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## Utilization of black wheat flour, finger millet flour and ashwagandha powder to develop value added Panjiri

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### Abstract

This research was designed to develop a nourishing Panjiri. Black wheat is high in iron and fiber, finger millet is high in calcium and ashwagandha powder is high in fiber and antioxidant. Wheat flour, black wheat flour, fin to increase the consumption of micronutrients, exploring the potential for value addition to traditional items like Panjiri, energy bars, and biscuits may be a preferable choice. Finger millet flour, fox nut and ashwagandha powder were mixed in the ratio of 26:40:20:10:4 (T<sub>1</sub>), 15:45:25:10:5 (T<sub>2</sub>), 4:50:30:10:6 (T<sub>3</sub>) and 90:10 wheat flour, fox nut (Control). Four treatments were prepared with varying ratios of the ingredients, with T<sub>0</sub> as the control and T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> as the treatments. A hedonic scale with nine points was used for sensory analysis. The results revealed that T<sub>2</sub> had the highest score for colour, texture, taste, and overall acceptability. Sensory analysis indicated that value added Panjiri (T<sub>2</sub>) were liked very much by the panelists. The nutritional composition of the best product T<sub>2</sub> increased with the incorporation of black wheat flour, finger millet flour, ashwagandha powder, foxnut in Panjiri. Ash content was discovered to be 1.3 g/100 and 2.31 percent respectively. 17.1 g of protein, 9.24 g of fat, 5.55 g of fiber, 70.05 g of carbohydrates, 11.77 mg of iron, and 102 mg of calcium, Antioxidant- 62.33% and Energy 432 (kcal) make up this serving. The cost of the Panjiri T<sub>0</sub> (18.4 Rs.), T<sub>1</sub> (23.68 Rs.), T<sub>2</sub> (24.84 Rs.) and T<sub>3</sub> (26 Rs.). Panjiri suggested for all age groups because it strengthens immune, maintain blood sugar level, high blood pressure.

**Keywords:** Black wheat flour, finger millet flour, ashwagandha powder, value added product, Panjiri

### Introduction

Black wheat has many important nutrient like anthocyanin, antioxidant, folic acid, dietary fiber, gluten free and vitamin B complex (B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>5</sub>, B<sub>6</sub>, B<sub>9</sub>). Black wheat possess higher protein content, dietary fiber, calcium and antioxidant. Minerals include zinc, selenium, manganese, potassium, calcium, iron, magnesium, copper, and phosphorus. The combination of blue colour from extensive introgression and purple colour from pericarp mutation gave rise to the black colour of wheat, however linkage drag reduces yields. Compared to blue and purple-coloured wheat, which are less frequent, black wheat has 17.71 percent more protein and is richer in anthocyanins. According to estimates, 100 g of black wheat has on average 71 g of carbohydrates, 13 g of protein, 10 g of fiber, and 3.40 g of fat. Around the world, a number of crops with significant nutraceutical value are used commercially, including maize with a high anthocyanin concentration (Petroni *et al.*, 2014) [1]. Black wheat flour also contains high-Quality proteins and essential aminoacids, particularly the content linoleic and linolenic acids are 30%-50% higher than normal wheat. Its consumption is associated with several health benefits such as protecting endothelial cells, preventing heart and cardiovascular diseases and as anti-cancer agents (Dykes *et al.*, 2007) [4]. Black-grained wheat has been reported to have high free radical scavenging ability and phenolic content (Shan *et al.*, 2005) [3]. Black wheat has high protein content and antioxidant activity, owing to the presence of phenolic acid and vitamin C (Beta *et al.*, 2010) [5]. Immunity must be boosted by nutrient-rich, low-carb, and protein-rich diets. Supplemental consumption of items made with black wheat flour may contribute to increased immunity and bodily resistance. The significant danger of hyperglycemia, manganese, selenium, and hypertension would be reduced, and the resilience of older persons or those with underlying illnesses who are more vulnerable to severe infection would be strengthened. (Kumari and Tzudir 2021) [2]. Ashwagandha use for a very long time for all age groups and both sexes and even during pregnancy without any side effects.

Historically, the plant has been used as an antioxidant, adaptogen, aphrodisiac, liver tonic, anti-inflammatory agent, astringent and more recently to treat ulcers, bacterial infection, venom toxins and senile dementia (Sharma *et al.*, 2006) [6]. Ashwagandha have used dosages of 250-600 mg/day of a root extract. The most common dosing protocol is 600 mg/day divided into two doses, with one taken in the morning with breakfast and the other in the evening (Murray, 2022) [7]. Ashwagandha root improvements in sleep quality, mental alertness upon awakening, and general well-being were observed. The tested treatment was found to be safe and effective, and the participants showed good tolerance. The world's top producers of finger millet are Uganda, Nepal, China, and India, while it is grown in more than 25 African and Asian nations. The tiny, dark-red grain is a fantastic source of protein, fiber, iron, calcium, and other minerals. It is also devoid of gluten and has a little amount of mostly unsaturated fat. It is among the healthiest millets in the world as a result of all of them. According to Zucco *et al.*, (2011) [13], it aids in weight loss, manages diabetes, treats anemia, and strengthens bones. Regular consumption of finger millet is known to reduce the risk of diabetes mellitus and gastrointestinal tract disorders and these properties were attributed to its high polyphenols and dietary fiber contents (Chethan *et al.*, 2008) [8].

## Resources and Procedures

Utilization of white wheat, black wheat, finger millet, fox nut, and ashwagandha powder for the development of Panjiri was the title of a study carried out in the Nutrition Research Laboratory of the Department of Food Nutrition and Public Health at the Ethelind College of Community Science of Sam Higginbottom University of Agriculture Technology and Sciences in Prayagraj, Uttar Pradesh, India. Raw materials for the production of food goods, including as black wheat flour imported from a small farm in Bihar (Gopalganj), finger millet flour, fox nut, and ashwagandha, were obtained from Prayagraj's local marketplaces.

## Development of the value added products

Black wheat flour, finger millet flour, fox nut, ashwagandha powder, and white wheat flour were used to make value-added food products. The baseline recipe (control T<sub>0</sub>) for each product had three variations, T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub>, where the quantity of one or more ingredients was changed.

## Treatment combination

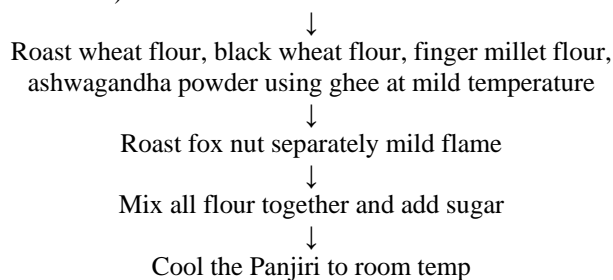
Panjiri were prepared by using refined flour, black wheat flour, finger millet flour and ashwagandha powder in ratio of 90:0:0:10:0 (control), 26:40:20:10:4 (T<sub>1</sub>), 15:45:25:10:5 (T<sub>2</sub>) and 4:50:30:10:6 (T<sub>3</sub>).

**Table 1:** Preparation of Panjiri by using of black wheat flour, finger millet flour, fox nut and ashwagandha powder

Treatment	Wheat flour	Black wheat flour	Finger millet flour	Fox nut	Ashwagandha powder
T <sub>0</sub>	90	-	-	10	-
T <sub>1</sub>	26	40	20	10	4
T <sub>2</sub>	15	45	25	10	5
T <sub>3</sub>	4	50	30	10	6

## Preparation of Panjiri

Panjiri made utilizing various nutrient value ratios. Receiving of sieved raw materials, wheat flour, black wheat flour, finger millet flour, ashwagandha powder and fox nut (in the ratio T<sub>0</sub>= 90:0:0:0:10, T<sub>1</sub>= 26:40:20:4:10, T<sub>2</sub>=15:45:25:5:10, T<sub>3</sub>= 4:50:30:6:10)



**Sensory evaluation:** A panel of 5 judges conducted a sensory examination of the food products to determine their acceptability. The Hedonic 9-point scoring system was used to evaluate sensory aspects such as color and appearance, body and texture, flavor and taste intensity, and overall acceptability.

**Chemical analysis:** Proximate composition *viz.* moisture, ash, crude protein, crude fat, crude fiber, was analyzed by standard methods (AOAC, 2007). Drying the samples in a hot air oven at 105 °C allowed researchers to assess the moisture content of raw and treated leaves. The amount of total ash was calculated using a muffle furnace. Lowry's Method was used to calculate the protein. The Soxhlet Method was used to extract crude fat using petroleum ether in a continuous

extractor, while the Extraction Method was used to extract fiber using acid-alkali washing. The amount of moisture, crude protein, crude fat, fiber, and ash was added, and the result was divided by 100 to get the amount of accessible carbohydrates (Calculation Method). The formula [Gross Energy (Crude protein 4) + (Crude fat 9) + (Carbohydrate 4)] was used to calculate gross energy. Calcium was determined by Titration Method and iron was determined by the colorimetric method. Antioxidant Activity of the developed food products was done by the DPPH (2, 2- diphenyl-1-picrylhydrazyl) Method.

## Calculating the cost

The cost of each raw ingredient used in the manufacturing of the food products was factored into the cost of the completed products at the going market rate.

## Statistical analysis

The data were analyzed using the analysis of variance (ANOVA) technique and the critical difference method.

## Results and Discussion

### Organoleptic evaluation of prepared product 'Panjiri'

Products were prepared by the incorporation of wheat flour, black wheat flour, and finger millet flour and ashwagandha powder. The basic recipe of Panjiri with the incorporation black wheat flour, finger millet flour and ashwagandha powder as a control. Panjiri with the three treatments of each product *i.e.*, T<sub>1</sub> wheat flour, black wheat flour, finger millet flour, foxnut and ashwagandha powder (in ratio of 26:40:20:10:4), T<sub>2</sub> (wheat flour, black wheat flour, finger

millet flour, fox nut and ashwagandha powder (in ratio of 15:45:25:10:5), wheat flour, black wheat flour, finger millet flour, fox nut and ashwagandha powder (in ratio 4:50:30:10:6). A nine-point hedonic scale was used to evaluate products' organoleptic qualities in terms of their color, body and texture, flavor, taste, and general acceptability. The most suitable course of action was T<sub>2</sub> for colour and appearance (45% incorporation level of black wheat flour, 25% incorporation level of finger millet flour, 15% wheat flour, 10% fox nut, 5% ashwagandha powder) as compare to T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub>. T<sub>2</sub> got highest score for body and texture which contained 45% percent black wheat flour, 25% incorporation level of finger millet flour, 15% wheat flour, 10% fox nut, 5% ashwagandha powder followed by T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub>. T<sub>2</sub> got highest score for flavor and taste which contained 45% black wheat flour, 25% incorporation level of finger millet flour, 15% wheat flour, 10% fox nut, 5% ashwagandha

powder followed by T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub>. T<sub>2</sub> got highest score for overall acceptability which contained 45% percent black wheat flour, 25% incorporation level of finger millet flour, 15% wheat flour, 10% fox nut, 5% ashwagandha powder followed by T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub>. The outcome was validated by the discovery of Giridhar *et al.*, (2019) <sup>[9]</sup> studied sensory evaluation of Khakhra prepared with finger millet different proportions. The level of incorporation of finger millet flour in Khakhra was 10%, 15%, 20%, 10% (T<sub>1</sub>) finger millet is found to be significantly superior over the rest of the treatments. The result was finding supported by Dhangare *et al.*, (2018) <sup>[10]</sup>. This present study was undertaken to determine the enhancement of functionality of 'cookies' by incorporating finger millet flour at 30%. The developed food product was analysed for organoleptic evaluation. The result shows that 30% finger millet flour incorporation was accepted in terms of sensory attributes.

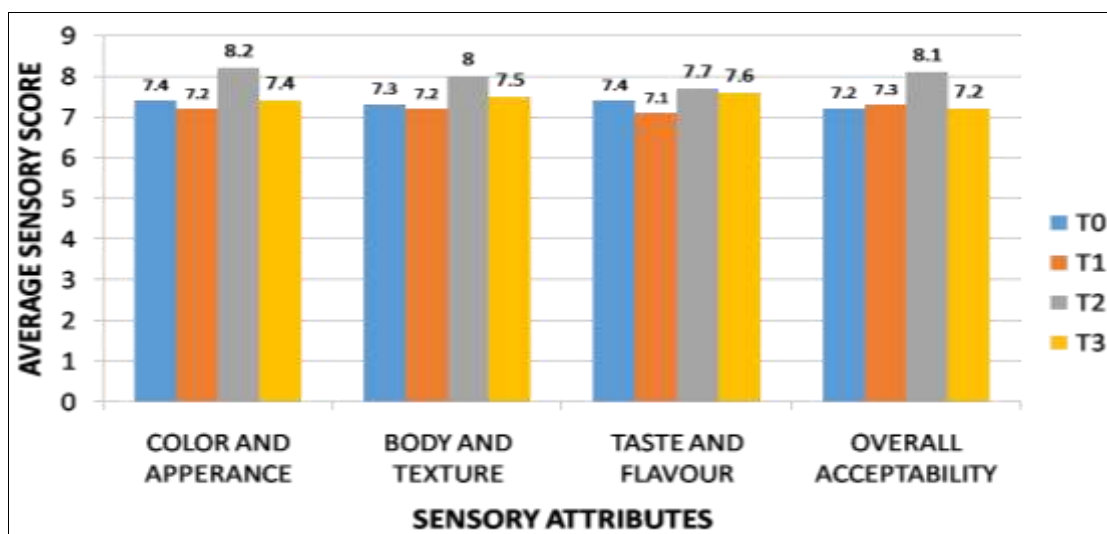


Fig 1: Average sensory score for different attributes of "Panjiri"



Plate 1: Panjiri prepared by incorporating Black wheat flour, Finger millet flour, Fox nut and Ashwagandha powder

#### Nutritional composition of Developed product 'Panjiri'

Table 2 demonstrates the differences between the control and the best treatment sample i.e., the moisture content of the developed product decreases as a result of incorporating Black wheat flour, Finger millet flour, Foxnut, Ashwagandha powder and Wheat flour. On the other hand, the ash, protein, calcium, iron and crude fiber content increase due to the inclusion of black wheat flour, which are a good source of these nutrients. The carbohydrate content of T<sub>2</sub> decreases due

to the addition of black wheat flour, ashwagandha powder, finger millet flour, which has a lower carbohydrate content. However, the energy, iron, calcium, and antioxidant properties increase as a result of a higher level of incorporation of Black wheat flour, finger millet flour and Ashwagandha powder. The outcome was validated by the discovery of Athawale *et al.*, (2015) <sup>[11]</sup> that developed crackers formulated with wheat flour, finger millet and flaxseeds in the ratio 3:1:1 which showed high acceptability

as well as high nutrient content in terms of dietary fibre, calcium. The outcome was validated by the discovery of Kumari *et al.*, (2020)<sup>[12]</sup> that nutritionally developed chapattis from black wheat flour. Result shows that black wheat flour rich chapatti recorder protein is 10.95% in 100 g black wheat flour, thus black wheat flour is rich source of protein.

**Table 2.** The average nutritional composition of control and the best treatment samples of Panjiri

Nutrients	Control(T <sub>0</sub> )	Treatment(T <sub>2</sub> )	(T <sub>2</sub> -T <sub>0</sub> )	T. cal
Moisture (g)	0.9	2.31	1.4	57.05
Ash (g)	0.9	1.3	0.4	6.12
Protine (g)	6.2	17.1	10.9	66.59
Fat (g)	14.2	9.24	4.96	19.00
Energy	463	432	4	1.22
Fiber (g)	1.7	5.55	3.85	94.57
Iron (mg)	4.46	11.77	7.31	24.80
Calcium (mg)	62	102	40	4.56
Carbohydrate (g)	77.8	70.05	7.75	17.20
Antioxidant (%)	48.2	62.33	14.13	37.92

(Tabulated) value at 5% = 4.303, Result = Satisfactory (\*).

### Cost of the prepared product 'Panjiri'

The cost of each raw ingredient used in the manufacturing of the food products was factored into the cost of the completed products at the going market rate. The cost of the Panjiri T<sub>0</sub> (18.4 Rs.), T<sub>1</sub> (23.68 Rs.), T<sub>2</sub> (24.84 Rs.) and T<sub>3</sub> (26 Rs.) because ratio of ingredients is high in T<sub>3</sub> as compare to T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>.

### Conclusion

It is concluded that black wheat flour could be successfully incorporated in wheat flour, finger millet, black wheat flour, fox nut and ashwagandha powder to enhance the nutritive value of value added Panjiri. Among the experimental treatments, the treatment incorporated with 25%, finger millet flour, 45% black wheat flour, 15% refined flour, 10% fox nut, 5% ashwagandha powder T<sub>2</sub> was the most acceptable for all the four products namely Panjiri. Black wheat flour, finger millet flour, fox nut powder, and ashwagandha powder incorporation levels increased the cost, however it was still significantly less than the control. For the entire development of malnourished children who have significant stunting and wasting growth problems at their stage of physical and mental development, Panjiri can be advised.

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