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Test of Acceptance and Fe Levels of Green Beans with the Addition of Katuk Leaves "PUCAHITUK" as a Teenager Snack to Prevent Anemia

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ABSTRACT

According to (WHO, 1992) anemia is a condition where the Hb level is lower than the normal limit. The purpose is to determine the acceptability and levels of iron in processed mung bean pudding products with the addition of katuk leaves as a source of iron snacks for adolescents. This research method is experimental. Data collection is obtained from organoleptic tests and Fe levels in the laboratory. Statistical analysis used the Kruskall Wallis and Mann Whithney test. The results showed organoleptic properties, the most preferred formulation by the panelists was the PKU formulation with a ratio (80:30). The highest Fe content in the control code was PKA at 18.91 mg/kg. Nutritional Adequacy Ratio recommends intake of 16 mg of Fe per day as a dietary effort to prevent anemia. If the snack is given 2 times with a portion of 10% of daily needs = 10% x 16 mg = 1.6 mg. Meanwhile, the Fe content of PUKAHITUK Pudding was <0.028 mg/kg. If the green bean pudding and katuk leaves weigh 90 g/cup, they contain 90gr/1000 x < 0.028 mg = 0.0252 mg/cup. It can be concluded that 1 cup of pudding does not meet the snack needs for teenagers.

INTRODUCTION

Anemia is a condition where there is a decrease in hemoglobin, hematocrit, and the number of red blood cells below normal values.[1] Kreamer (2007), states that the cause of anemia is due to nutritional and non-nutritional factors.[2] Nutritional factors are related to protein, vitamin and mineral deficiencies, while non-nutritional factors are related to infectious diseases.[3]

Based on WHO data in Worldwide Prevalence of Anemia, it shows that the total world population suffering from anemia is 1.62 billion people with a prevalence of pre-school age 47.4%, school age 25.4%, women of childbearing age 41.8% and men 12.7% (WHO, 2008).[4] According to data (Ministry of Health of the Republic of Indonesia 2014) there are 18.4% in the 15–24-year age group who suffer from anemia. Based on Basic Health Research 2018, in the 15–24-year age range, the prevalence of anemia in East Java is 32%. In East Java, according to basic data from the Safe Mother Hood Project, an anemia prevention project in Indonesia with data from abroad, it is stated that 80.2% of young women are affected by anemia. The average prevalence of anemia in East Java Province is 5.8%. [5] The average prevalence of anemia in East Java Province is still below the National target, namely 28% (RPJMN 2015-2019). Districts/Cities namely Situbondo Regency at 10.69%, Mojokerto City at 11.23%, Madiun Regency at 11 .66% and Pasuruan Regency 12.83%.

Meanwhile, the prevalence of anemia according to the Surabaya Health Service in 2018 at the Pucang Sewu Community Health Center was 15.34%.[6]

Adolescence is a period where development occurs very quickly, so nutritional needs during this period also increase.[7] One of the nutrients whose needs are increasing is iron. Iron is needed in all body cells and is involved in physiological processes, such as the formation of hemoglobin (red blood cells) and enzyme functions. Women require greater iron consumption than men.[8] The Nutritional Adequacy Rate table states that the iron requirement for young women aged 13-24 years is 15 mg, this figure is much greater than for men their age.[9]

One type of legume that contains high iron is green beans. Green beans (Phaseolus radiates L.) are a source of vegetable protein, vitamins (A, B1, C and E) and several other substances that are very beneficial for the human body such as starch, iron, sulfur, calcium, fatty oils, manganese, magnesium and niacin (Purwono & Hartono, 2009).[10]

Apart from nuts, plants in Indonesia that have been used to treat iron deficiency anemia, one of them is katuk leaves.[11] In Indonesia, katuk leaves have been used as a phytopharmaceutical preparation which is effective in facilitating breast milk. Katuk leaves are a local plant that has high levels of chlorophyll and contains deep antioxidants large amounts are very useful for preventing free radicals, preventing premature aging, anemia, increasing nutrient absorption in the digestive tract, overcoming fatigue, and preventing blood vessel disorders (Endang S, 2016).[12]

The iron levels in green beans and katuk leaves can be an alternative for treating iron deficiency anemia.[13] Green beans and katuk leaves are safer compared to administering Fe tablets, because green beans and katuk leaves are safe and do not cause digestive side effects. Therefore, researchers want to make green bean pudding with the addition of katuk.[14] It is hoped that green bean pudding with processed katuk leaves can improve nutritional status, especially iron in pudding as an alternative snack to prevent anemia in young women.[15]

MATERIALS AND METHODS

Research Design

This type of research uses experimental research. According to experts, Sugiyono's experimental research is a multidisciplinary research method used to determine the effect of differences in independence (correction) on differences (results) in a treatment or experiment. The first stage is a test or hedonism test by staff to test the product and test the Fe content in the product.

Testing of the organoleptic properties and Fe content of pudding with the substitution of green beans and katuk leaf flour was carried out with a target of 25 panelists. From the measurement method used for measurements, overall preferences can be seen based on color,

taste, smell and texture. Then the measurement results were obtained using the Kruskall Walis scale to determine the level of liking. Meanwhile, the objective test through the laboratory aims to see the Fe content in the pudding with the substitution of green beans and katuk leaf flour.

Research Time and Location

This research was carried out in October 2021 - June 2022. The preparation and organoleptic testing of pudding with a green bean formulation with the addition of katuk leaves was carried out at the Food Laboratory of the Nutrition Department of the Health Polytechnic, Ministry of Health, Surabaya, Jalan Pucang Jajar Selatan No. 24B Surabaya, while the Fe content test was at the Balai Chemistry Laboratory. Surabaya Industrial Standardization Research Jln. Jagir wonokromo No. 360 Surabaya.

Population and Research Sample

The research sample is a formulation of green bean pudding with the addition of katuk leaves. Four samples of green bean pudding with the addition of katuk leaves were then subjected to an organoleptic test and one of the treatment samples with the best results from the organoleptic test was tested for its Fe content. Organoleptic testing in this research is testing acceptability after which it is continued with testing Fe levels. The number of testing panelists was 25 people. Each panelist will be given a sample of 24 grams (for each sub-treatment) with 4 comparisons.

Table 1. Pudding Formulation

Ingredients	**Ingredients for Making Pudding**			
	Kontrol (100 : 0)	F1 (80 : 20)	F3 (75 : 25)	F4 (70 : 30)
jelly	7 gram	7 gram	7 gram	7 gram
Green Puding	100 gram	80 gram	75 gram	70 gram
Katuk Leaves	-	20 gram	25 gram	30 gram
Sugar	30 gram	30 gram	30 gram	30 gram
Powder skim bubuk	30 gram	30 gram	30 gram	30 gram
Pandan leaves	5 gram	5 gram	5 gram	5 gram
Vanilla	5 gram	5 gram	5 gram	5 gram
salt	5 gram	5 gram	5 gram	5 gram
Water	800 ml	800 ml	800 ml	800 ml

Data Collection Technique

The method for collecting data in this research was accepted and accepted using the Hedonic Scale Test, while to test the Fe content of green bean pudding with the addition of katuk leaves using an Atomic Absorption Spectometer. The organoleptic test was carried out in the Taste Test Laboratory, the Nutrition Department of the Health Polytechnic, Ministry of Health, Surabaya, which has a room consisting of a preparation section (kitchen), tasting room, and waiting room or

discussion room. Pudding was randomly served to 25 moderately trained panelists. When giving assessments, the supervisor did not re-assess or compare the sample (Pudding) with other samples. Presentation of 4 Pudding formulations served directly in one small cup. A panelist in carrying out an organoleptic test must fulfill several requirements, to minimize the level of error in the research results.

Data Analysis

Organoleptic test data analysis used the Kruskall Walis test to determine the products preferred by the panelists according to color, taste, aroma and texture with an error rate of 0.05 (α=0.05) while the Fe content analysis was tested using a spectrometry tool.

RESULTS

The results of research on green bean pudding with the addition of katuk leaves include the results of the Organoleptic Test and Fe Content Test. Organoleptic tests include color, aroma, taste and texture which are assessed subjectively according to the respondents present. Testing for Fe levels is carried out at the intended laboratory. The differences in the characteristics of the receiving capacity of each Pudding can be seen in table 1 below:

Table 2. Characteristics of Pudding Formulation

Formulation Indicator	**Green bean pudding and katuk leaves**			
	PKA (100 : 0)	PKO (80 : 20)	PKY (75 : 25)	PKU (70 : 30)
Color	Mung bean green	Slightly dark green	Slightly dark green	Dark green
Flavor	Has a more dominant green bean aroma	Has a green bean aroma and a bit of katuk leaf	Has a slight green bean aroma and somewhat more dominant katuk leaf Aroma	has a more dominant aroma of katuk leaf
Taste	Sweet taste with a more dominant taste of green beans	Sweet taste of green beans with a slight taste of katuk leaves	Has a sweet initial taste and taste of katuk leaves	Has a more dominant sweet taste of katuk leaves
Texture	Has a softer texture	Has a dense texture	Has a dense texture	Has a denser texture

It can be seen from the table above that the PKA formulation produces a product with a green bean color with a more dominant green bean aroma, has a sweet taste with a more dominant green bean taste and has a denser and softer texture. The PKO formulation produces a product with a slightly dark green color with the aroma of green beans and a hint of katuk leaves, has a sweet taste of green beans with a slight taste of katuk leaves, and has a dense and soft texture. The PKY formulation produces a product with a rather deep green color with a slight aroma of green

beans and a slightly dominant taste of katuk leaves, has a sweet initial taste and a slight taste of katuk leaves and has a dense and soft texture. The PKU formulation produces a product with a deep green color with a more dominant aroma of katuk leaves, a sweeter taste of katuk leaves that is more dominant and a soft and denser texture.

The results of the pudding acceptability test in this study to determine the level of liking used a hedonic scale test on 25 slightly trained panelists, the results of which are presented as follows:

Table 3. Average distribution of green bean and katuk leaf pudding formulations

No	Indikator	Green bean pudding and katuk leaves			
		PKA (100 : 0)	PKO (80 : 20)	PKY (75 : 25)	PKU (70 : 30)
1	Color	3,32	3,48	3,56	3,68
2	Flavor	3,92	3,04	3,2	3,6
3	Taste	3,52	2,8	3,52	3,32
4	Texture	3,4	3,4	3,72	3,6
Average		3,54	3,18	3,5	3,55

Information:

Strongly dislike (1), dislike (2), neutral (3), like (4), like very much (5)

Based on table 5.2, the results of the average distribution of PUCAHITUK pudding assessments show that the highest assessment results are in the PKU code with an average score of 3.55, but this assessment is not much different from the PKY code with an average score of 3.5. On average, respondents liked the color, aroma and texture of the PKU code, but for taste, respondents mostly chose the PKY code. Because based on respondents' recognition, the taste in the PKY code has a balanced taste between the taste of green beans and katuk leaves.

Kruskal Wallis Non-Parametric Test to see whether there are differences in the indicators of color, aroma, texture and taste in green bean pudding and katu leaves. The results of the Kruskal Wallis test can be seen in table 4.

Table 4. Kruskal Wallis Test Results Green bean and katuk leaf pudding

No	Indikator	Nilai Uji *Kruskal Wallis*
1	Color	0,129
2	Flavor	0,002
3	Taste	0,003
4	Texture	0,205

Based on table 5.3, the results of the Kruskal Wallis test on the aroma and taste indicators have a p value < 0.05, which means that there are significant differences in the four formulations of green bean and katuk leaf pudding. Meanwhile, the results of the Kruskal Wallis test on the color and texture indicators had a p value > 0.05, which means there was no significant difference in the four formulations of green bean pudding and katuk leaves. A follow-up test after finding out if there

were differences in color, aroma, texture and taste, the Mann Whitney test was carried out to find out whether the hypothesis was accepted or not.

Table 5. Results of the Mann Whitney Test on Pudding

No	Indikator	Nilai Uji *Mann Withney*		
		PKA:PKO	PKA:PKY	PKA:PKU
1	Color	0,312	0,095	0,025
2	Flavor	0,001	0,006	0,170
3	Taste	0,001	0,906	0,333
4	Texture	0,949	0,118	0,256

The results of the Fe content analysis showed that the highest levels were found in the control formulation with the PKA code with a 100:0 formulation, namely with an average Fe content of 18.01 mg/kg, while the PKU code with a 70:30 formulation, namely with an average Fe content of <0.028 mg/kg. The results of the analysis of Fe levels in 100 grams of green bean pudding and katuk leaves treated can be seen in table 6 as follows:

Table 6. Average Fe Content of Mung Bean Pudding and katuk leaves

	Fe content in 100 grams of green bean and katuk leaf pudding	
	Kontrol (PKA)	F3 (PKU)
	Green beans: katuk leaves (100 : 0)	Green beans: katuk leaves (70 : 30)
I	17,71 mg/kg	<0,028 mg/kg
II	18,91 mg/kg	<0,028 mg/kg
Average	**18,01 mg/kg**	**<0,028 mg/kg**

Acceptability Characteristics of green bean and katuk leaf pudding

The acceptability test used was the hedonic test (likability test) of 25 panelists in the somewhat trained category which was carried out at the Nutrition Department of the Health Polytechnic, Ministry of Health, Surabaya. Panelists were asked to give their personal responses regarding the level of liking for the product formulation of green bean pudding and katuk leaves, the level of liking is called the hedonic scale. The hedonic scale is transformed into a numerical scale with quality scores according to the level of liking. In this study, the sample indicators carried out by hedonic testing included 4 indicators, namely color, aroma, texture and taste of each formulation of green bean pudding and katuk leaves.

DISCUSSION

Acceptability Characteristics of green bean and katuk leaf pudding

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a. Color

Color is an indicator that can be seen directly by the sense of sight, so color is the first indicator that can be directly seen and observed by panelists (Fanyalita, 2018). Based on the results of the acceptability test, the highest average value was obtained by the PKU formulation with a value of 3.68 while the PKO and PKY formulations have an average value of 3.48 and 3.56 and the lowest average value is the PKA formulation with a value of 3.32.

b. Flavor

Aroma is the smell that comes from food which is able to stimulate a person's sense of smell to create an appetite, the aroma is caused by food and has a very strong attraction (Livianti, 2008). Based on the results of organoleptic testing on panelists, it was found that the highest average value of the aroma indicator showed the highest results in the PKA formulation with a value of 3.92 which means like it, while the PKY formulation had a value of 3.2.

c. Taste

Taste is the sense of taste that plays a role in assessing the taste of food. The sense of taste has basic tastes such as sweet, bitter, sour, salty and spicy (Setyaningsih et al, 2010). Based on the organoleptic test results, the highest average value of the taste indicator showed the highest result in formulation 2 or code PKY, namely with a value of 3.52 which means like it and the lowest was the PKO formulation with a value of 2.8.

d. Texture

Food texture is a component that also determines the taste of food, because texture affects taste sensitivity, namely hard, soft and mushy. Based on the organoleptic test results, the highest average value of the texture indicator shows the highest result in the PKY formulation with a value of 3.72 which means like it and the lowest is formulation 1 or PKO code with a value of 3.4.

Fe Content of Green Bean Pudding and Katuk Leaves

Green Bean Pudding is a food that is rich in Fe. By adding katuk leaves as a source of Fe, it is hoped that a formula can be produced that can increase the nutritional value of Green Bean Pudding and Katuk Leaves. Green Bean and Katuk Leaf Pudding with high Fe levels can be said to have the potential to become a superior functional food product.

Fe content testing using the Atomic Absorption Spectrophotometry (SSA) method, with the results of Fe content analysis showing that the highest Fe content in the Green Bean Pudding sample without the addition of Katuk Leaves was 18.01 mg, while the results in the Green Bean Pudding sample with the addition of Katuk Leaves were as much as <0.028.

Discussion of the Acceptability of PUKAHITUK Products

It can be concluded that the acceptability test of the three PUKAHITUK product formulations is most preferred, namely the product with the addition of more katuk leaves or formulation 3 (PKU). This is due to direct respondents' recognition that formulation 3 does not smell too much of katuk leaves, the dark green color looks good, the texture is softer and denser and the aroma does not smell too much of katuk leaves.

CONCLUSION

Based on the research and experiments that have been carried out, the following conclusions have been obtained:

1. Based on 3 formulations of Green Bean Pudding with the addition of Katuk Leaves with a total organoptic test assessment using a hedonic scale, results were obtained in general for liking the Green Bean Pudding and Katuk Leaves products in terms of color, aroma, texture and taste. The formula most liked by the panelists is PKU code pudding with a formulation ratio of green beans: katuk leaves = 70 g: 30 g
2. Based on 3 formulations of Green Bean Pudding with the addition of Katuk Leaves, it was found that the difference in product acceptability was that the most preferred was the PKU code with a value of 3.55 while the lowest was the PKO code with a value of 3.18.
3. The highest average Fe Pudding content was found in the control code (PKA) with the 100 g : 0 g formulation of 18.01 mg.

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