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Acceptance And Shelf Life Of The Raisins And Edamame Brew As a Healthful Drink For Elementary School Kids

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ABSTRACT

Background: *Brew drinks are one type of functional food. When elementary school-aged children show signs of malnutrition, they can have this drink—made from edamame beans and raisins—for breakfast or as a snack. Edamame beans, raisins, maltodextrin, tween 80, vanilla, and salt are the ingredients used to make this brewed drink. This study aims to optimize edamame bean and raisin drinks' nutritional value, shelf life, and formulation.*

Research Methods: *This study used a completely randomized design with two factorials: the weight of edamame beans and raisins with four formulas. Thirty-five untrained panelists carried out sensory tests in the food laboratory of the Palembang Health Polytechnic Nutrition Department, and proximate tests were carried out in the CV Saraswati Bogor laboratory.*

Research Result: *Formulation 1 (30 grams of edamame beans, 10 grams of raisins) is the chosen brewed drink formula based on the sensory data acquired. For every 100 grams of brewed drink, Formula 1 measured the energy content: 404.82 kcal, 8.6% protein, 5.58% fat, 79.96% carbohydrates, 4.21% water, and 1.5% ash. In the meantime, this brewed beverage has a two-month shelf life.*

Conclusion: *The acceptance of edamame beans and raisins beverages varies depending on the mouthfeel and flavor. After a drink was steeped in edamame beans and raisins for 60 days, the Total Plate Count (TPC) test yielded a value of 0.*

BACKGROUND

A child's appetite and eating habits change during childhood to accommodate their needs for growth and development. Childhood is defined as the years between six and twelve (Anggiruling et al., 2019). Elementary school students are those who are 7 to 12 years old. This is a transitional period between early and late childhood. After turning twelve, students move on to the next stage of their lives, puberty, where a proper diet ensures healthy growth (Lonto et al., 2019).

According to Schlenker and Gilbert (2018), nutritional status denotes a state of health impacted by the body's intake and utilization of nutrients. Food is the body's energy source; the body uses energy for physical activity, basal metabolism, and the thermal effects of food. When energy intake and output are balanced, nutritional conditions are expected. If this does not occur, though, it may result in issues with nutrition, such as an excess or deficiency. One of the populations most susceptible to nutritional issues is elementary school students (Qamariyah & Nindya, 2018). Because it directly correlates with high-quality human resources, improving the nutrition of elementary school students is a strategy (Ministry of Health, 2005). In 2015, 95.2 million children, or 14.3% of all children worldwide, were underweight (Organization, 2015). According to the 2018 Riskesdas results, 2.4% and 6.8% of Indonesian children aged 5 to 12 had very thin nutritional statuses, respectively (Ministry of Health, 2018). Low nutrition in snacks can be caused by

various factors, including low family socioeconomic status, a lack of food options, a lack of nutrition knowledge, and snacking habits (Octaviani et al., 2018). Snacks meet 10% of a schoolchild's total energy needs nutritionally. Foods and soft drinks have varying nutritional values, each serving containing 150–200 kcal and 0.8–10 grams of protein. Food and drink serving sizes range in fat content from 0.8 to 15.3 grams and in carbohydrate content from 7.4 to 547.6 grams (Winarno, 2002).

Edamame beans have a high nutritional content; for every 100 grams, there are approximately 11.5 grams of protein, 7 grams of carbs, and nine essential amino acids necessary for human health. Over 40% of the protein comprises all the essential amino acids absent from other plants (Hayati et al., 2021). According to Kalamillah (2019), raisins weigh 32.5 grams and contain 5 grams of water, 25.7 grams of carbohydrates, and 19.6 grams of sugar (45.9% glucose, 48.48% fructose, 4.61% sucrose, and 0.6 mg iron). Based on the data above, researchers are interested in studying the acceptability test and shelf life of drinks brewed with raisins and edamame as healthy drinks for elementary school children.

RESEARCH METHODS

The present study used edamame beans, raisins, maltodextrin, tween 80, refined salt, and vanilla as its constituent ingredients.

Making Edamame and Raisin Drinks

After washing the edamame beans:
1. Rinse them with water for five minutes.
2. Add the raisins, 40 milliliters of water, and the edamame beans to the blender.
3. Blend the mixture until smooth, and then use a sieve to filter it.

Subsequently, the solution was mixed with 20 grams of maltodextrin, 1% tween 80, 0.6 grams of vanilla, and 0.4 grams of acceptable salt. After combining the ingredients, give the well-mixer a 15-minute shake to produce foam. After that, pour into an aluminum foil-lined baking dish and dry in the oven for three hours at 70°C. Table 1 shows the recipe for a drink made with edamame beans and raisins.

Table 1. Brewed Drinks Formulations

	F1	F2	F3	F4
Edamame beans	30 g	30 g	35 g	35 g
Raisins	10 g	15 g	10 g	15 g
Maltodextrin	20 g	20 g	20 g	20 g
Tween 80	1%	1%	1%	1%
Fine salt	0,4 g	0,4 g	0,4 g	0,4 g
Vanilla	0,6 g	0,6 g	0,6 g	0,6 g

Test 35 untrained panelists' acceptance and sensory abilities of brewed drinks. The assessment uses five scales: 5. I like it very much, 4. I like it, 3. Neutral/Normal, 2. I wouldn't say I like it, and 1. I dislike it very much.

The conventional method of extending storage studies determines the age of brewed drinks when storing multiple product packages with the same weight and production date. Food samples are tested for bacterial contamination for 10, 20, 30, 40, 50, and 60 days using the TPC method. The brewed beverage was evaluated in powder form. Data from the organoleptic test are analyzed using the Kruskal-Wallis test and the longer Man-Whitney test.

RESULTS

Organoleptic Test

The hedonic test, also known as the level of liking, is an organoleptic test that evaluates the color, aroma, taste, texture, and mouthfeel of an edamame and raisin-brewed beverage. Thirty untrained panelists participated in the test, which was conducted at the Food Technology Laboratory, Nutrition Department, Health Polytechnic, Ministry of Health, Palembang.

Table 2 below displays the formulation's significant value and the average hedonic test value for the raisin and edamame brew drink.

Table 2. Average Results for Organoleptic Tests

Parameter	Rata-Rata			
	F1	F2	F3	F4
Color	3,40±0,847[a]	3,34±0,906[a]	3,34±0,684[a]	3,46±0,741[a]
Aroma	3,83±0,747[a]	3,31±0,758[a]	3,57±0,689[a]	3,51±0,702[a]
Feel	3,83±0,785[a]	3,14±0,810[b]	3,11±0,718[b]	2,89±0,867[b]
Texture	3,77±0,731[a]	3,40±0,736[a]	3,49±0,781[a]	3,29±0,710[a]
Mouthfeel	3,80±0,747[a]	3,00±0,728[b]	3,23±0,690[b]	3,00±0,785[b]

Information: More significant numbers indicate more excellent preferences. The Kruskal Wallis and Mann-Whitney test results indicate a significant difference ($p \leq 0.05$) in the numbers followed by different letters.

Table 2 shows substantial differences in taste and mouthfeel ($p \leq 0.05$) between the edamame bean and raisin steeped drink formulations. According to statistical tests conducted by Kruskal Wallis, there are no significant differences ($p \geq 0.05$) in color, aroma, and texture between the brewed drink formulations of edamame and raisins. Mann-Whitney testing was then conducted.

Edamame and Raisin Brewed Drinks: A Proximate Test

Table 3 presents the findings of an exact and accurate proximate analysis conducted per the Indonesian National Standard (INS) 1996 to determine energy, protein, fat, carbohydrates, water, and ash for Formula 1 compared to cereal drinks.

Table 3. Proximate Test Results

Content	F1	INS 1996
Energy (kcal)	404,82	-
Protein (%)	8,69	-
Fat (%)	5,58	-
Carbohydrates (%)	79,96	-
Water (%)	4,21	Max. 3.0
Ash (%)	1,56	Max. 1.5

Utilizing the TPC Test Method for Shelf Life Analysis

The TPC method was used for total microbial analysis. The TPC test is one of the earliest tests to identify the total microbial count. Counting the number of bacteria in the sample is how the total microbial test is performed (Jacob et al., 2018). Table 4 shows the results of the TPC test.

Table 4. Test Results for the TPC of Brewed Drinks

Days to-	TPC
10	0
20	0
30	0
40	0
50	0
60	0

DISCUSSION

Organoleptic Properties

Color

The color produced by the brewed drink containing edamame beans and raisins did not significantly differ, according to the results of the organoleptic test. Dark yellow is the most visually appealing color of the brewed beverage that came from the formula 4 (F4) treatment. The brewed beverage's yellow hue originates

from edamame beans, while its brown hue results from the raw ingredients, specifically raisins. The raisins' process of caramelization is what gives them their color.

Aroma

Graph 2 illustrates that the brewed drink Formula 1 (F1), which contained 30 grams of edamame beans and 10 grams of raisins, received the highest aroma preference score from the panelists. The main ingredients provide the aroma, which includes raisins, edamame beans, and vanilla. The oxidation of the lipoxygenase enzyme by linoleic acid gives edamame beans their distinctively bad peanut smell (Barikah *et al*., 2021). However, the aroma of vanilla and raisins overpowers the pleasant aroma of the brew when you drink it. In addition to the primary ingredients, the caramelization process also affects the aroma, where the product develops a unique aroma during drying.

Flavor

The panelists preferred the taste produced in Formula 1 (F1) brewed drinks with a weight ratio of 30 grams of edamame beans and 10 grams of raisins the most, as shown in Graph 3. The addition of sugar gives this brewed beverage its sweet flavor. In addition, the amount of edamame beans and raisins added to the drink affects its overall taste, as raisins have a slightly sour and sweet flavor when eaten.

Texture

Based on organoleptic tests, the research findings indicate that variations in the weight of the raw materials used in each formula account for the texture variations observed in brewed drinks among treatments. Water content and base ingredient selection can affect the final texture of the edamame bean and raisin beverage.

Mouthfeel

Based on Graph 5, the panelists found that the mouthfeel of the drink made with edamame beans and raisins was acceptable. However, formula 1 (F1) was the best formula they liked because it had a heavy base of 30 grams of edamame beans and 10 grams of raisins, and the panelists found that the sour and sweet taste was not overpowering. Because the primary ingredients in the brewed drink are edamame beans and raisins, it leaves a sour and sweet aftertaste.

The first formula comprises the panelists' preferred color, scent, taste, texture, and flavor. Panelists will like it because of the bright color and slightly sour taste from the base ingredients' lower concentration of edamame beans and raisins. Certainly, because Formula 1 contains fewer edamame bean solids than other formulas, it also yields a mouthfeel that the panelists find acceptable.

Nutrient Content

Energy

Schoolchildren can use this drink made from edamame beans and raisins as a snack because, according to proximate test results, formula 1 has 404.82 kcal calories per 100 grams. This beverage has 38 grams of calories or 153.8 kcal. The edamame bean and raisins drink, which weighs 100 grams and has 404 calories, can be consumed as a breakfast beverage.

Protein

Formula 1 was 8.6 grams based on the panelists' preferred edamame bean and raisin brewed drink, as determined by the proximate test in 100 grams of the beverage. There is no maximum or minimum protein content for powdered drinks, per Indonesian National Standard 01-4320-1996 Quality Requirements for Powdered Drinks. The higher the protein content, the higher the recommended daily protein intake. Compared to other packaged brewed drinks, the protein content of this beverage is high. Because edamame beans are the main ingredient in the drink, they have a high protein content. The protein content of 100 grams of edamame beans is 11.91, according to TKPI 2017.

Fat

Proximate tests show that the brewed drink made with edamame beans and raisins has 5.58 grams of fat per 100 grams. There are no standards for the quality of powdered drinks. The Indonesian National Standard 01-4320-1996 states that the amount of fat in powdered drinks can be as high as or as low as desired. The more time passes during the drying process, the less fat there will be. The length of the drying period

determines how much the fat content decreases. Fat is not heat resistant, so during the processing process, the fat will melt and evaporate (Kasim *et al*., 2018).

Carbohydrate

Proximate test results show that 100 grams of edamame bean and raisin brew contains 79.96 grams of carbohydrates. Carbohydrates are essential to the body and should be consumed in large quantities. The majority of the polysaccharides we eat must be broken down into simpler forms for the body to absorb through the digestive tract's mucous membranes (Wulandari & Kurnianingsih, 2018).

Water Rate

Based on the results of the proximate test, the brewed drink made from edamame beans and raisins has a water content of 4.21%, whereas the maximum allowed by the quality requirements for powdered drinks is 3%. Raisins affect the amount of water in the beverage made with edamame beans and raisins; 32 grams have 5 grams of water. Several factors that can influence the water content of powdered beverage products include drying temperature, drying time, drying method, and material properties (Rakhmad, 2017).

Ash Rate

A maximum of 1.5% of the brewed drink meets the quality requirements for powdered drinks, whereas the ash content of the drink made with edamame beans and raisins is 1.5% based on the results of the proximate test. Material type, ashing technique, drying temperature, and time affect the ash content. Hasanah and Harini (2018) state that higher drying temperatures cause the dried material's water to evaporate.

Utilizing the TPC Test Method for Shelf Life Analysis

Due to its correlation with the financial gain from consuming these products, the microbiological quality of raisin and edamame drinks is noteworthy.

As per INS Number 7388/2009, the TPC test method can detect microbial contamination in food and powdered drinks up to 3 x 103 colonies/gram. The TPC analysis results of the TPC analysis of the edamame and raisin powder drinks were used to determine the duration of testing for six samples, which were tested for 10, 20, 30, 40, 50, and 60 days. Table 4 displays the results of the TPC test for the drink made with edamame beans and raisins, which were all zero for all treatments. There is little chance of bacterial contamination because boiling water is used to make edamame and raisin powder. The amount of water in food significantly impacts its shelf life. The drink made with raisin powder and edamame beans is still perfectly safe to eat after 60 days, according to the results of the TPC test.

CONCLUSIONS

Formula 1 (F1) was the best edamame bean and raisin brew drink formulation when tested with the organoleptic test method. The degree of preference for the mouthfeel and flavor of drinks made with raisin and adamame varies significantly.

The formula 1 in 100 grams has the following results from the proximate analysis: 404.82 kcal of energy, 8.69 grams of protein, 5.58 grams of fat, 79.96 grams of carbohydrates, 4.21 grams of water, and 1.5 grams of ash. When tested using the TPC method, a drink steeped in edamame beans and raisins for 60 days yielded a TPC value of zero.

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