



## A study on the development and acceptability of millet incorporated pizza base

Ayisha Zaman, M Umamaheswari, Veena B M\*

Department of Nutrition and Dietetics, JSS Academy of Higher Education, Mysore, Karnataka, India

### Abstract

Millets are considered nutri-cereals, are highly nutritious, and have high nutrient content, including protein, essential fatty acids, dietary fiber, B-Vitamins, and minerals such as calcium and iron, zinc, potassium, and magnesium. Millets have many health benefits, and their regular consumption can reduce the risk associated with many metabolic disorders. Enrichment of pizza base with millets can benefit a large population as it has become a popular customer food throughout the globe. Even though people know that pizza base is made with refined flour, devoid of nutrients, it is a preferred food by all age groups because of its taste and popularity. Hence, a study was conducted to develop a pizza base, traditionally prepared using refined flour, which is considered unhealthy, replaced with millets. The millet flour pizza base was developed, incorporating flours of proso millet, Kodo millet, and Barnyard millet, each replacing refined flour in different proportions (50:50, 60:40, and 70:30). Chakramuni leaf (*Saropous androgynous*) powder was added to the pizza base to improve the nutritional quality. A pizza base with 100 % refined flour incorporation was developed as a control. Developed products were subjected to acceptability along with control by semi-trained panelists. The millet-based pizza bases were accepted on par with the control pizza base. The use of millets and chakramuni leaf powder has increased the nutritional value of pizza and is well accepted among the younger generation. Hence millet incorporated pizza base can be used as a healthy replacement for regular pizza base available in the market.

**Keywords:** millets, refined flour, pizza base, acceptability, and market

### Introduction

Millets are a group of highly diverse small-seeded grains grown around the globe as cereal crops or grains for human food and fodder. Millets are important crops in the semi-arid tropics of Asia and Africa, especially in India, Mali, and Nigeria, with 97% of millet production in developing countries. The crop is accommodated due to its productivity, potency, and short growing season under dry, high-temperature conditions.

Millions of people across the globe depend on millets for their staple food. Millets, namely finger millet, Kodo millet, Proso millet, Pearl millet, Foxtail millet, Little millet, Barnyard millet etc., are rain-fed crops grown in low rainfall areas. Thus have greater importance in assisted agriculture and food security.

Millets are a good source of energy, proteins, vitamins, minerals, and other trace elements. Grains of millet contains about 65% of carbohydrate, out of which the highest composition is dietary fiber and non-starchy polysaccharides. They are low in the glycaemic index and glycemic load and have many health benefits (Rao and Deepika, 2016). It has anti-cancer, antioxidant, anti-cholesteremic, anti-hypertensive properties, which can help prevent certain disease conditions like cancer, gastrointestinal disorders, and atherosclerosis (Bhavya *et al.*, 2020) <sup>[1]</sup>. Individuals who have celiac disease may adhere to a gluten-free diet by including millets in their daily routine.

Ill effects of health conditions and simultaneous awareness among the population in the field of nutrition have created a demand for healthier replacements for bakery and junk foods as people are becoming conscious of health. So, there is a need to fulfill the needs by utilizing therapeutic and low-cost food ingredients without compromising on the sensory attributes of the developed product. Hence a study was carried out to develop pizza, which has become popular consumer food with increasing market expansion, by incorporating millets to improve their nutritional attributes.

### Materials and Methods

#### Raw Materials

Raw materials required for the study such as Proso millet (*Panicum miliaceum*), Kodo millet (*Paspalum scrobiculatum*), Barnyard millet (*Echinochloa esculenta*), active dry yeast, sugar, salt, and vegetable oil were procured from local markets of Mysuru. Chakramuni leaves (*Sauropus androgynus*) were obtained from the domestic garden of a regular household. Leaves were dried and powdered.

#### Development of millet incorporated pizza

Millet incorporated pizza base were developed with flours of proso millet, Kodo millet, and Barnyard millet, each replacing refined flour in different proportions. Chakramuni leaf (*Saropous androgynous*) powder was

added to the pizza base to improve the nutritional quality. Accordingly, three variations from each millet were developed by incorporating refined flour and millet flour in different ratios of 70:30, 60:40, and 50:50 as presented in table 1. A pizza base with 100 % refined flour incorporation was developed as a control (RFPB).

The developed products (control and millet-based pizza base) were subjected to sensory evaluation by 40 semi-trained panel members from the Department of Nutrition and Dietetics, JSS AHER. Sensory characteristics such as appearance, crust color, aroma, texture, taste, and overall acceptability using a 9-point hedonic scale, where one indicates dislike extremely (very bad) and nine indicate like extremely (excellent) (Meilgaard *et al.*, 1999) [3].

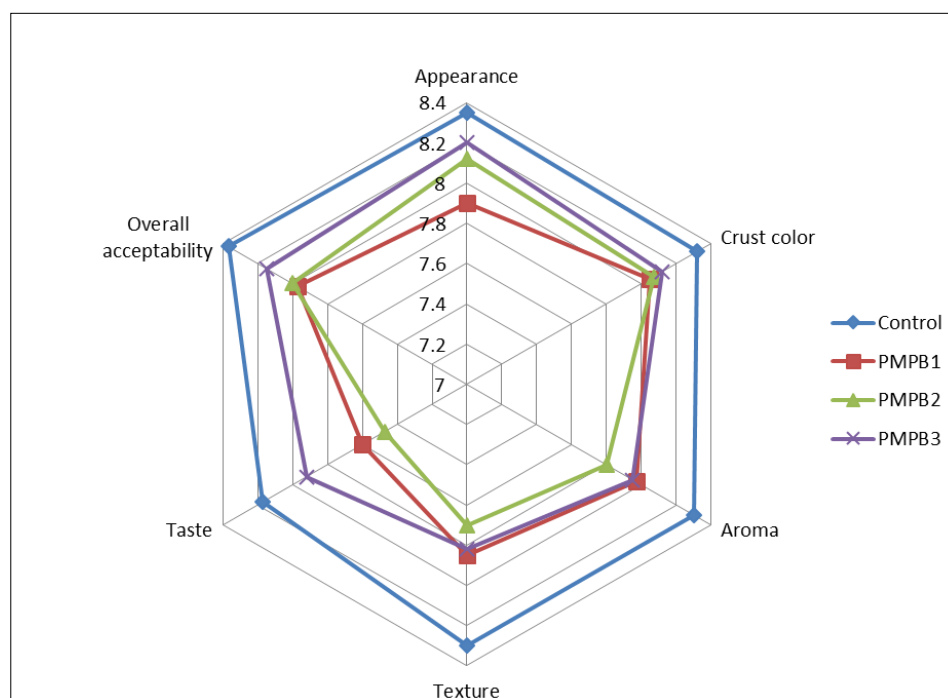
**Table 1:** Pizza base formulations

Ingredients (gm)		Refined flour	Millet flour	Yeast	Sugar	Salt	Vegetable oil (ml)
Control (RFPB)		100	-	2	2	3	10
Proso millet pizza base	PMPB1	70	30	2	2	3	10
	PMPB2	60	40	2	2	3	10
	PMPB3	50	50	2	2	3	10
Kodo millet pizza base	KMPB1	70	30	2	2	3	10
	KMPB2	60	40	2	2	3	10
	KMPB3	50	50	2	2	3	10
Barnyard millet pizza base	BMPB1	70	30	2	2	3	10
	BMPB2	60	40	2	2	3	10
	BMPB3	50	50	2	2	3	10

**Note:** Control- 100% refined flour; PMPB1-refined flour and proso millet flour 70:30; PMPB2-refined flour and proso millet flour 60:40; PMPB3-refined flour and proso millet flour 50:50; KMPB1-refined flour and Kodo millet flour 70:30; KMPB2-refined flour and Kodo millet flour 60:40; KMPB3-refined flour and Kodo millet flour 50:50; BMPB1-refined flour and barnyard millet flour 70:30; BMPB2-refined flour and barnyard millet flour 60:40; BMPB3-refined flour and barnyard millet flour 50:50.

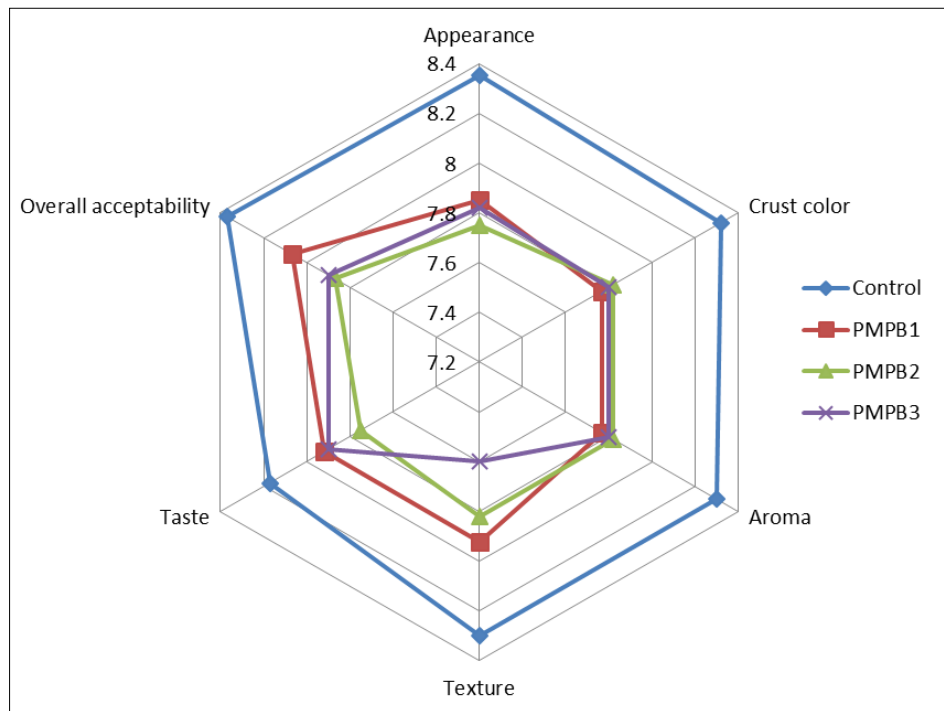
## Results and Discussion

Mean sensory scores of the proso millet pizza base of different variations are presented in figure 1. Results revealed that the panelists well accepted all the experimental products, and variation PMPB2 was highly acceptable among all the three variations and was on par with the control with the sensory scores for overall acceptability of  $7.97 \pm 0.86$ ,  $8.37 \pm 0.83$ ,  $8.15 \pm 0.73$ , and  $8 \pm 0.84$  for control, PMPB1, PMPB2, and PMPB3 respectively. Similar results were obtained in by Bhavya *et al.*, (2020) [1], which showed that the overall acceptability of pizza base developed with the ratio of 70:30 of refined flour and millet flour scored high compared to other variations.



**Note:** Control- 100% refined flour; PMPB1-refined flour and proso millet flour 70:30; PMPB2-refined flour and proso millet flour 60:40; PMPB3-refined flour and proso millet flour 50:50.

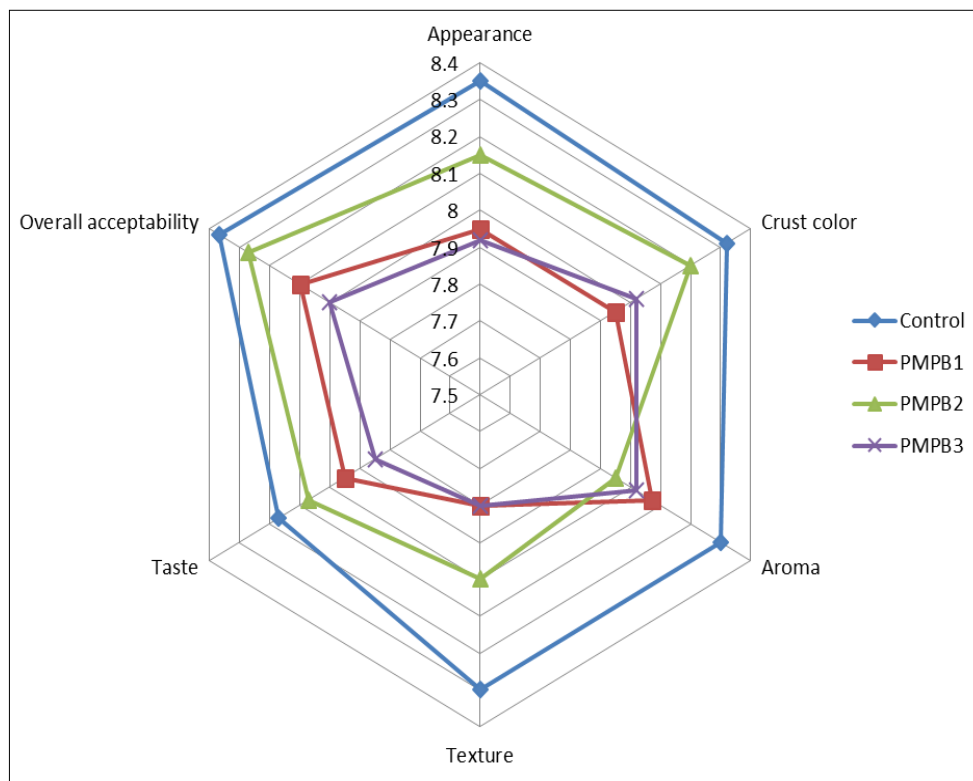
**Fig 1:** Mean sensory values of the proso millet pizza base



**Note:** Control- 100% refined flour; KMPB1-refined flour and Kodo millet flour 70:30; KMPB2-refined flour and Kodo millet flour 60:40; KMPB3-refined flour and Kodo millet flour 50:50

**Fig 2:** Mean sensory values of the Kodo millet pizza base

Figure 2 reveals the results for the pizza base developed with Kodo millet in different proportions. The panel members accepted all the experimental products, whereas KMPB1 scored high for appearance, aroma, texture, and overall acceptability ( $7.85 \pm 1.14$ ,  $7.92 \pm 0.99$ ,  $7.97 \pm 1.07$ , and  $8.07 \pm 0.97$ , respectively) compared to other two experimental variations. Control was highly acceptable in terms of all the sensory attributes.



**Note:** Control- 100% refined flour; BMPB1-refined flour and barnyard millet flour 70:30; BMPB2-refined flour and barnyard millet flour 60:40; BMPB3-refined flour and barnyard millet flour 50:50

**Fig 3:** Mean sensory values of barnyard millet pizza base

Sensory characteristics of pizza base developed with barnyard millet flour (Fig 3) revealed that there was no significant difference in the scores among different variations and control. Overall acceptability of control scored highest ( $8.37\pm 0.83$ ) followed by variation BMPB2 ( $8.27\pm 0.87$ ) and BMPB1 ( $8.1\pm 0.98$ ). All the products were highly acceptable with good sensory scores. Karuppasamy *et al.*, (2013) [2] revealed that the panelists highly accepted the bread with millets up to 20 %.

### Conclusion

Results of the study showed that the millet-based pizza base was equivalent with control for its sensory characteristics and hence can be used as a healthy alternative to regular pizza. Since pizza is the most popular food among all age groups and is generally prepared with refined flour devoid of fiber and other nutrients, regular consumption can lead to malnutrition and other metabolic disorders such as weight gain, hyperglycemia, and hypertension. Millets, rich in nutrients, can be replaced with refined flour, which not only improves the nutritional composition of pizza but also helps to fill the needs of consumers for this product without compromising on the consumer's health.

Adding the millet flour with refined flour enhances the nutritional quality of a regular pizza. The proso millet, Kodo millet and barnyard millet are highly nutritious and increase the pizza's taste and nutrient content. Developing unhealthy and non-nutritious food into healthier and more nutritious foods significantly impacts individuals' food choices.

### References

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