"Angakar Roti" - Rice Based Traditional Recipe of Chhattisgarh and its Value Addition

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Abstract: *In the present investigation, rice based traditional recipe- "Angakar Roti" consumed by the urban, rural and tribal people of Chhattisgarh, India, was prepared using standard technique and evaluated for its nutritional contents. It was observed that though Angakar Roti contains Carbohydrates and hence Calories in sufficient quantities, its Protein content was qualitatively & quantitatively low. In order to improve its nutritive value, the Angakar Roti was value added with Bengal gram, Spinach and Soy milk. Three different samples along with control sample were prepared and evaluated nutritionally and organoleptically. Nine point Hedonic Rating Scale was used for sensory evaluation while nutritive value was calculated using Food Composition Tables. The results revealed a dramatic improvement in Proteins and other micronutrients.*

Keywords: Protein quality, Sensory evaluation, Soy milk, Traditional recipe, Value addition.

1. Introduction

Chhattisgarh is the tenth largest state in Central India with an area of 135,190km² (52,200sq mi). Chhattisgarh is the sixteenth most populated state in India with the population of 25.5 million. Rice is the staple food of Chhattisgarh and hence all the traditional recipes have a predominance of Rice. Rice is equally popular in Urban, Rural as well as Tribal belts of Chhattisgarh. Mouth-watering traditional recipes of rice form a part of day to day meals as well as are used in festive occasions also. Rice is rich in carbohydrates but is not a good source of proteins and other micronutrients. Excessive use of rice definitely affects the status of nutrition of its inhabitants. Balanced diet is not accessible to a large population of the world, particularly of developing countries. In India malnutrition is a major health problem, which is responsible for about 40-50% of infant death **(Rai et al 1999).** In fact, some researchers have suggested that rice based recipes are energy dense, rich in carbohydrates and fats but contain moderate amounts of protein **(Palta & Nair 2004).**

To enhance the nutritive value of the rice based recipes by adding functional ingredients to them and also to improve their appearance, taste and texture is the basic objective of value addition. Nutrition intervention has been suggested to boost calorie and protein intake for those who cannot get enough nutrition from their diets**.** Soybean is an economically important crop, which serves as a source of good quality protein as it contains up to 48% protein. Moreover, the essential amino acid content in soybean exceeds the amino acid requirements of children and adults, which confirms the protein quality of this legume **(Maribel et al 2008).** Hence Soy and Soy products can very well be used for value addition.

2. Review of Literature

Chakma et al. (1996) conducted a study on Health and Nutrition Profile of Tribal of Madhya Pradesh and Chhattisgarh in India. The results revealed that their diet was cereal-based, with very low quantities of pulses green leafy vegetables and fats & oils. Energy and protein intake was lower than RDA.

Nair et al. (2013) carried out a study on sensory and nutritional quality of soy fortified traditional products. In this study they observed that fat content of soy flour is higher than rice flour similarly the protein content of full fat soy flour is nearly four times than of rice flour. Efforts have been made to develop soy-rice traditional products by incorporation of soy flour at 10%, 20% and 25% level to rice flour. The sensory evaluation shows that 20% soy based products were best on the basis of overall acceptability on 7 point hedonic scale.

3. Methodology

The present investigation was carried out in Raipur the capital city of Chhattisgarh state India. The whole experiment had one control and three treatments as T1, T2 and T3 with 40%, 30% and 20% value addition.
The treatment combinations are given in Table No.1.

Table 1: Details of Control and Treatments

Ingredients	Control T0 ♦	T1	T2	T3
Boiled rice(g)	100	100	100	100
Rice flour(g)	100	60	70	80
Bengal Gram flour(g)	-	20	15	10
Spinach(g)	-	20	15	10
Water/Soy milk(ml)	20	20*	20*	20*
Oil (5g)	5	5	5	5

♦ Without value addition   * Soy milk used

The method of preparing control sample and treatments are as under:

The ingredients of "Angakar Roti" are leftover boiled rice and rice flour which is commonly known as "mota roti". Angakar Roti is eaten as a breakfast item in Urban, Rural and Tribal areas. A common method of Chhattisgarh state preparing Angakar roti was standardized for one serving. Leftover boiled rice, rice flour, salt were all mixed together.

Water was added and kneaded well to make soft dough. The roti was cooked on hot griddle (tawa) after smearing oil on it. The roti was rolled by flattening with hands. Then it was cooked on both the sides & served with tomato chutney.

Similar procedure was adopted to prepare treatments with an exception that apart from basic ingredients bengal gram, spinach and soy milk was also added in quantities mentioned in Table No. 1 to prepare it.

Organoleptic evaluation: Sensory evaluation of control and treatment samples for Angakar Roti was done by a panel of six judges. The judges scored the products with the help of the Nine point Hedonic Rating Scale.

Calculation of Nutritive value: The nutritive value of control and treatment samples were calculated following using Food Composition tables of ICMR. Nutritive value was calculated in terms of energy, protein, fat, fibre, carbohydrate, iron, vitamin A, vitamin B_{12} vitamin C, sodium, potassium, lysine and leucine.

4. Results and Discussions

The results of the study are depicted in

Table No 2 & 4.

Table 2: Comparison of parameters of Sensory Evaluation of Different Samples of "Angakar Roti"

Sensory Parameters	Control T0 ♦	T1	T2	T3	F-ratio
	Mean ± S.D.	Mean ± S.D.	Mean ± S.D.	Mean ± S.D.	
Appearance	7.50 ± 0.54	7.66 ± 0.51	8.66 ± 0.51	8.66 ± 0.51	8.63 (p<.01)
Colour	7.66 ± 0.81	7.66 ± 0.51	8.66 ± 0.51	8.83 ± 0.40	6.95 (p<.01)
Flavour	6.83 ± 0.40	7.00 ± 0.63	9.00 ± 0.00	9.00 ± 0.00	61.47 (p<>.01)
Taste	7.33 ± 0.51	6.83 ± 0.40	8.83 ± 0.40	9.00 ± 0.00	46.66 (p<.01)
Texture	6.83 ± 0.40	6.83 ± 0.40	8.83 ± 0.40	8.16 ± 0.40	36.00 (p<.01)
Overall Acceptability	7.33 ± 0.51	7.16 ± 0.40	9.00 ± 0.00	8.83 ± 0.40	37.40 (p<.01)

♦ Without value addition

Perusal of entries reveal significant difference in all the sensory parameters i.e. appearance, colour, flavour and taste between T0, T1, T2 and T3 of Angakar Roti. The calculated F ratios of 8.63, 6.95, 61.47, 46.66, 36.00 and 37.40 are statistically significant at .01 level confirms the above findings. The results are same for overall acceptability of different samples of Angakar Roti (F=37.40, p<.01).

To find out the significant difference in mean judges scores between prepared samples, Least Significant Difference Method was adopted. The results are depicted in Table No. 3.

Table 3: Comparison of Mean Difference in Sensory Evaluation Parameters between Control and Experimental Angakar Roti

Sensory Parameters	Control T0 ♦	T1	T2	T3	Mean Difference
	Mean	Mean	Mean	Mean	
Appearance	7.50	7.66	8.66	8.66	T0-T1 = -.16 T0-T2 = -1.66* T0-T3 = -1.16* T1-T2 = -1.00* T1-T3 = -1.00* T2-T3 = 0.00
Colour	7.66	7.66	8.66	8.83	T0-T1 = 0.00 T0-T2 = -1.00* T0-T3 = -1.16* T1-T2=-1.00* T1-T3=-1.16* T2-T3=-.16
Flavour	6.83	7.00	9.00	9.00	T0-T1=-.16 T0-T2=-2.16* T0-T3=-2.16* T1-T2=-2.00* T1-T3=-2.00* T2-T3=0.00
Taste	7.33	6.83	8.83	9.00	T0-T1=.50* T0-T2=-1.50* T0-T3=-1.66* T1-T2=-2.00* T1-T3=-2.16* T2-T3=-.16
Texture	6.83	6.83	8.83	8.16	T0-T1=0.00 T0-T2=-2.00* T0-T3=-1.33* T1-T2=-2.00* T1-T3=-1.33*

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					T2-T3=.66*
Overall Acceptability	7.33	7.16	9.00	8.83	T0-T1=.16 T0-T2=-1.66* T0-T3=-1.50* T1-T2=-1.83* T1-T3=-1.66* T2-T3=.16

◆ Without value addition   * Significant at .05 level

According to judges score, value added experimental samples T2 and T3 of Angakar Roti showed superiority in appearance, colour, flavour, texture and overall acceptability as compared to control sample T0 and experimental sample T1. It was also observed that mean difference in appearance, colour, flavour, texture and overall acceptability of control sample T0 and experimental sample T1 did not differ significantly with each other except that taste of control sample T0 was found to be significantly better as compared to experimental sample T1.

By and large no statistically significant difference was observed in majority of sensory evaluation parameters i.e. appearance, colour, flavour and overall acceptability of experimental sample T2 and T3 except that texture of sample T2 was significantly better as compared to T3.

The sensory evaluation indicates a favourable results in favour of experimental sample T2 and T3 as compared to control sample T0 and experimental sample T1 respectively.

Table 4: Percentage Change in Nutritive Values in Control and Experimental Samples of Angakar Roti

Nutrients	Control T0	T1	T2	T3
Protein (g)	12.8	23.44 (83.12)	22.94 (79.21)	22.44 (75.31)
Fat (g)	5.8	10.8 (86.20)	10.52 (81.37)	10.25 (76.72)
Fibre (g)	0.4	1.42 (255)	1.35 (237.5)	1.28 (220)
CHO (g)	158	143.12 (-9.41)	147.88 (-6.40)	152.65 (-3.38)
Energy (kcal)	737	764.6 (3.74)	779.3 (5.73)	794 (7.73)
Iron (mg)	2	4.96 (148)	4.74 (137)	4.52(126)
Vitamin A (μg)	37.5	1264.5 (3272)	979 (2510)	693 (1749)
Vitamin B12 (μg)	22	91.7 (316.8)	79.27 (260.31)	66.85 (203.86)
Vitamin C (mg)	00	06	4.35	2.9
Na (mg)	00	26.34	19.75	13.17
K (mg)	00	185.2	138.9	92.6
Lysine (mg)	440	598 (35.91)	580 (31.82)	560 (27.27)
Leucine (mg)	1120	1214 (8.39)	1214.5 (8.43)	1215 (8.48)

Values in parentheses () show percentage change

An increase in all the nutrients like was observed in experimental sample T1, T2 and T3 respectively when compared to the values of control sample T0. Only the carbohydrate content showed a decrease after value addition.

In the present study, nutritive value of experimental samples of Angakar Roti was found to be significantly better than the control sample. This is not surprising because the value addition was in the form of bengal gram and soy milk, both of which enhance the nutritive value of experimental samples of Angakar Roti as compared to control sample in which main ingredients are rice and rice flour.

The value addition of bengal gram, spinach and soy milk adds organoleptic properties of traditional recipe of Angakar Roti. Studies done in past by **(Nair et al 2013)** also showed impact of value addition on organoleptic properties of prepared recipe.

5. Conclusion

From the results, it can be concluded that after value addition with bengal gram, spinach and soy milk, the traditional Angakar Roti becomes better not only in terms of sensory attributes but also in terms of the nutritive value. Hence, any three forms of value addition i.e. 40%, 30% and 20% may be used but the sensory attributes were found to be the best with 30% value addition.

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