



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(6): 4066-4069
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www.thepharmajournal.com

Received: 16-04-2023

Accepted: 29-05-2023

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Standardization and quality evaluation of Appe prepared from finger millet (*Eleusine coracana*)

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Abstract

Appe is a popular morning food in south India due to its enticing look, rich flavour, and spongy texture. Finger millet contains large amounts of minerals, lipids, and protein. The nutritional value of finger millet is higher than that of barley, rye, and oats. Green gram dal which is highly digestible, also known as moong dal, is a superior source of carbohydrates, vitamins, minerals, fibre, and essential fatty acids in addition to high-quality proteins. In the present study, the ordinary rice flour and finger millet flour was mixed in three different proportions. Ordinary rice flour was replaced with finger millet flour and its organoleptic evaluation was done. All the data was statistically analysed as per the objective of the study. Data related to overall acceptability revealed that the combination T3 (60 percent incorporation of finger millet flour) was liked very much followed by T0, T2 and T1 which were liked moderately. Replacing rice with finger millet had good impact on the nutrition as it has great amount of nutrients such as dietary fibre, calcium and iron is present which is helpful in maintain healthy life.

Keywords: Standardization, Appe, finger millet, *Eleusine coracana*

Introduction

Appe is a common culinary item made from grains and legumes. Breakfast time is a popular time to eat this fermented meal. Because it has a soft and spongy feel after cooking, the appe is a popular cuisine morning food in India. This specific type of pancake comes from south India. Appe is a popular morning food in south India due to its enticing look, rich flavour, and spongy texture. It is gaining popularity across India due to its high nutritional content and straightforward digestion. In a built vessel, cooking an appe product takes only a few minutes, however making an appe batter-which has to be pulverised and fermented before cooking takes a lot of time (Wandhekar *et al.*, 2021) [7].

Finger millet (*Eleusine coracana*) also known as ragi and mandua are additional names in India. Finger millet is a common staple food in several parts of eastern and central Africa, as well as India. It is extensively grown all over the world, including several locations in India. The most popular colours for finger millets, which come in a wide variety of hues, are black, brown, and milky creamy. The majority of the world's finger millet is produced in India. (Kamini and Sarita, 2011) [3]. One of finger millet's most notable traits, proving that it is the most efficient among millets (Gopalan *et al.*, 2002) [2], is its capacity to adapt to varied agroclimatic situations. In the Indian states of Karnataka, Tamil Nadu, and Andhra, it is widely grown (Vijayakumari *et al.*, 2003) [5]. Finger millet contains large amounts of minerals, lipids, and protein. The nutritional value of finger millet is higher than that of barley, rye, and oats. It stands out among the grains for having excellent features as a crop for feeding people on a subsistence basis. Finger millet is a small cereal with significant nutritional value due to its high amounts of calcium, phosphorus, iron, and zinc (Chandra *et al.*, 2016) [1]. As their primary source of sustenance, members of the low socioeconomic category frequently consume finger millet (*Eleusine coracana*).

Green gram dal which is highly digestible, also known as moong dal, is a superior source of carbohydrates, vitamins, minerals, fibre, and essential fatty acids in addition to high-quality proteins. These are rich in nutrients including manganese, potassium, magnesium, copper, zinc, and vitamin B. It has a lot of protein and fibre for nourishment. Due to its low carbohydrate content, this variety of lentil stands apart from others. This is one of the best foods for person suffering with diabetes since it helps control blood sugar levels and has a low glycemic index (Singh *et al.*, 2017) [4].

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Material and Methods

Basic formulation of Appe

In the present study, the ordinary rice flour was replaced with finger millet flour in three different proportions. One formulation was prepared ordinary with rice flour (control) and in other three formulation ordinary rice flour was replaced with finger millet flour at different levels as shown in table 1, which was three times standardized and tested by panel members (30 members). Necessary modifications were made in the

recipes and this was repeated till the recipes were acceptable.

Preparation of Appe: The ingredients above mentioned with different proportions were soaked and grounded separately. Finger millet, rice, green gram dal, and semolina were ground into a fine powder (flour). Ingredients were mixed together, curd and salt was added. Green gram dal was used instead of black gram dal because green gram dal is found to be highly digestible. The batter was allowed to ferment for 3 hours after that it was poured in an appe pan and fried till it is done.

Table 1: Standardized recipe of appe using finger millet flour

S. No	Ingredients	Control	T1 (20%)	T2 (40%)	T3 (60%)
1.	Rice flour(g)	100	80	60	40
2.	Finger millet flour(g)	-	20	40	60
3.	Green gram dal flour(g)	30	30	30	30
4.	Semolina(g)	20	20	20	20
5.	Curd(ml)	20	20	20	20
6.	Salt	¼ tsp	¼ tsp	¼ tsp	¼ tsp
7.	Baking soda	¼ tsp	¼ tsp	¼ tsp	¼ tsp
8.	Oil	2 tsp	2 tsp	2 tsp	2 tsp
9.	Water(ml)	50	50	50	50

Organoleptic Evaluation

It speaks to how the senses evaluate a dish. The stimulation of a person's senses has a significant impact on whether or not something is accepted. It is a scientific field that measures, analyses, and interprets data related to how the senses of sight, smell, taste, and touch affect food properties. The finalised recipes were served to the panellists after three times preparation. A panel of judges standardised the product by sensory assessment in the laboratory using a nine-point Hedonic Rating Scale (William 1989) [8]. To evaluate products' sensory qualities, including colour, taste, texture, flavour, appearance, and overall acceptability, a score card was created. Consistent presentation of the samples was used. In order to ensure accurate evaluation and prevent the flavours of the two samples from mingling together, the panel

was given a glass of water. The standard recipe was defined as one scoring seven points or more and reproducible using the same weight, time, and serving size.

Statistical analysis

All the data was statistically analysed as per the objective of the study. Analysis of variance (ANOVA) one way classification was used to determine the significant difference in sensory characteristics for evaluating the acceptability of the appe with different formulations.

Results and Discussion

Standardized Recipe

The ingredients required, their amount and method followed for preparing the recipe is given in the table 2.

Table 2: standard recipe of finger millet *Appe*

S. No	Method of Preparation	Ingredients	Edible Amount	Remarks/ Precaution
1.	Firstly, for making dry mix, ingredients like finger millet flour, rice flour, green gram dal flour, baking soda and powdered semolina were mixed and mixture was obtained.	Rice Flour Finger millet flour Green gram dal flour Semolina Baking soda	40 g 60 g 30 g 30 g 1.7g	The millet, dal, rice, and semolina were washed in water for 2-3 times then they were dried and subsequently powdered and mixed.
2.	In a wide bowl, curd was added and water as required was mixed until well combined.	Curd Salt Oil Water	10ml 2g 5 g 30 ml	
3.	<i>Appe</i> pan was heated to medium heat and oil was greased in each mould with brush.			The batter was made without any lumps.
4.	Once the pan became hot, the batter was poured about ¾ full in each mold. Then it was cooked for 3-4 minutes until edges became firm.			The batter was of pourable thick consistency.
5.	<i>Appe</i> were been gently flipped over with wooden spatula. Then they were cooked for another 2-3 minutes.			

Organoleptic Evaluation of the appe

The recipe prepared was served to the panel members for sensory evaluation using 9 point hedonic scale. The result of standardization of *appe* prepared with replacement of rice flour with 20, 40 and 60 percent incorporation with finger

millet flour is presented in the table 3 and figure 1. Data related to overall acceptability revealed that the combination T3 (60 percent incorporation of finger millet flour) was liked very much followed by T0, T2 and T1 which were liked moderately. The sensory characteristics are mentioned below:

- **Colour:** Table 3 revealed that colour of the T3 was found to be 8.33 ± 0.57 which was highest among the three followed by T0, T2 and T1. Similarly Wandhekar *et al.*, (2021)^[7] formulated appe incorporating finger millet and foxtail millet and found that the highest score for colour was incorporating 20g finger millet and 20 g foxtail millet.
- **Appearance:** Through table 3 it was found that T3 was found to have high appearance (8.30 ± 1.15). Similarly Wandhekar *et al.*, (2021)^[7] revealed that the highest score for appearance was incorporating 20g finger millet and 20 g foxtail millet.
- **Flavour:** Table 3 have shown highest score for flavour (8.53 ± 0.57) followed by T0, T2 and T1. Similarly Wandhekar *et al.*, (2021)^[7] revealed that the highest score for Flavour was incorporating 20g finger millet and 20 g foxtail millet.
- **Texture:** The highest score for texture was found to be in T3 (8.40 ± 0.57) followed by T0, T2, and T1. Similarly Wandhekar *et al.*, (2021)^[7] revealed that the highest score for colour was incorporating 20g finger millet and 20 g foxtail millet.
- **Taste:** The highest score for taste was found to be in 8.53 ± 0.57 followed by T0, T2 and T1. Similarly Wandhekar *et al.*, (2021)^[7] revealed that the highest score for colour was incorporating 20g finger millet and 20 g foxtail millet.
- **Overall acceptability:** The overall acceptability was found to be highest in 8.37 ± 0.11 followed by T0, T2 and T1. Similarly Wandhekar *et al.*, (2021)^[7] revealed that the highest score for colour was incorporating 20g finger millet and 20 g foxtail millet.

Table 3: MEAN \pm SD Scores of sensory evaluation of *appe*

S.no	Treatment	Sensory attributes Mean \pm SD					
		Appearance	Color	Flavor	Texture	Taste	Overall Acceptability
1.	T0	7.93 ± 0.57	8.10 ± 0.57	8.00 ± 0.57	8.13 ± 1.00	8.03 ± 0.57	8.10 ± 0.00
2.	T1	7.13 ± 0.57	7.43 ± 1.15	7.37 ± 1.15	7.33 ± 0.57	7.43 ± 1.15	7.27 ± 0.12
3.	T2	7.70 ± 1.15	7.47 ± 0.57	7.67 ± 0.57	7.87 ± 0.57	7.47 ± 0.57	7.37 ± 0.17
4.	T3	8.30 ± 1.15	8.33 ± 0.57	8.53 ± 0.57	8.40 ± 0.57	8.53 ± 0.57	8.37 ± 0.11
	SE	0.084	0.098	0.088	0.083	0.094	0.083
	CD5%	0.235*	0.275*	0.246*	0.232*	0.263*	0.232*

All the values are mean \pm SD of three observations.

T1-20 percent, T2-40 percent, T3-60 percent incorporation of finger millet flour SE- Standard Error, *- Significant at 5 percent level

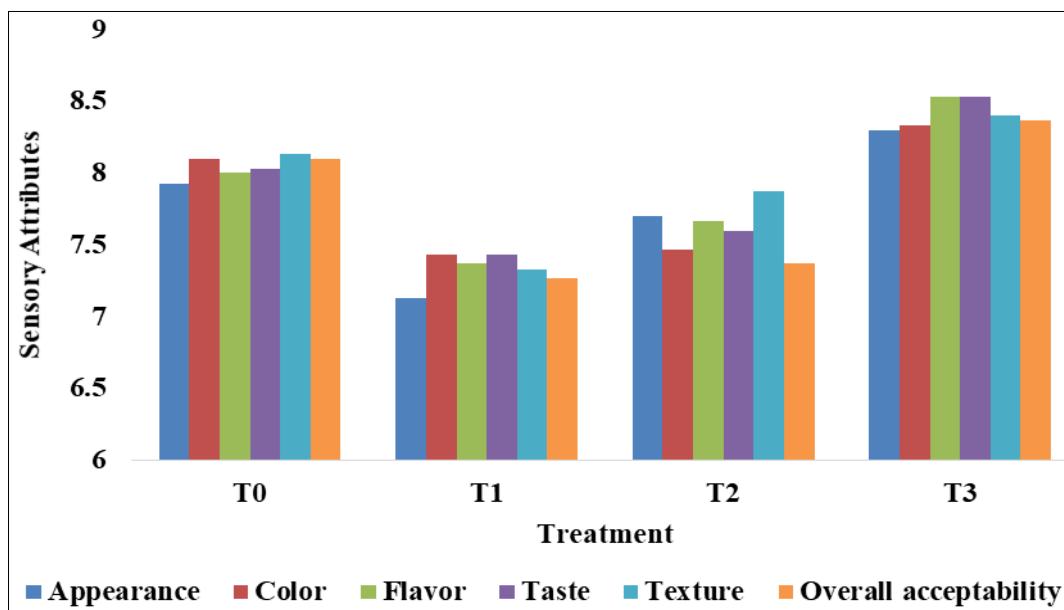


Fig 1: Sensory evaluation of the *appe*

T1-20 percent, T2-40 percent, T3-60 percent incorporation of finger millet flour

Conclusion

Finger millet can be used in *appe* preparation instead of rice in scarcity areas. Meanwhile finger millet is a short duration, rapid growth and drought tolerance crop and hence this is an attempt to optimize various methods for utilizing in diversified ways. Replacing rice with finger millet had good impact on the nutrition as it has great amount of nutrients

such as dietary fibre, calcium and iron is present which is helpful in maintain healthy life. To test whether the finger millet was palatable or not sensory evaluation was done by 30 trained panellists and it was found that the finger millet was acceptable by incorporating 60g in 100g of batter. Hence, finger millet must be promoted for various other recipes and formulation.

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