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Test of Acceptance and Potassium Pancake Levels of Red Bean Formulation as a Snack Alternative for Hypertension Pantients

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ABSTRACT

According to the AKG (2019), the potassium requirement of adults is 4,700 mg. If a snack is given 10% of the requirement, then 470 mg is obtained per snack meal. To meet this need, an innovation of high-potassium snacks was carried out by formulating red beans in the form of flour into pancakes. The purpose of this study to determine the acceptability and potassium content of red bean pancake formulation as an alternative snack for people with hypertension. This study was an experiment on 4 different formulations with a ratio of wheat flour and red bean flour 100: 0 g, 85: 15 g, 70: 30 g, 50: 50 g, then tested for acceptability and tested for potassium levels. The highest acceptability test was in formulation 3 (PKM 3), which was 3.59 in the preferred category with a potassium content of 447.5 mg/100g. One serving of red bean pancake snack based on caloric needs obtained 80 grams for adult men with 358 mg of potassium and 67 grams for adult women with 300 mg of potassium. The highest acceptability test was in formulation 3 (PKM 3). One serving of red bean pancake snack cannot meet the needs of potassium

INTRODUCTION

Currently, one of the problems being faced in health development is the shift in disease patterns from infectious diseases to non-communicable diseases (NCDs). This shift in disease patterns certainly has an impact on decreased productivity and disruption to the fulfillment of daily activities.[1] non-communicable diseases are by far the main cause of death throughout the world. Where 15 million people aged 30-69 years die every year and more than 85 percent of NCD deaths occur in developing countries, one of which is Indonesia.[2]

Hypertension is a type of NCD which is a very serious health problem today. Hypertension is a condition in which the systolic and diastolic blood pressure increases from the normal threshold of 120/80vmmHg. According to the World Health Organization (WHO), a person's blood pressure can be considered normal if it is less than 130/85 mmHg. If the blood pressure is more than 140/90 mmHg then you can be declared as suffering from hypertension or the limit for adults over 18 years.[3]

According to the World Health Organization (WHO) in 2015, there were around 1.13 billion people worldwide suffering from hypertension. This shows that 1 in 3 people in the world are diagnosed with hypertension. The number of hypertension sufferers in the world continues to

increase every year. Where in 2025 it is estimated that the number of hypertension sufferers will increase to 1.5 billion, while the number of deaths due to hypertension and complications each year is estimated at around 9.4 million people.[4]

The results of Basic Health Research in 2018 show that the prevalence of hypertension in Indonesia has increased, where in 2013 high blood pressure in people aged 18 years and over was 25.8%. From the latest riskesdas data, the incidence of hypertension reached 34.1%. This shows that the prevalence of hypertension has increased by 8.3% and is expected to continue to increase every year.[5]

The high prevalence of hypertension sufferers and the resulting risk of death mean that hypertension requires curative management. This management is divided into 2, namely pharmacological & non-pharmacological management. Pharmacological management can be done by taking anti-hypertension drugs, while non-pharmacological management can be done by reducing sodium levels in the body. One of the micronutrients that can help reduce sodium levels in the body is potassium.[6]

Potassium levels will affect blood pressure if sodium levels in the body increase, but if sodium levels in the body are normal or low then potassium levels have no effect on blood pressure. Consuming foods rich in potassium is highly recommended for hypertension sufferers because it can increase the concentration in the intracellular fluid so that it will increase the fluid in the extracellular section and lower blood pressure.[7] These nutrients can be obtained from food, including mustard greens, spinach, oranges, grapes, and bananas. Apart from fruit and vegetables, potassium can also be obtained from nuts.[8]

One type of legume that is rich in potassium is red beans (*Phaseolus vulgaris L*). Based on the 2017 Indonesian Food Composition Table, 100 g of dried red beans contains 1,265.5 mg of potassium. When compared with dried soybeans and dried green beans, dried red beans still have the highest potassium levels, whereas soybeans have potassium levels of 713.4 mg and dried green beans 815.7 mg.[9]

People have used red beans as a food ingredient to meet food needs in Indonesia. However, it still uses simple processing techniques. Red beans are usually used as a complement in cooking, such as soup, ice cream, and baby food.[10] The nutritional content that is good for health means that red beans can be processed into flour which can later be used as a raw material for processing food products, one of which is cake.

Pancakes are a type of moist cake that can be consumed as a snack or can also be enjoyed as an alternative breakfast because they are simple to make. The savory and sweet taste of cake makes it popular among all groups. This is supported by the results of a survey conducted by

researchers on Google Form, where 71.4% of respondents chose pancakes and the remaining 28.6% chose other snack foods.

From the explanation of the various factors above, researchers moved to innovate a food made from red beans which is rich in potassium so it is good for hypertension sufferers. The food innovation that will be carried out is making red bean formulation pancakes as an alternative snack for people suffering from hypertension.

MATERIALS AND METHODS

This research uses an experimental research design. The research was conducted in November 2021- April 2022. Receptivity testing was carried out in the laboratory of the Nutrition Department, Health Polytechnic, Ministry of Health, Surabaya, Jl. Pucang Jajar Selatan No. 24B while the potassium level test was carried out in the Chemistry laboratory of the Surabaya Industrial Standardization Research Institute, Jl. Jagir Wonokromo No. 360 Surabaya.

The samples used in this research were pancakes formulated with red bean flour in three different formulations and pancakes without the addition of red bean flour as a control sample. Following are the details of the formulation between wheat flour and red bean flour; control formulation (PKM 0) 100 g : 0 g, formulation 1 (PKM 1) 85 g : 15 g, formulation 2 (PKM 2) 70 g : 30 g, and formulation 3 (PKM 3) 50 g : 50 g.

The data collection method for the acceptability test uses a liking scale test (Hedonic Scale Test), namely the level of acceptance in the form of liking or disliking color, aroma, taste, and texture. Meanwhile, to test potassium levels using the SSA (Atomic Absorption Spectrophotometry) method.

Data from the acceptability test including color, aroma, taste and texture will be processed using computer tools with the SPSS 16.0 program using a non-parametric test, namely the Kruskal Wallis test. The aim is to find out which type of treatment is the most different with an error rate of 0.05 ($\alpha = 0.05$). Then the final result of this physical quality analysis was the determination of one of the red bean pancake formulations that was most liked by the panelists. Meanwhile, the test for potassium levels in samples was carried out using the SSA (Atomic Absorption Spectrophotometry) test equipment.

RESULTS

Characteristics of Red Bean Formulated Pancakes

Pancakes are made from wheat flour and eggs. In the processing process, red beans are added which have been processed into flour. In this pancake formulation, there are differences in the composition of the use of wheat flour and red bean flour.

Table 1 Characteristics of Red Bean Formulated Pancakes

Indicator	Characteristics of Red Bean Formulated Pancakes			
	Formulation 0 (PKM 0) (100: 0)	Formulation 1 (PKM 1) (85: 15)	Formulation 2 (PKM 2) (70: 30)	Formulation 3 (PKM 3) (50: 50)
Color	Golden yellow	Slightly brownish - yellow	Brownish yellow	Chocolate
Aroma	Typical aroma of milk and eggs	The typical aroma of milk and eggs is reduced, with a slight aroma of red beans	Typical aroma of red beans	The distinctive aroma of red beans is pungent
Texture	Soft, not stiff, and soft	Soft, not stiff and soft but starting to have a few fine grains	A little dense, a little stiff, and has fine grains	Dense, stiff, easy to break, and fine grain increases
Taste	Sweet and savory from milk and eggs	Sweet and with a slight taste of red beans	Sweet and distinctive taste of red beans	Sweet and strong red bean taste

Resource: Primary Data (2022)

From the table above it can be seen that each formulation given treatment has different characteristics.

Acceptability Test of Red Bean Formulated Pancakes

The acceptability test uses a hedonic scale to determine the level of liking of 25 panelists in the somewhat trained category. The results of this research can be seen in Table 2 below:

Table 1 Distribution of Average Rating for Red Bean Formulated Pancake

No	Indicator	Red Bean Formulated Pancakes			
		Control formulation (PKM 0)	Formulation 1 (PKM 1)	Formulation 2 (PKM 2)	Formulation 3 (PKM 3)
1.	Color	3,76	3,72	3,64	3,8
2.	Aroma	3,72	3,52	3,56	3,48
3.	Texture	3,64	3,56	3,48	3,52
4.	Taste	3,28	3,4	3,48	3,56
Average		**3,6**	**3,55**	**3,54**	**3,59**

Resource: Primary Data (2022

Based on the table above, the research results of the three red bean pancake formulations and one control formulation by assessing the acceptability test using a hedonic scale can show the results of the panelists preferences in general based on color, aroma, texture, and taste. The red bean formulation pancake that has the highest acceptability value is formulation 3 (PKM 3) with an average score of 3.59, which means it is in the like category.

Kruskal Wallis Pancake Test Red Bean Formulation

Kruskal Wallis Non-Parametric Test to see whether there are differences in the indicators of color, aroma, texture, and taste in red bean pancake formulations. The results of the Kruskal Wallis test can be seen in Table 3 below:

Table 2 Kruskal Wallis Pancake Test Results Red Bean Formulation

No	Indicator	Kruskal Wallis Test Values
1.	Color	0,915
2.	Aroma	0,815
3.	Texture	0,924
4.	Taste	0,772

Source: Primary Data (2022)

Based on table 3 of the results of the Kruskal Wallis Test, it is known that the color, taste, aroma and texture indicators have a p-value > 0.05, so H_0 is accepted, which means there is no significant difference between the four formulations in terms of color, aroma, texture, and taste. Therefore, testing was not continued with the Mann Whitney Test.

Test the Potassium Content of Red Bean Formulated Pancakes

The results of the analysis of potassium content in the control pancakes and the best treated pancakes from the internal acceptability test results can be seen in table 4 below:

Table 3 Results of Analysis of Potassium Content in Pancakes

No	Sample Code	Potassium Levels (%)		
		Simplo	Duplo	Average
1.	PKM 0 (control)	0,145	0,177	0,161
2.	PKM 3	0,486	0,409	0,4475

Source: Primary Data (2022)

The results of the analysis of potassium content with two repetitions showed that the highest potassium content was found in formulation 3 (PKM 3) with an average of 0.4475%, which means that 100 g of red bean pancakes formulation 3 (PKM3) contains 447.5 mg of potassium.

The potassium content of one serving of red bean pancakes formulation 3 (PKM 3), which is calculated based on the calorific value of one snack for adult men and women in one day can be seen in Table 5 below:

Table 4 Potassium Content of Red Bean Pancake Formulation 3 (PKM 3)

a. Potassium Content in One Portion for Adult Men

Pancake Formulation 3 (PKM3)	Weight (g)	Amount	Potassium
1 Recipe	280	3,5 portions	1.253 mg
1 Portion	80	1 portion	358 mg

b. Potassium Content in One Portion for Adult Women

Pancake Formulation 3 (PKM3)	Weight (g)	Amount	Potassium
1 Recipe	280	4,2 portions	1.253 mg
1 Portion	67	1 portion	300 mg

DISCUSSION

Color

One parameter that is often used to determine the overall level of consumer acceptance of a product is color. According to Lase (2018), a product that has good nutritional value, is delicious, and has a very good texture will not be eaten if it has a color that is unsightly or gives an impression that deviates from the color it should be.[11]

Based on the color indicator of the red bean pancake formulation, the highest average score among the three formulations is formulation 3 (PKM 3) with a score of 3.8, which means it is included in the category of liking the characteristic brown color. Meanwhile, the lowest average score is formulation 2 (PKM 2) with a score of 3.64, which means that you like the characteristics of the brownish yellow color.

Judging from the results of the Kruskall Wallis test on color, it shows that between the four formulations there are no significant differences. The addition of red bean flour affects the color changes in each formulation. The higher the amount of added red bean flour, the more brownish the resulting color becomes. One of the factors that causes pancakes to turn brown is because of the baking process, which causes the Maillard reaction to occur.

According to Winarno (1995), "the Maillard reaction is a reaction in which the amino group of a protein reacts with the carbonyl group of a reducing sugar to produce a dark or brownish color". Red bean flour has a high protein content, namely 19.08%. The higher the protein, the more amino groups it contains, so these groups will react with reducing sugars during the roasting process.[12]

Aroma

Aroma is one of the components that play a role in determining the taste of food. The aroma that comes from food will be a very strong attraction and can stimulate the sense of smell, resulting in appetite.[13]

Based on the aroma indicator in the red bean pancake formulation, the highest average score among the three formulations is formulation 2 (PKM 2) with a score of 3.56, which means it is included in the likes category with the characteristic aroma of red beans. Meanwhile, the lowest average score was formulation 3 (PKM 3) with a score of 3.48, which means neutral with a characteristic pungent red bean aroma.

Judging from the results of the Kruskall Wallis test on aroma, it shows that between the four formulations, there are no significant differences. The addition of red bean flour influences the aroma in changes to each formulation. The higher the amount of red bean flour added, the more pungent aroma it produces, typical of red beans.

This is because red beans have a distinctive aroma. Apart from that, red bean flour has a high protein content so it can give off the distinctive aroma of this food ingredient.[14]

Taste

Taste is the most important factor in determining the final decision whether a product is acceptable or not. Even though the color, aroma, and texture are good, if the taste is bad, consumers will reject the product.[15]

Based on the taste indicators of the red bean pancake formulation, the highest average score among the three formulations is formulation 3 (PKM 3) with a score of 3.56, which means it is included in the likes category with its sweet characteristics and strong red bean taste. Meanwhile, the lowest average score was formulation 1 (PKM 1) with a score of 3.4, which means neutral with sweet characteristics and a slight red bean taste.

Judging from the results of the Kruskall Wallis test on taste, it shows that between the four formulations, there are no significant differences. The addition of red beans affects the taste in changes to each formulation. The higher the amount of red beans added, the stronger the red beans' distinctive taste will be.

This happens because red beans contain glutamic acid. Glutamic acid can produce a delicious taste and improve the taste of food or snacks by improving the balance of taste. 100 g of dried red beans contains 190.16 mg of glutamic acid.[14]

Texture

Texture is a characteristic of a material as a result of a combination of several physical properties such as shape, quantity, size, and the elements forming the material that can be perceived by the sense of touch and taste.[15]

Based on the texture indicators of the red bean pancake formulation, the highest average score among the three formulations is formulation 1 (PKM 1) with a score of 3.56, which means it is included in the likes category with the characteristics of a soft, not stiff, soft texture but starting to have a little graininess. fine. Meanwhile, the lowest average score is formulation 2 (PKM 2) with a score of 3.48, which means it is neutral with the characteristics of a texture that is slightly dense, slightly stiff, and contains fine grains.

Judging from the results of the Kruskall Wallis test on texture, it shows that between the four formulations, there are no significant differences. The addition of red bean flour affects the texture in

changes to each formulation. The higher the amount of added red bean flour, the resulting texture becomes denser, stiffer, easier to break, and the finer grains increase.

This is in line with Rukimi's (2009) research, namely that as red bean substitution increases, the amylopectin contained in snacks also increases through the gelatinization process so that the texture of the snack becomes harder. Red bean flour contains amylopectin levels of 61%. Amylopectin functions to provide crunchy and crunchy properties.[12]

Potassium content of Red Bean-Formulated Pancakes

The results of testing potassium levels in red bean pancake formulations using the Atomic Absorption Spectrophotometry (SSA) test showed that the highest potassium content was found in formulation 3 (PKM 3) at 447.5 mg/100 g, when compared to the control formulation (PKM 0) namely 161 mg/100 g.

According to the 2019 Nutritional Adequacy Rate (AKG), the potassium requirement for adults is 4,700 mg/day. If snacks are given once with a portion of 10% of needs, then 470 mg per snack is given. The average daily calorie requirement for adult men is 2,150 kcal, so the calories per snack meal are 10% x 2,150 kcal = 215 kcal. In one recipe, red bean pancakes have a cooked weight of 280 g with a calorie content of 761.7 kcal. So, to meet the snack needs of adult men at one meal, they can consume 80 g of pancakes with a potassium content of 358 mg. Meanwhile, the average calorie requirement for adult women is 1,830 kcal, so the calories per one snack meal are 10% x 1,830 kcal = 183 kcal. To meet these needs, you can consume 67 g of pancakes with a potassium content of 300 mg. Based on the potassium requirement for snacks per meal, namely 470 mg, it shows that one snack portion for adult men and women cannot meet potassium needs. However, it is still used as an alternative snack because it can meet calorie needs.

CONCLUSION

Based on the research results of the Description of Mothers' Knowledge about animal foods, attitudes, and behaviors in providing food in Gunggungan Lor Village, Probolinggo Regency, conclusions can be drawn as follows: The research results showed that the majority of toddlers were aged 42-58 months, which were 15 toddlers (39.3%), and they were male. The majority of mothers of toddlers were aged 20-30 years, which were 24 mothers (63.3%), with education completed up to Junior High School (SLTP/SMP). Most mothers of stunted toddlers had good knowledge with Junior High School education completed, totaling 9 mothers (56.2%). The majority of mothers of stunted toddlers had an agreeable attitude with good knowledge, totaling 18 mothers (78.3%). Most of the behaviors of mothers of stunted toddlers in providing animal foods were categorized as insufficient, with 22 individuals (57.9%).

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