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Nutritional Aspects of Kutki Fortified Papad

Miss. Afsharika Azmi (Corresponding Author)
Faculty of Agriculture Science and Technology, AKS University
Amoudha Sherganj Panna Road, Satna (M. P.) 485001, India
Email address – azmi.afsharika10@gmail.com

Dr. (Smt.) Pratibha Parihar
Department of Food Science and Technology, JNKVV, Adhartal, Jabalpur (M. P.) 482004

Mr. Ankur Agrawal
Faculty of Life Science, AKS University, Amoudha Sherganj Panna Road, Satna (M. P.) 485001, India
Email address – frendlyankur@yahoo.com

Mr. Milind M. Patil
Department of Food Science and Technology, JNKVV, Adhartal, Jabalpur (M. P.) 482004
Email address – mmpatil1504@gmail.com

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Abstract
Minor millet fortified papad is a rich source of protein, fibers, minerals and highly energetic snacks consumed and liked by everyone. Therefore the present study was made on Nutritional and proximate attributes like moisture, proteins carbohydrate, ash values and fiber. The quality of papad made from blends containing kutki, soya bean, sago, green gram and rice was as good as prepared from soya fortified millet papad. However the quality deteriorates slightly in papad prepared from blends up to limit of more than 20 percent.
Keywords: Papad, Proximate analysis, Excipients, Kutki, Sago.

Introduction

Papad is a popular food items in Indian diet (Chansoriya, 2005). It is essentially a thin wafer-like product, circular in shape, rolled and nutritious as well. Papad is eaten along with the main course as taste enricher, while farsan is a snack. Papad also known as Appalam is a popular snack and tasty food item in the Indian diet in many centuries, which is regularly consumed as a meal, accompaniment, after roasting or frying or as adjunct along with vegetable soups and curries (Chowdhury *et al*. 2008).

Little millet (*Panicum miliare*) was domesticated in India. The grains of little millet are smaller than those of common millet. The grain contains 8.7 percent protein, 5.3 percent fat, 65.7 percent carbohydrate, 5.4 percent ash, 12.0g fibre, 17 mg calcium, 220 mg phosphorus and provides energy 329 kcal. Generally it is used as a cooked rice, kheer, thin porridge, dosa, sattu, halwa.

Since production of millet is abundant, there is a need to find diversified uses in order to maximize their utilization and to cater the fast changing taste of new generation. Hence, it was proposed to evaluate the quality characteristics and sensory attributes of indigenous papad prepared from little millet and supplementation of rice, green gram, sago and soybean. This paper discusses the nutritional quality of papad prepared from various blends from rice, green gram, sago and soybean.

Material and Method

Grains of Kutki, rice, green gram, soybean and sago were taken as the materials for conducting various experiments in this investigation. The methods used for preparation of full fat soy flour from soybean, kutki flour from kutki, rice flour from rice and green gram flour from green gram. Different combination of preparation of kutki millet based papad in different combination of rice flour green gram flour sago flour and full fat soya flour were tested. There are following treatment-

Kutki: Rice (100:00, 80:20, 60:40, 40:60, 20:80, 0:100)
Kutki: Sago (100:00, 80:20, 60:40, 40:60, 20:80, 0:100)
Kutki: green gram (100:00, 95:5, 90:10, 85:15, 80:20, 0:100)
Kutki: full fat soya (100:00, 95:5, 90:10, 85:15, 80:20, 0:100)

Kutki, green gram, rice, soya bean and sago were purchased from the local market then after cleaning the grains manually for milling purpose then sieving from various meshes. Weighing the flour blends and addition of excipients (like salt, cumin) and water. Mixing the material then cooked till gelatinization. Spread the material

on oil smeared polyethylene sheet finally sun dried till 10-13% moisture content.

The packaging materials namely Low density polyethylene (LDPE), air tight plastic boxes and air tight steel container were purchased from the local market. Three replication of each sample were packed sealed and exposed to the ambient conditions at the room temperature for subsequent evolution during investigation.

The proximate analysis (Moisture content, crude protein, carbohydrates, ash, crude fiber and crude fat) in different samples was estimated as per the procedure given by A.O.A.C 1980 and 1995. Mineral contents of papad were obtained by calculation using table values.

Result

Different types of blend papad were developed from cereals minor millets and pulses flour and subjected to sensory test on 9 point hedonic scale from the sensory mean scores and the comments or the panel list best combinations were selected kutki : rice (20:80) kutki :sago (40:60), kutki : green gram (90:10), kutki : soya bean (90:10). The moisture content of four samples varies from 11.15-11.83%, protein 6.9-11.43%, fat 1.36-5.69%, ash 1.75-2.25%, and carbohydrates 66.3-74.3 % fiber 2.69-7.46 %.

Moisture content decreased with formulation of various pulses grits. This might be due to fortification of grains in minor millet. A sharp increased in fat content was observed with the addition of the soya flour in papad. This might be due to high content of oil. Maximum ash content was found in $KuSO_2$, whereas minimum was found in rice fortified kutki based papad. This might be due to supplementation of soya flour in fortified papad.

Results showed that carbohydrate content was significantly differing in all fortified papad. Carbohydrate Content was decreased with supplementation of soya bean and green gram flours in all fortified papad. These findings might be due to incorporation of sago and pulses which are rich source of fiber. The supplementation of green gram and soybean flour increased the calcium content in all papad. This might be due to rich source of calcium in those flours Phosphorus content increased with the supplementation of soya and green gram flour in all fortified papad. Supplementation of soya flours had increased the iron content in fortified papad. This might be due to the incorporation of rich source of iron content flours.

On the basis of findings it was concluded that soya fortified papad could be consider the best from nutritional point of view, whereas overall acceptability point of view rice fortified papad could consider the best. Fortification of soya and green gram flours increased the amount of fibers, calcium, phosphorus and iron in fortified papad.

Conclusion

Hence it was concluded that low cost high protein energy fortified papad could be developed. Efforts should also be made to suggestion for transfer this technique to house hold women for cottage level. It is, therefore, recommended that inclusion of such papad in supplementary feeding programmes like ICDS would certainly help in improving the nutritional status of masses.

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Table 1. Proximate analysis minor millet based papad

S. No.	Treatments	Combinations	Proximate parameters (%)						
			MC	Protein	Fat	Ash	Carbohydrate	Fiber	EV (Kcal)
Kutki based papad	KuR_4	20 : 80	11.83	**6.9**	**1.36**	1.75	**74.3**	**2.69**	336.34
	KuS_3	40 : 60	11.15	7.7	2.01	2.25	73.08	**7.46**	**349.20**
	KuG_2	90 : 10	11.68	8.9	2.8	1.90	66.66	6.97	326.85
	$KuSO_2$	90 : 10	11.64	11.43	**5.69**	1.85	66.3	7.2	333.68
	SEm±	-	NS	0.132	0.060	0.034	0.146	0.073	0.149
	CD at 5%	-	1.681	0.382	0.175	0.098	0.423	0.213	0.431

MC = moisture content, EV = Energy value

Table 2. Sensory analysis of rice fortified kutki papad

Treatments	Appearance & colour	Aroma	Texture	Taste	Overall acceptability
KuR_0	7.1	7.0	**6.0**	**6.2**	6.5
KuR_1	7.0	**6.0**	7.0	7.0	6.8
KuR_2	6.5	7.9	6.5	7.0	7.0
KuR_3	7.2	7.5	6.9	7.2	7.2
KuR_4	**8.9**	**8.5**	**9.0**	**8.9**	**8.9**
KuR_5	**5.9**	**6.0**	6.5	7.0	**6.4**

KuR_0 = Kutki control (100:0) KuR_1 = Kutki + Rice (80:20)
KuR_2 = Kutki + Rice (60:40) KuR_3= Kutki + Rice (40:60)
KuR_4= Kutki + Rice (20:80) KuR_5= Kutki + Rice (0:100)

Table 3. Sensory attributes of sago fortified kutki papad

Treatments	Appearance & colour	Aroma	Texture	Taste	Overall acceptability
KuS_0	5.0	5.5	6.9	6.0	5.9
KuS_1	**4.9**	**5.4**	6.5	6.0	**5.7**
KuS_2	5.9	6.0	**5.5**	**5.9**	5.9
KuS_3	**7.0**	**7.5**	**7.9**	**7.5**	**7.5**
KuS_4	6.0	6.0	6.0	**5.9**	6.0
KuS_5	5.5	5.9	**5.5**	6.0	5.8

KuS_0 = Kutki control (100:0) KuS_1 = Kutki + Sago (80:20)
KuS_2 = Kutki + Sago (60:40) KuS_3= Kutki + Sago (40:60)
KuS_4= Kutki + Sago (20:80) KuS_5= Kutki + Sago (0:100)

Table 4. Sensory attributes of green gram fortified kutki papad

Treatments	Appearance & colour	Aroma	Texture	Taste	Overall acceptability
KuG_0	7.0	7.1	**6.0**	**6.2**	6.6
KuG_1	7.0	6.9	6.5	7.0	6.9
KuG_2	**7.5**	**7.2**	**7.9**	**8.0**	**7.7**
KuG_3	7.3	7.0	6.9	6.5	7.0
KuG_4	**6.0**	**6.0**	6.2	6.8	**6.3**

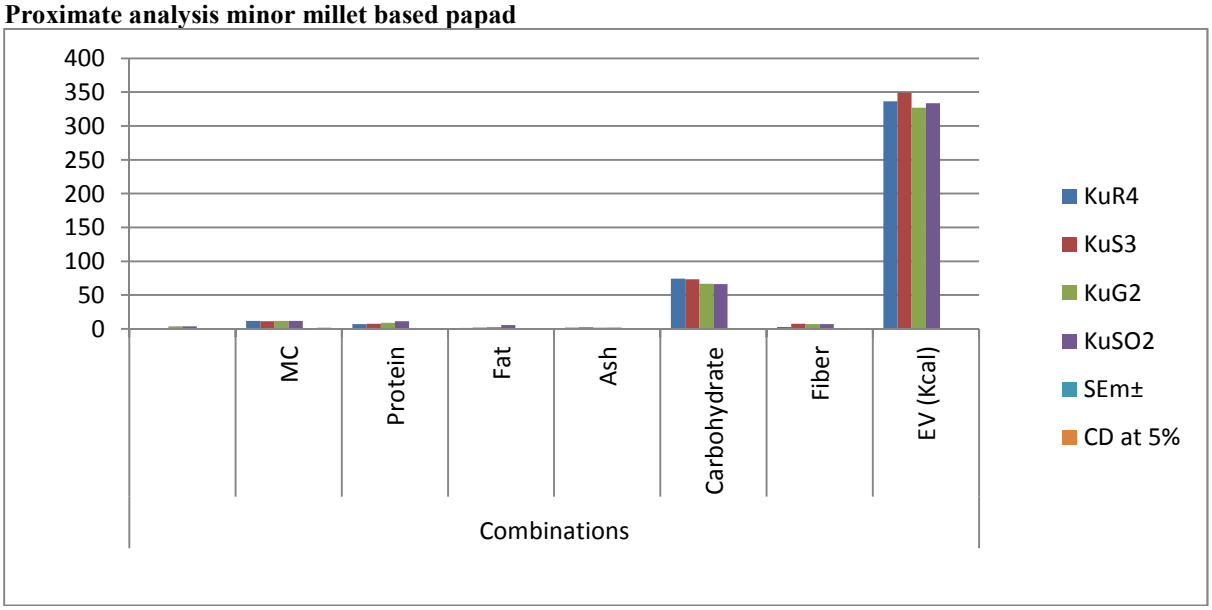
KuG_0 = Kutki control (100:0) KuG_1 = Kutki + Green gram (95:5)
KuG_2 = Kutki + Green gram (90:10) KuG_3= Kutki + Green gram (85:15)
KuG_4= Kutki + Green gram (80:20)

Table 5. Sensory analysis of kutki fortified soybean papad

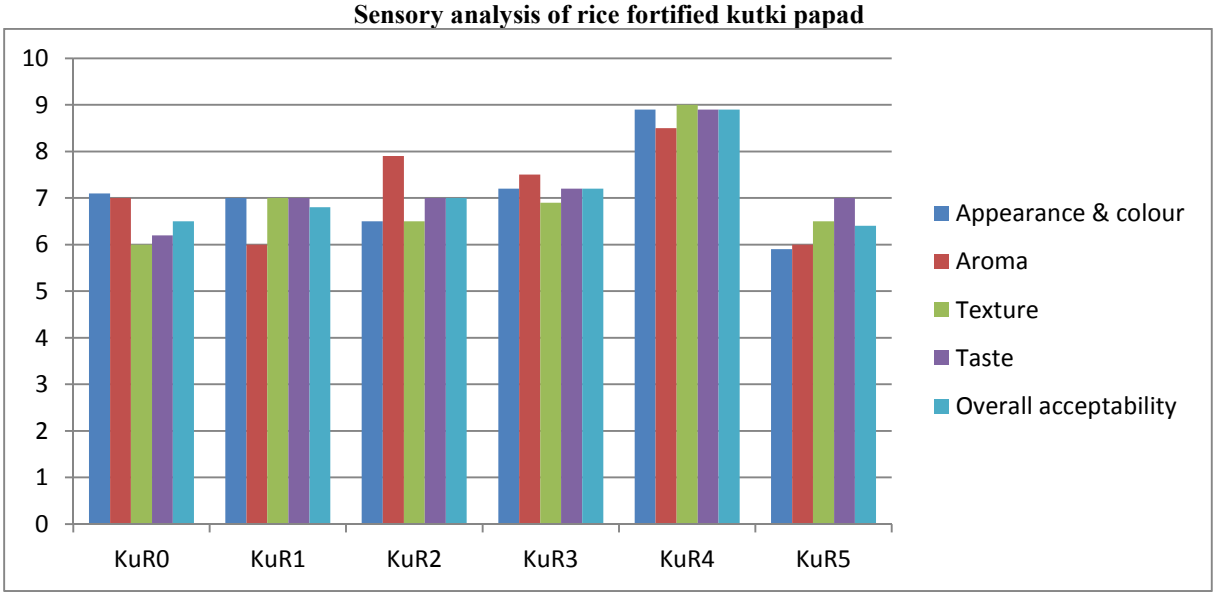
Treatments	Appearance & colour	Aroma	Texture	Taste	Overall acceptability
$KuSO_0$	**7.5**	7.5	7.4	7.5	7.3
$KuSO_1$	7.3	7.0	7.2	7.1	7.2
$KuSO_2$	7.4	**7.9**	**8.0**	**8.3**	**7.9**
$KuSO_3$	6.5	6.9	7.0	7.2	6.9
$KuSO_4$	**6.0**	**6.0**	**6.9**	**6.5**	**6.4**

$KuSO_0$ = Kutki control (100:0) $KuSO_1$ = Kutki + Soybean (95:5)
$KuSO_2$ = Kutki + Soybean (90:10) $KuSO_3$= Kutki + Soybean (85:15)
$KuSO_4$= Kutki + Soybean (80:20)

Proximate analysis minor millet based papad



Sensory analysis of rice fortified kutki papad



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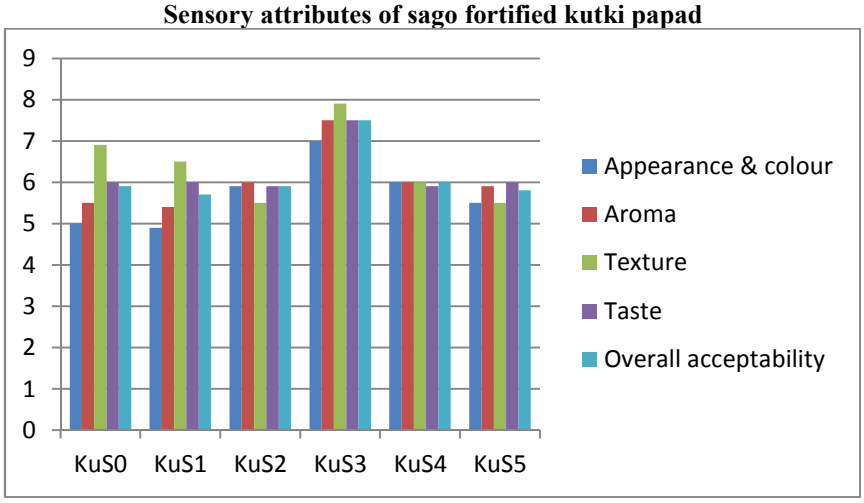
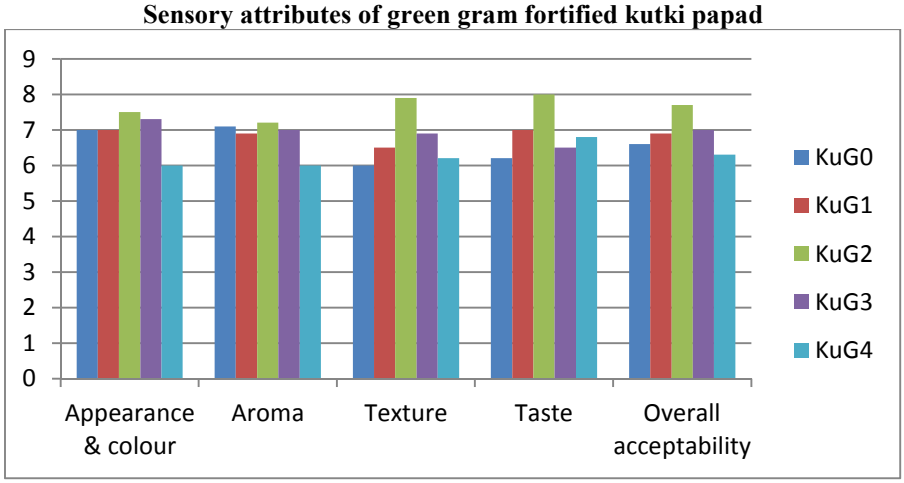
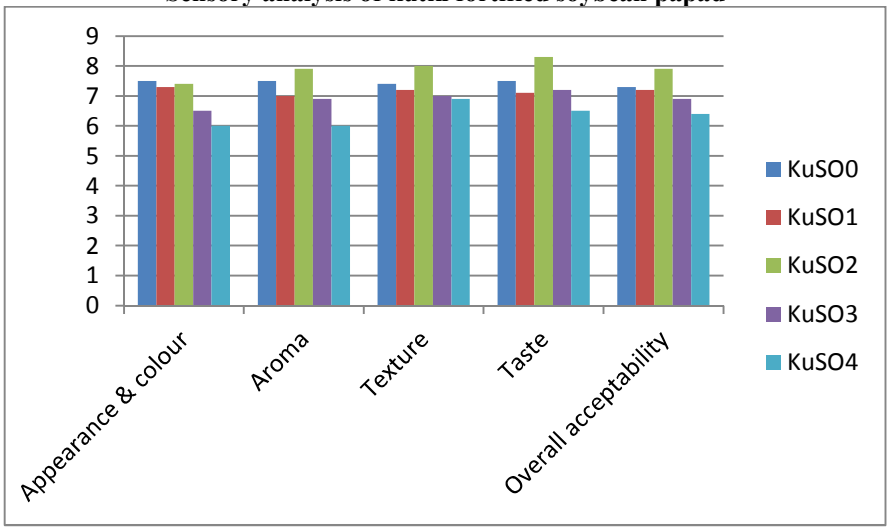


Sensory attributes of green gram fortified kutki papad



Sensory analysis of kutki fortified soybean papad



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