54	2,63	2,58

Source: Primary data, 2023

Based on the table above, the results of iron content analysis prove that there is a comparison in iron content between 3 formulations. In the F1 control formulation with a ratio of chicken meat: anchovies: moringa leaf flour as much as 100 g: 0 g: 0 g which is 1.96 mg / 100 g. In the formulation of F2 treatment with a ratio of chicken meat: anchovies: moringa leaf flour as much as 0 g: 97 g: 3 g which is 2.32 mg / 100 g. While in the formulation of F3 treatment with a ratio of chicken meat: anchovies: moringa leaf flour as much as 0 g: 96 g: 6 g which is 2.58 mg / 100 g.

DISCUSSION

1. Characteristics of Lori Dim Sum Acceptability Test (Moringa Leaf Meal and Anchovies)

A. Color

Based on the results of the color acceptability test of the three formulations, the highest average value on the color indicator is found in the F1 formulation with a value of 4.12 which means like, followed by the F2 formulation with a value of 3.36 which means ordinary and the lowest value is in the F3 formulation with a value of 3.12 which means ordinary. Judging from the results of the acceptability test with the color indicator, panelists tend to like the F1 formula which is yellowish-white compared to a slightly solid green color.

This is in accordance with the statement (Abraham Manik, 2020), bright and bright colored food will be more attractive to customers when choosing food than concentrated colored food[24]. For the most part, the assessment of the quality of foodstuffs is related to the color of a product[25]. The more moringa leaf flour in the dim sum, the more intense the green color due to the high chlorophyl[26].

B. Texture

Based on the results of the acceptability test, the highest average value on the texture indicator is found in the F1 formulation with a value of 3.52 which means like, followed by the F2 formulation with a value of 3.32 which means ordinary and the lowest value is the F3 formulation with a value of 3.24 which means ordinary.

Based on these results, the more additional Moringa leaf flour, the more water reacts in the flour and gel is formed, which makes the dough texture solid[26]. Properties that can be seen from textures such as, crispy, soft, rough, hard, and chewy[27].

C. Aroma

Based on the results of the acceptability test, the highest average value in the aroma indicator is found in the F1 formulation with a value of 4 which means like, followed by the F2 formulation with a value of 3.32 which means ordinary and the lowest value is in the F3 formulation with a value of 2.92 which means ordinary.

Based on these results, that adding Moringa leaf flour that has a distinctive aroma of Moringa leaves can affect the aroma of a product[26]. Therefore, the more Moringa leaf flour, the more it eventually smells of Moringa leaves langu. The aroma can also indicate how well the product is received by consumers[27].

D. Taste

Based on the results of the acceptability test, the highest average value on the taste indicator was found in the F1 formulation with a value of 3.8 which means like, followed by the F2 formulation with a value of 3.32 which means ordinary and the lowest value is in the F3 formulation with a value of 2.84 which means ordinary. Panelist acceptance of Dim sum Lori was influenced by the taste of Moringa leaf flour. In the contents of dim sum there is a strong special taste due to the taste of Moringa leaf flour.

Based on these results, that products added Moringa leaf flour have a bitter taste due to tannin compounds[20]. Thus, the more additional moringa leaf flour, the more bitter the taste. Taste is an evaluation of the taste of a food that is raised and can be selected with a sense of taste that includes salty, sweet, sour, and bitter tastes[26].

2. Support Iron Content of Dim sum Lori (Moringa Leaf Flour and Anchovies)

In testing iron content using the ICP-OES test, with the results of the iron content analysis test stating that the highest iron content results in the F3 treatment formulation with a formulation ratio of 0 g : 94 g : 6 g which is 2.58 mg / 100 g. Continued with the second highest result, namely in the F2 treatment formulation with a formulation ratio of 0 g : 97 g : 3 g which is 2.32 mg / 100 g and in the F1 control formula with a formulation ratio of 100 g : 0 g : 0 g which is 1.96 mg / 100 g. In the F1 formulation, the control has a lower iron content value compared to F2 and F3 because the basic ingredients used are chicken meat which has a lower iron content than anchovy iron and there is no additional treatment of Moringa leaf meal. Meanwhile, the F3 iron content test results are higher than the F2 formulation because there are more additional Moringa leaf flour, which is as much as 3 grams and 6 grams, so the higher the additional Moringa leaf flour, the higher the iron content test results.

Table 6. RDA Per Dim sum Lori Recipe

Formulation	Energy (kkal)	Serving	Weight Per Serving (g)
F1	979.6	5	77
F2	772.8	4	96
F3	776.6	4	96

Source : Primary data, 2023

Based on the table above, the average energy needs of Young Women a day is 2016.7 kcal, then in one snack meal is 201.67 kcal. Meanwhile, the energy for 1 F2 recipe is 772.8 kcal, so to meet the total energy of 201.67 kcal snacks, 4 servings are obtained with 1 serving of 3 dim sum with a total weight of 96 grams of dim sum per serving.

Young Women's fe needs a day amounted to 12.67 mg, then in one snack meal amounted to 1.27 mg. The following is a table of snack fe content per serving of Dim sum Lori.

Table 7. Fe Content of Snacks Per Serving of Dim sum Lori

Type of Formulation	Fe Content of Snacks Per Serving (mg)	Fe Requirements for Young Women According to AKG 2019 (mg)
F1	1.13	1.27
F2	2.3	
F3	2.5	

Source : Primary data, 2023

Based on the table above, that the F1 control formulation has not met the fe needs in one snack meal. Meanwhile, the formulation of F2 and F3 treatments can meet the needs of fe in one snack meal for Young Women.

3. Estimated Production Cost of Dim sum Lori (Moringa Leaf Flour and Anchovies)

Table 8. Estimated Cost of Making Dim sum Lori

No	Material Name	Quality	Unit	Unit Price	Total
1	Tapioca flour	1	kg	IDR. 12.000	IDR. 1.500
2	Flour	1	kg	IDR. 13.000	IDR. 500
3	Anchovies	1	ons	IDR. 10.000	IDR. 10.000
4	Egg	1	kg	IDR. 21.000	IDR. 2.000
5	Carrot	1	kg	IDR. 15.000	IDR. 500
6	Leek	1	gr	IDR. 5.000	IDR. 500
7	Sesame oil	1	btl	IDR. 7.500	IDR. 500
8	Sugar	1	kg	IDR. 13.000	IDR. 500
9	Oyster sauce	1	bks	IDR. 3.000	IDR. 500
					IDR. 16.500

Source : Primary data, 2023

The estimated cost of this production in 1 recipe there are 10 pieces of dim sum, so that in 1 piece of dim sum is calculated at IDR. 1,650 which is relatively cheap in making alternative snacks for people with anemia in Young Women.

CONCLUSION

Based on research and experiments that have been carried out, then the results are obtained, including: In the Dim sum Lori formulation (Moringa Leaf Flour and Anchovies) there are 3 formulations, namely the F1 control formulation with a ratio of chicken meat: anchovies: Moringa leaf flour as much as 100 g: 0 g, the F2 treatment formulation with the ratio of chicken meat: anchovies: Moringa leaf flour as much as 0 g: 97 g: 3 g, and the F3 treatment formulation with a ratio of chicken

meat: Anchovies: Moringa leaf meal as much as 0 g: 94 g: 6 g. The results of statistical tests prove that F1 has differences between F2 and F3, namely between control formulations and treatment formulations. Meanwhile, F2 and F3 have no difference between treatment formulations. Dim sum treatment formulation can meet the needs of Fe in one snack of 2.3 mg (F2), 2.5 mg (F3) of the RDA needs of Young Women one snack of 1.27 mg.

In connection with these conclusions, suggestions can be given, namely: For Young Women, Moringa leaf meal and anchovies can be processed into varied foods such as dim sum, or other types that are desired to prevent anemia. For further research, you can conduct an analysis of the content of macro and other micronutrients in Lori dim sum (Moringa Leaf Flour and Anchovies).

Further research needs to be carried out on raw materials or additions that can reduce the aroma of langu to Moringa leaves with the addition of kaffir lime leaves and pandan leaves when making them.

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