Jurnal Gizi Prima (Frime Nutrition Journal)
Vol.10, Edisi.1, March 2025, pp. 35-40
ISSN: 2656 - 2480 (Online)
ISSN: 2355 - 1364 (Print)
Website : http://jgp.poltekkes-mataram.ac.id/index.php/home

Organoleptic Properties, Nutritional Value, and Acceptability of Padu Telu with Moringa Leaf Addition

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Article Info

Article history:
Received January 8th, 2025
Revised February 10th, 2025
Accepte March 27th, 2025

Keyword:
Moringa Padu Telu;
Nutritional Value;
Organoleptic

ABSTRACT

Background: *Padu Telu is the famous fish nugget from Sumbawa. Padu telu is fried and contains fish and coconut, so it has a high protein and fat content. Proteins, antioxidants, and minerals found in moringa leaves (Moringa oleifera) can boost the nutritional content of food items. According to Syahfitri et al. (2022), adding moringa leaves at a rate of 10% of the weight of squid is recommended and significantly affects the color, texture, flavor, and aroma of squid nuggets (p < 0.05).*

Research Methods: *This study aims to evaluate Padu Telu Kelor's (Puriga) acceptability, nutritional value, and organoleptic qualities. The laboratory trial used a one-factor, fully randomized design (RAL) and comprised five doses of moringa leaf therapy (10%, 20%, 30%, 40%, and 50% of the weight of pond fish).*

Research Result: *There was a significant difference (p<0.05) when 20% Moringa leaves were added to the optimal treatment level. Puriga got a 63% approval score in the good category for its nutritional profile, which includes 349 kcal, 7.96% protein, 24.68% fat, and 23.75% carbs.*

Conclusion: *Adding 20% moringa leaves affects color, aroma, taste, and texture (p<0.05). Every 100 grams of Puriga contains 349 kcal of energy, 7.96 grams of protein, 24.68 grams of fat, and 23.75 grams of carbohydrates. Puriga's acceptability was 63% in the good category.*

BACKGROUND

Each region has its culinary specialties with diverse flavors. Padu Telu is one of the culinary specialties of the Sumbawa region. According to Heryan (2019), padu telu is a traditional Sumbawa cuisine often served on special occasions. Because of its triangular shape, this cuisine is known as padu telu.

Padu Telu is not only found in Sumbawa. However, padu telu can also be found in Southeast Sulawesi (Kendari), West Sulawesi (Mamuju), and South Sulawesi (Makassar). In Sulawesi, some people call this padu telu as pupu' mandar, tempa-tempa, tompi-tompi, and tumpi-tumpi. Adrianti et al. (2019) mentioned that tumpi-tumpi is a typical North Buton (Butur) cuisine that is triangular and made from fish (minced meat). Tumpi-tumpi is often processed by frying. Old coconut, tapioca flour, spices (galangal, lemongrass, shallots, garlic, pepper, and salt), and cooking oil are used (Syahrul et al., 2017).

One of the most common fishery products in Sumbawa is pond fish. Ketambak fish is called ketamak fish in Sumbawa. The flesh of the fish pond (Lethrinus nebulosus), which is very soft and thick, contains a lot of omega three and omega 6 (Furqon et al., 2023). Adding the vitamins and minerals found in Moringa leaves can improve the nutritional value of padu telu.

ISSN : 2656 - 2480 (Online)
ISSN : 2355 - 1364 (Print)

Moringa leaves (Moringa oleifera) are widely found in Sumbawa. In 100 grams of moringa leaves, there are 92 grams of energy, 5.1 grams of protein,

1.6 grams of fat, 14.3 grams of carbohydrates, 8.2 grams of fiber, 22 mg of vitamin C, and 3266 mcg of vitamin A (Mahmud et al., 2018). Moringa leaves can be added to food products due to their high mineral, protein, and antioxidant content (Setiaboma et al., 2021).

The study's results (Syahfitri et al., 2022) showed that the color, taste, aroma, and texture properties of squid nuggets were influenced by adding moringa leaves to 10% of the weight of the squid. The results of previous studies conducted by researchers, which added 10% moringa leaves to the weight of fish pond, obtained the preferred color, aroma, taste, and texture of Puriga. Research on organoleptic properties, nutritional value, and acceptability of padu telu with the addition of moringa leaves to obtain ingredient formulations to be used as a distraction for underweight toddlers.

RESEARCH METHODS

Using a one-factor Completely Randomized Design (CRD), namely adding moringa leaves with five treatments (10%, 20%, 30%, 40%, and 50%) of the weight of the fish and three repetitions. Color, taste, aroma, and texture were obtained from organoleptic tests. Rahayu (1998) states that the organoleptic test is carried out with a hedonic approach using five numerical scales, namely dislike (scale 2), immensely dislike (scale 1), like (scale 4), somewhat like (scale 3), and very like (scale 5). Furthermore, organoleptic results were analyzed using the Mann-Whitney test.

For water content test using thermogravimetric method (SNI 2354.2: 2015), ash content test using Thermogravimetric method (SNI 2354.2: 2006), fat content test using Soxhlet method (SNI 2354.3: 2006), protein content test using Kjeldhal method (SNI 2354.4: 2006), carbohydrate content test using By Difference method.

Weighing the remaining product is a way of testing Puriga's acceptability. Furthermore, the weight of the dish was multiplied by 100% to compare it with the weight of the leftover Puriga. The stages in this study are the preparation of the Puriga formula, the Puriga manufacturing process, the organoleptic test, including color, aroma, taste, and texture, as well as the nutritional value test, including ash, water, fat, protein, and carbohydrates, and the acceptance test for Underweight toddlers.

Table 1. Moringa Padu Telu Formula

Food Ingredient Name	Treatment Level				
	t1 (10%)	t2 (20%)	t3 (30%)	t4 (40%)	t5 (50%)
Crawfish (g)	100	100	100	100	100
Moringa leaf (%)	10	20	30	40	50
Roasted coconut (g)	35	35	35	35	35
Tapioca flour (g)	10	10	10	10	10
Chicken egg (g)	20	20	20	20	20
Shallots (g)	15	15	15	15	15
Garlic (g)	10	10	10	10	10
Candlenut (g)	10	10	10	10	10
Pepper (g)	5	5	5	5	5
Turmeric (g)	5	5	5	5	5
Galangal (g)	5	5	5	5	5
Lemongrass (g)	5	5	5	5	5
Granulated sugar (g)	5	5	5	5	5
Salt (g)	5	5	5	5	5

The initial process of making Puriga involves cleaning and weighing the prepared ingredients according to a predetermined amount. The spices are mashed and then sautéed until fragrant. All raw

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ISSN : 2355 - 1364 (Print)

materials and spices are blended until homogeneous. Next, the dough is formed into a triangle with a side three centimeters and one centimeter thick. Then, the dough is steamed for 20 minutes. Once cooked, the dough is fried until browned. Puriga is ready to be served.

RESULTS

Organoleptic Properties

Table 2. shows that the color, taste, texture, and aroma of Puriga have a significant effect with adding moringa leaves ($p < 0.05$).

Table 2. The mean score of liking for Puriga

Treatment	Parameters			
	Color	Aroma	Taste	Texture
t1	3.70 [a]	3.90 [a]	4.17 [a]	3.87 [a]
t2	3.60 a	3.50 b	3.60 b	3.83 a
t3	3.20 b	3.27 b	2.83 c	3.13 bc
t4	2.70 c	2.83 c	2.83 c	2.63 c
t5	2.43 c	2.63 c	2.17 d	2.77 c
Probability	0.000	0.000	0.000	0.000
Notation	S	S	S	S

Figures followed by the same letter in the same column are not significantly different 5% α. S

Table 2 shows a greenish color with a preferred category, produced by adding 20% moringa leaves to the Puriga manufacturing process. The aroma produced combines spices and fish ponds, which is a favorable category. It has a distinctive savory taste with a preferred category and a chewy, dense, and soft texture.

Nutritional Value Content

The nutritional value content with the addition of 20% moringa leaves is shown in Table 3.

Table 3. Nutritional Value Content of Puriga

Unit	Parameters	Test Method	Average	SNI 7758:2013
Water content	%	Thermogravimetry	41.33	Max 60.0
Ash content	%	Thermogravimetry	2.29	Max 2.5
Protein content	%	Kjeldahl	7.96	Min 5.0
Fat content	%	Soxhlet	24.68	Max 15.0
Carbohydrate*)	%	By difference	23.75	Max 25
Energy**)	Kcal		349	140-210

Source: BSN, (2013), (2002), AKG, (2019), and proximate test laboratory results Description:
* SNI 01-6683-2002 chicken nuggets
** Percentage of RDA snacks/snacks for children under 4-6 years old

Table 3. shows that the composition of water, ash, protein, and carbohydrates in these foods meets the Indonesian National Standard (SNI). In addition, Puriga's fat and energy content are higher than the SNI.

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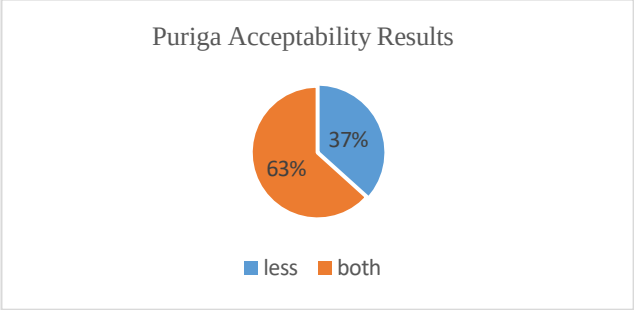
Puriga Acceptability

Graph 1. shows the results of the acceptability test on Underweight toddlers, with as much as 63% in the good category.



Graph 1. Puriga Acceptability Test Results

DISCUSSION

Organoleptic Test

The puriga in this study was brown because it was fried before consumption. Yuwono et al. (2021) in Syahfitri (2022) stated that the outside of the nugget turns yellow-brown due to the frying process. The addition of moringa leaves affects the color because the chlorophyll in the leaves is released during the heating process. Puriga will be dark green and less preferred by panelists if more moringa leaves are added.

Hadi and Siratunnisak (2016) in Syahfitri (2022) emphasized that the aroma of a food product plays an important role in determining the level of consumer preference. The aroma produced can judge whether or not a food ingredient is delicious. The addition of more moringa leaves will decrease the aroma of fish and spices, which panelists will not like

.

According to Rujiah et al. (2013) in Hapsari et al. (2022), adding ingredients, especially spices, affects the taste of fish nuggets. The more moringa leaves added, the more bland and astringent the taste. This is in accordance with research by Muchtadi et al. (2011) in Syahfitri (2022), which found that the addition of moringa leaves will affect the taste of nuggets due to tannins, which cause an astringent taste.

Diana (2017) and Vidayanana et al. (2020) stated that the soft texture of nuggets results from the catfish formula, which mixes eggs and tapioca flour. Puriga is made with tapioca flour and eggs and has a chewy, dense, and soft texture.

Nutrient Content

Puriga's water content has met the Indonesian National Standard (SNI) for fish nugget water content. Moringa leaves contain much water, so the resulting nugget product also contains much water (Vidayanana et al., 2020).

Puriga's ash content meets the SNI standard for fish nuggets. The raw materials used, namely fish ponds, chicken eggs, tapioca flour, and coconut, affect the ash content of Puriga. Adding moringa leaves, which contain many minerals, also affects ash content. In line with Aufari (2013) and Vidayanana et al. (2020), ash content in food is related to mineral content.

According to Zakaria et al. (2013) and Hapsari et al. (2022), protein content, especially for toddlers in their growth period, can be used as a reference in choosing food ingredients. Puriga's protein content meets SNI standards for fish nuggets. In Puriga, fish ponds, chicken eggs, and moringa leaves are the primary protein sources.

According to research by Gelora et al. (2017) in Hapsari et al. (2022), adding ingredients such as eggs and margarine can increase the fat content of the final product of catfish nuggets. The frying process, coconut, pond fish, and chicken eggs all affect the amount of fat in the puriga.

As stated by Vidayanana et al. (2020), carbohydrates can be increased by using ingredients such as cornstarch and wheat flour. According to the Indonesian National Standard (SNI), fish nuggets have no carbohydrate content, so Puriga uses the carbohydrate content in the SNI of chicken nuggets. Puriga's carbohydrate content comes from tapioca flour and moringa leaves.

Puriga Acceptability

According to the Minister of Health Regulation No. 28 of 2019 on Nutrition Adequacy Rates for the Indonesian Population, infants and children aged four to six years are 220 grams of carbohydrates—25 grams of protein, 50 grams of fat, and 1400 kcal of energy per person daily. Puriga is given as much as 15% of the total RDA as a snack. Since puriga is a new food for toddlers, the acceptance rate is 63% in the good category. Padu Telu is only prepared on traditional occasions and is not well known by toddlers. In addition, Padu Telu is only used as a complementary food to the main dish.

CONCLUSIONS

Adding 20% moringa leaves affects color, aroma, taste, and texture ($p<0.05$). Every 100 grams of Puriga contains 349 kcal of energy, 7.96 grams of protein, 24.68 grams of fat, and 23.75 grams of carbohydrates. Puriga's acceptability was 63% in the good category.

RECOMMENDATION

Puriga products must be socialized through Posyandu activities to be used as local PMT for underweight children.

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