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Physiochemical, functional and sensory properties of developed health drink from minor millets

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Abstract
Minor millets play an important role is the food and nutritional security of the poor in arid and semiarid regions of the world. Millet based products is economically viable and also it highlights the excellent medicinal and nutritional qualities. The present study focused to develop millet based health drink using germinated kodo millet, barnyard millet, little millet and finger millet. Compare to other health drink available in market. The grain were soaked in water for 5 h and allowed to germinate for 24 h followed by shade dried for 12 h. The dried germinated millets were roasted until husks split open and then milled in a grinder to obtain fine flour. Sensory evaluation was conducted for the health drink prepared by using the composite flour. The drink had high consumer acceptability.

Keywords: Millets, germination, composite flour, health drink, sensory

1. Introduction
Minor millets are small coarse of grains belong to the group of forage grass called millet (Weber 1998) [19], belongs to the family poaceae. According to the archaeological and genetic studies most of the millets had their origin in the wide region of Asia and Africa (De, 1989 Dogget, 1989 Sakamoto, 1992; Weber, 1998) [4, 5, 19,]. Minor millets are major food sources for millions of people, especially those who live in hot, dry areas of the world. Millet is one of the oldest foods known to humans and probably the first cereal grain used for household purposes. The most important major millets cultivated in India are Pearl millet (*Pennisetum glaucoma*), Foxtail millet (*Setaria italica*), Proso millet (*Panicum Miliaceum*) and Finger millet (*Eleusine coracana*) and minor millets are Barnyard millet (*Echinochloa* spp.), Kodo millet (*Paspalum scrobiculatum*), little millet (*Panicum sumatrense*) etc.
Minor millets not only have nutritional value but also tremendous medicinal uses. It is used in the treatment of difference diseases like Cancer, Leprosy, and Pneumonia etc., (Khoud Bachar, *et al.*, 2013) [7]. Minor millets are very good source of variety of health improving important nutrients. The major constraints for less utilization of millets are coarse seed coat, characteristic flavor and poor keeping quality of its products. Hence, there is a need to develop suitable processing technique to suit the needs of the households and food industry.
The objective of this research was to study the effect of proportion of kodo millet flour, barnyard millet, little millet and finger millet flour for the production of composite flour and developing a new innovative value added minor millet based health drink for regular consumption compared with market product and assessment of its acceptability through sensory evaluation.

2. Material and methods
Raw materials
JPU-K3 variety of kodo millet, K-1 variety of barnyard millet, JK-8 variety of little millet and JNR-852 variety of finger millet were procured from local market in Durg District, Chhattisgarh, India.
Preparation of Millet Flour
All the selected millets were cleaned to remove dust, dirt and washed. The sample was soaked for 5 h. Then they were allowed for sprouting overnight. Then the sprouts were taken shade dried for 12 h. For development of flavor grains were dry roasted for about 100°C in wok.

While the wok temperature reached 100°C grain temperature reached 60-70°C. After roasting the millets are cooled to room temperature and ground into flour in an electric grinder. The flour was sieved through 80 mesh sieve and then stored separately in polyethylene bags before using.

Composite Flour Preparation

The four different intervals of kodo millet flour, barnyard millet, little millet and finger millet flour (Table 1) are used in composite flours. To prepare composite flour sugar was added to the flour. The composite flour samples were stored in air tight container.

Table 1: Different samples used for composite flour

Samples	Finger millet (%)	Kodo millet (%)	Little millet (%)	Barnyard millet (%)
S_1	50	30	10	10
S_2	50	20	15	15
S_3	50	25	20	5
S_4	50	20	20	10

Functional Properties of Composite Flours

The functional properties of individual and composite flour such as bulk density, water solubility index (WSI) and swelling index (SI) were determined by using standard methods.

Bulk density (BD)

The bulk density of the flour samples was determined by the method described by Narayana Rao, (1984) [9]. A measuring cylinder tubes were weighed and flour sample filled to 5 ml by constant tapping until there was no further change in volume. The contents were weighed and the difference in weight determined. The bulk density was computed using following equation:

$$Bulk\ density = \frac{Weight\ of\ the\ sample}{Volume\ occupied\ by\ the\ sample} \times 100$$

Water solubility index (WSI)

Water solubility index for each flour sample were determined by the method of Niba *et al*. (2001) [10]. Flour samples (1 g) were suspend in 10 ml of distilled water in a tared 45 ml centrifuge tube and be stirred with glass rod then put in water bath for 30 min at 30ºC temperature then centrifuge at 3000 rpm for 15 min. The supernatants would pour into dry evaporator dishes of known weight and stored overnight at 120ºC for the process of evaporation. The following formula used for determination of WSI.

$$WSI = \frac{Weight\ of\ solid\ in\ supernatant}{Weight\ of\ dry\ sapmle\ in\ the\ original\ sample} \times 100$$

Swelling index (SI)

The swelling index of flour was determined based on a modified method of Abbey and Ibeh, (1998) [1]. One gram of the flour samples were weighed into 10 ml graduation measuring cylinder. Five milliliters of distilled water was carefully added and the volume occupied by the sample was recorded. The sample was allowed to stand undisturbed in water for 1 h and the volume occupied after swelling. The swelling index determined the following method:

$$Swelling\ index = \frac{Volume\ occupied\ by\ sample\ after\ swelling}{Volume\ occupied\ by\ the\ sample\ before\ swelling} \times 100$$

Health drinks making process

Millet based composite flour of 100 g was added to 1000 ml of boiled water or milk and mixed well to get malt.

Physiochemical characteristics of health mix

The physiochemical properties of the health mix was analysed according to the AOAC (1980) method.

Sensory evaluation of health drink

For sensory evaluation of prepared health drink were presented to a panel of 15 judges. Sensory evaluation provides an index of overall acceptability of foodstuffs, which depends on its appearance, color, flavor, taste, texture, aftertaste and overall acceptability. To ensure the acceptability of the modified recipes, they were subjected to evaluation by composite scoring for their sensory qualities. Specific sensory characteristics of each recipe (appearance, color, flavor, taste, texture and overall acceptability) were rated separately using hedonic scale on a scale of 1 to 9. Scores were defined as follows: 1 - dislike extremely, bad; 9 – like extremely, excellent. Numerical averages were then calculated for a composite test score.

3. Result and discussion

The results obtained from the present investigation are summarized below.

Functional properties of composite flour

Bulk density is depended upon the particle size of the samples. The value of millet based health drink obtained from the study was ranged from 0.78 to 0.87 g/cm^3. Water solubility index measures the rate and extent to which the component of powder material or particles dissolves in water. The water solubility index of the health drink was found to be 8.4 to 9.2 per cent. Swelling index of the mix was calculated as 0.91 to 1.7 per cent which indicates there is minimum swelling power in the health drink (Table 2).

Table 2: Functional Properties of composite flour

Properties	Samples			
	S_1	S_2	S_3	S_4
Bulk density (g/cm^3)	0.87	0.81	0.85	0.78
Water solubility index (%)	8.4	9.0	8.7	9.2
Swelling index (%)	1.7	1.0	1.3	0.91

Ocloo *et al.* (2010) [11] studied that the bulk density of jackfruit seeds flour was 0.80 g/cm^3. Water solubility index of ready to eat food prepared from finger millet based composite mixer was found to be in composite mix sample 9.21±0.52 (Sawant *et al.*, 2013) [15] which in accordance with the result of the present study. Ojukwu *et al.* (2012) [12] reported that the swelling index of the full fat, defatted and lime bean protein isolate are 1.3167±0.0231%, 1.16±0.436% and 2.8±0.0854%, respectively.

Physiochemical properties of health mix

The physiochemical properties of millet based health mix

were calculated. The nutritional value of the final product plays a vital role in enhancing the consumer acceptance of the product. The moisture content ranged from 8.9 to 9.75 %; protein content of 17.08 to 23.18 %, fibre content of 5.04 to 8.50 % and ash content of 1.93 to 2.54 %, respectively. The physiochemical properties of millet based health mix are given below (Table 3).

Table 3: Physiochemical properties of health mix

Properties	Samples			
	S_1	S_2	S_3	S_4
Moisture content (%)	8.9	9.51	9.23	9.75
Fibre (%)	5.04	7.37	5.61	8.50
Protein (%)	17.08	21.38	18.94	23.18
Ash content (%)	2.54	2.31	2.07	1.93

Sensory evaluation of prepared health drink

The health drink which was determined to be the most acceptable and preferable by the consumers. After sensory evaluation we observed that the overall composite score highest for the treatment S_4 was at 8.9. Their consistency was neither thick nor thin and less sediment and color was also pleasing. Treatment T_1 was dark is color and high in consistency. This may be attributed to fact that (S_1) content 30% kodo and kodo goes as substitute for rice and hence gave a thick gruel due to high starch content. Scores for each of the individual attributes for health drink ranged from 8.2 to 8.9. The sensory evaluation of millet health drink revealed that it was more acceptable and preferable by the consumers.

Table 4: Overall acceptability scores of the health drink

Samples	S_1	S_2	S_3	S_4
Overall rating	8.2	8.7	8.5	8.9

4. Conclusion

Minor millets play an important role is the food and nutritional security of the poor in arid and semiarid regions of the world. Millet based products are economically viable and also it highlights the excellent medicinal and nutritional qualities. The nutritional value of millet health drink contains high protein. The nutrient rich health drink is suitable for all age groups. The mix can be stored long terms in MPP packaging without loss of nutrients. Following result of this study:

1. Health drink from minor millets provides essential minerals apart from energy.
2. It can be easily prepared by malting, grinding and mixing the powder in water or milk along milk sugar.
3. To enhance taste and nutrition, various proportions of kodo, barnyard, little and finger millet flour can be mixed.
4. Sensory evaluation can guide us about the samples which apart from being nutritious are also good in taste, when compared with costly health drinks available in the market.

5. References

1. Abbey BW, Ibeh GO. Functional properties of raw processed cow pea flour. J. Food Sci, 1998; 53:1775-1777.
2. Amandikwa C, Iwe MO, Uzomah A, Olawuni AI. Physico-chemical properties of wheat-yam flour composite bread. Nigerian Food Journal. 2015; 33:12-17.
3. AOAC. Official Method of Analysis 13rd Ed. Association of official analytical Chemist. Washington, D.C. USA, 1980.
4. De Wet JMJ. Origin evolution and systematics of minor cereals. In: Seetha ram A, Riley K, Harinaryana G, Small Millets in Global Agriculture. Oxford & IBH, New Delhi, 1989, 19-32.
5. Doggett H. Small millets: A selective over view. In: Seetha ram. A, Riley K, Harinaryana G. Small Millets in Global Agriculture, Oxford & IBH, New Delhi, 1989; 3-18.
6. Julianti E, Rusmarilin H, Ridwansyah, Yusraini E. Functional and rheological properties of composite flour from sweet potato, maize, soybean and xanthan gum. Journal of the Saudi Society of Agricultural Sciences. 2015; 16:171-177.
7. Khoud Bachar, Elhem Mansour, Abdennaceur Ben khaled, Mabrouka Abid, Mansour Haddad, Leila Ben Yahya *et al*. Journal of Agricultural Science. 2013; 5(2).
8. Mathangi S, Geetahanjali SS. Preparation and Analysis of Value Added Health Mix Using Germinated Millets Flour and Corn Silk (Functional Food) for Diabetic Patients. IJARETS, 2016; 3(12): 61-68.
9. Narayana K, Narasinga Rao MS. Effect of partial proteolysis on the functional properties of winged pea (*Psophocarpus tetragonolobus*) flour. J. Food Sci. 1984; 49: 944-947.
10. Niba LL, Bokonga MM, Jackson EL, Schlimme DS, Li BW. Physicochemical properties and starch granular characteristics of flour from various *Manihot esculenta* (cassava) genotypes. J. Food Sci. 2001; 67(5): 1701-1705.
11. Ocloo FCK, Bansa D, Boatin R, Adom T, Agbemavor WS. Physico-chemical, functional and pasting characteristics of flour produced from jackfruits (*Artocarpus heterophyllus*) seeds. Agric. & Biol. J. North America. 2010; 1(5):903-908.
12. Ojukwu M, Olawini I, Iwouno JO. The proximate composition and functional properties of full-fat flour and protein isolate of Lima bean (*Phaseolus Lunatus*), 2012; 1(7):1-349.
13. Parvathi S, Nithya M, Yogeshwari Y. Development of a novel health drink from millets. Int. J. of Home Sci. Ext. and Comm. Mana. 2015; 2(2):90-95.
14. Sakamoto S, Kimata M, Kawase M. An analysis of species of cultivated millet collected in Halmahera. In Ishige N. The Galela of Halmahera: A preliminary survey. National Museum of Ethnology, Osaka, Japan. 1980, 181-190.
15. Sawant AA, Thokar NJ, Swami SB, Divate AD. Physical and sensory characteristics of ready-to-eat food prepared from finger millet based composite mixer by extrusion. Agric. Engg. Internat. CIGR J. 2013; 15(1):100-105.
16. Singh CR, Kumar SU, Govindan T. Medicinal benefits of Minor millets. IJARBS, 2015; 2(10):145-148.

17. Sudha A, Priyenka Devi KS, Sangeetha V, Sangeetha S. Development of fermented millet sprout milk beverage based on physicochemical properties studies and consumer acceptability data. Journal of Scientific & Industrial Research, 75:239-243.
18. Verma V, Patel S. Nutritional security and value added products from finger millets (ragi). Journal of Applicable Chemistry. 2012; 1(4):485-489.
19. Weber S. Out of Africa: The initial impact of millets in South Asia. Current anthropology, 1998; 39(2):267-274.