

Original Article

Development of Value Added Pizza from Browntop Millet and Pulse Flour: A Healthy Alternative

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Abstract

The present study was conducted to develop a fermented value-added pizza using browntop millet and black gram dhal flour as a healthy alternative to conventional refined flour pizza. Pizza is a popular baked product due to its easy making process. Browntop millet is rich in dietary fibre, minerals, and antioxidants, while black gram dhal improves protein quality and fermentation characteristics. Four different formulations were prepared by varying the ratio of browntop millet flour and black gram dhal flour. The treatments included T₀ (100:0), T₁ (80:20), T₂ (70:30), and T₃ (60:40). Fermentation was carried out to improve texture, flavour, digestibility, and nutritional quality of the pizza base. Sensory evaluation was conducted using a 9-point hedonic scale. Among all treatments, T₁ (80:20) recorded the highest overall acceptability. The study concluded that fermented browntop millet pizza can be developed successfully as a nutritious and acceptable functional food product.

Keywords: Browntop millet, fermented pizza, black gram dhal, millet-based pizza, sensory evaluation, healthy alternative.

Introduction

The term pizza was first discovered in 10th century in a manuscript from the town of Gaeta in Southern Italy. Modern pizza from flatbread dish in Naples, Italy in 18th or early 19th century. Increasing adoption of Western dietary habits contribute highly to growing popularity of pizza. It has worldwide preference among all age groups of 10-30 years. All bakery products prepared from refined wheat flour pose a risk of high glycemic index and an increase of health issues for every one as well as diabetic person. Thus, this aspect needs to be focused by nutrition researchers to develop more nutrient enriched protective food. Pizza is widely consumed across all age groups; however, conventional pizza prepared from refined wheat flour is low in fibre and micronutrients. Development of millet-based pizza can enhance nutritional quality and support healthier dietary patterns. Millets are considered Nutri-cereals because of their superior nutritional composition and health-promoting properties. Minor millets which consist of low glycaemic index and low glycaemic load. Browntop millet is rich in dietary fibre, iron, calcium, phosphorus, and antioxidants. It is also gluten-free and suitable for developing functional foods. Browntop millet (*Urochloa ramosum*) is one of the most uncommon and under-explored millets among all the others. It is a historical crop of India particularly in Tumkur, Chitradurga, Chikkaballapura and Bellary of Karnataka but also thrives in Andhra Pradesh (Mallikarjuna, 2016) [14]. Due to its resilience to heat, drought and flooding, browntop millet is a hardy crop that can withstand harsh climatic conditions. It has the capacity to spread deep and wide in the soil. browntop millet is renowned for having a high concentration of nutritional fibre. this tiny, greenish grain contains calcium, magnesium, potassium, zinc and iron, among other nutrients (Sarita and Singh, 2016) [21]. Fermentation is an important traditional food processing method that improves digestibility, flavour, texture, mineral bioavailability, and shelf life. Incorporation of black gram dhal flour enhances fermentation due to its protein and mucilage content, resulting in improved softness and sensory quality of the pizza base. Therefore, the present investigation was conducted to develop and evaluate fermented value-added pizza prepared from browntop millet and black gram dhal flour.

Objectives

1. To develop fermented pizza using browntop millet and black gram dhal flour.
2. To standardize different treatment combinations.
3. To evaluate sensory characteristics of fermented millet pizza and judges scoring.

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4. To determine nutritional quality of the developed product.

Materials and Methods:

The present study was conducted for the development of fermented value-added pizza using browntop millet flour and black gram dhal flour. Browntop millet grains and black gram dhal were procured from the local market. The millet grains were cleaned thoroughly to remove dust, stones, and other impurities. After cleaning, the grains were washed, dried under shade, and milled into fine flour. Black gram dhal was lightly roasted and ground into fine flour separately.

1. Raw Materials

The ingredients used were:

Pizza Base

1. Browntop Millet-80g
2. Black Gram dhal-20g
3. ¼ tsp fenugreek seeds
4. Salt to taste
5. Water as required
6. 1 tsp oil
7. **For Topping:** ¼ cup onion slices, ¼ cup capsicum slices, 2 tbsp sweet corn, 50 g

Paneer cubes, 2 tbsp pizza sauce, 20 g mozzarella cheese, Oregano & chili flakes. All raw materials were procured from Amravati city of local market sources.

Fermented Process: Soaking Wash Browntop millet and black gram dhal separately. Soak for 6–8 hours. Add fenugreek seeds while soaking urad dhal. Grind black gram dhal into a fluffy batter. Grind Browntop millet into a smooth batter. Mix both batters together.

Fermentation: Add little salt. Keep batter in a warm place for 8–10 hours for fermentation. Batter should become slightly fluffy and airy.

Pizza Preparation: 1. Prepare Base

1. Heat pan and grease lightly.
2. Pour thick batter and spread like pizza base.
3. Cook on low flame for 3–4 minutes and flip.

Step 2: Add Toppings

1. Spread pizza sauce.
2. Add onion, capsicum, sweet corn, Add Paneer cubes and cheese.
3. Sprinkle oregano and chili flakes. Ready to serve hot pizza.

Experimental Trials

Table: Formulation of Fermented Pizza Base

	Treatment	Browntop Millet Flour (g)	Black Gram Dhal Flour (g)
T ₀	100	0	
T ₁	80	20	
T ₂	70	30	
T ₃	60	40	

Sensory Evaluation

The developed pizza samples were evaluated for sensory characteristics by a panel of 5 semi-trained members using a 9-point hedonic scale. The sensory attributes evaluated included appearance, colour, texture, taste, flavour, aroma, sweetness, mouthfeel and overall acceptability. Nutritional composition of the best accepted treatment was calculated using standard food composition tables.

Sensory Evaluation Results Table: Sensory Evaluation of Fermented Browntop

Millet Pizza

(Mean Scores on 9-Point Hedonic Scale by 5 Semi-Trained Panel Members)

Sensory Attributes	T ₀ (100:0)	T ₁ (80:20)	T ₂ (70:30)	T ₃ (60:40)
Appearance	7.2 ±0.11	8.9 ±0.05	8.3 ±0.11	7.5 ±0.14
Color	7.0 ±0.12	8.8 ±0.06	8.1 ±0.10	7.4 ±0.15
Aroma	7.1 ±0.11	8.9 ±0.04	8.0 ±0.12	7.2 ±0.16
Texture	6.8 ±0.15	9.0 ±0.03	8.0 ±0.12	7.2 ±0.20
Sweetness	6.9 ±0.14	8.8 ±0.05	7.9 ±0.13	7.0 ±0.17
Taste	6.9 ±0.14	9.1 ±0.02	8.1 ±0.10	7.0 ±0.17
Mouthfeel	7.0 ±0.12	8.9 ±0.04	8.0 ±0.11	7.1 ±0.15
Flavor	7.1 ±0.11	8.9 ±0.04	8.0 ±0.11	7.3 ±0.16
Overall	7.0 ±0.13	9.0 ±0.03	8.1 ±0.10	7.2 ±0.15

Acceptability

Discussion

Fermentation significantly improved the sensory quality of millet pizza by enhancing flavour, softness, and texture. Browntop millet alone produced comparatively dense pizza bases due to absence of gluten. Addition of black gram dhal flour improved dough binding and fermentation properties. The use of Browntop millet in pizza preparation enhances the nutritional quality while maintaining desirable taste and texture. Addition of black gram dal in fermented batter further improves protein quality, digestibility. The development of Browntop millet pizza aims to promote millet consumption through value-added convenience foods that are both healthy and acceptable to consumers. Toppings such as paneer and vegetables contribute additional protein, vitamins, and minerals, making the product more balanced and nutritious. This innovative millet-based pizza supports sustainable food practices and encourages the use of traditional grains in modern food products.

Among the treatments:

1. T₀ showed lower acceptability because of compact texture.
2. T₁ achieved highest sensory scores due to balanced flavour and soft texture.
3. T₂ remained moderately acceptable.
4. T₃ showed reduced scores because higher pulse flour produced stronger beany flavor And denser texture.

The fermentation process also improved digestibility and palatability of the product.

Nutritional Composition of Best Accepted Treatment (T₁)

Nutritive Value per 100 g

Nutrients	Amount
Energy	330 kcal
Carbohydrates	55.8 g
Protein	12.2 g
Fat	6.7 g
Dietary Fiber	8.6 g
Calcium	52 mg
Iron	4.8 mg
Phosphorus	290 mg
Niacin	3.9 mg

Conclusion

The study revealed that fermented browntop millet pizza incorporated with black gram dhal flour can be successfully developed as a healthy alternative to conventional pizza. Fermentation improved texture, flavour, and digestibility of the product. Among all formulations, T₁ containing 80% browntop millet flour and 20% black gram dhal flour was found most acceptable based on sensory evaluation. The product also exhibited enhanced nutritional quality with higher protein, fibre, and mineral content.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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