SENSORY AND NUTRITIONAL QUALITY OF SOY FORTIFIED TRADITIONAL PRODUCT

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ABSTRACT
Cereals and pulses are the main constituents of any food all over the world. Cereals are considered as a major source of energy but they content less protein than animal protein. Soybean is one of the pulses that contain the highest of protein. The present study was aimed to develop high protein snack by incorporating soy flour to rice base flour Four types of product were prepared by adding high protein ingredient to basic rice flour standard Pedia (control group) as sample A, 10 % full fat soy flour added sample- B, 20 % full fat soy flour added as sample C, 25 % full fat soy flour added as sample D by using proximate analysis fiber, ash, fat, protein, carbohydrates and sensory evaluation 7 point hedonic scale used. When 20 % soy flour was added to rice flour it gives high level of protein of 15.75 than that of 9.62 for control product. Fat content was decreased from 22.80 to 20.03. The sensory evaluation indicates that 20 % soy based product was best on the basis of overall acceptability on 7 point hedonic scale. The analysis revealed that Protein and fat content of the product increased with the addition of soy flour. Thus newly developed product is more nutritious than the pure rice flour product. The traditional rice based products can be enriched by the incorporation of soy flour but excessive incorporation of soy may not be acceptable due to its specific taste.
Keywords: Soy, traditional food, proximate analysis, Sensory evaluation, Rice.

INTRODUCTION

Protein- energy malnutrition is one of the major health problems among children in developing countries including India. Several studies reported that malnutrition at early age causes impaired physical as well as mental development in children[1]. Several researches carried out in India have confirmed that protein energy and Iron deficiency among children has increased[2]. High protein food could be beneficial to such malnourished children. Therefore high protein foods should be incorporated to traditional foods and should be produced from locally available food items to meet out the cost. Locally available food requires less processing and can be easily modified by incorporating other food item and can be easily accepted by the people. These types of modifications are easily transformed to similar. Culture and can be implemented as whole[3]. Consumption of small amount of such type of high protein snacks between two meals by the school children can meet a protein defiant diet. 'Pedia' is a locally consumed sweet snack of the Chhattisgarh. Traditional Pedia is prepared by rice flour and is deficient in protein in quality and quantity. High protein snack preparation by adding or fortifying with high protein rich food can be costly so in the present study full fat soy flour was incorporated by replacing rice flour to develop a new soy rich traditional product.

MATERIALS AND METHODS

Chhattisgarh state of India is popularly known as bowl of rice. Therefore rice is a staple food of Chhattisgarh. Rice is consumed as a main dish as well as snacks also. Pedia is one of the popular sweet snacks of the state. Pedia is prepared by only rice flour. The new soy rich product was prepared in different varieties by mixing different level of soy flour. The composition of ingredients used in different varieties is indicated in Table 1.

Table 1: Percentage composition of Rice flour and Soy flour in composite Pedia
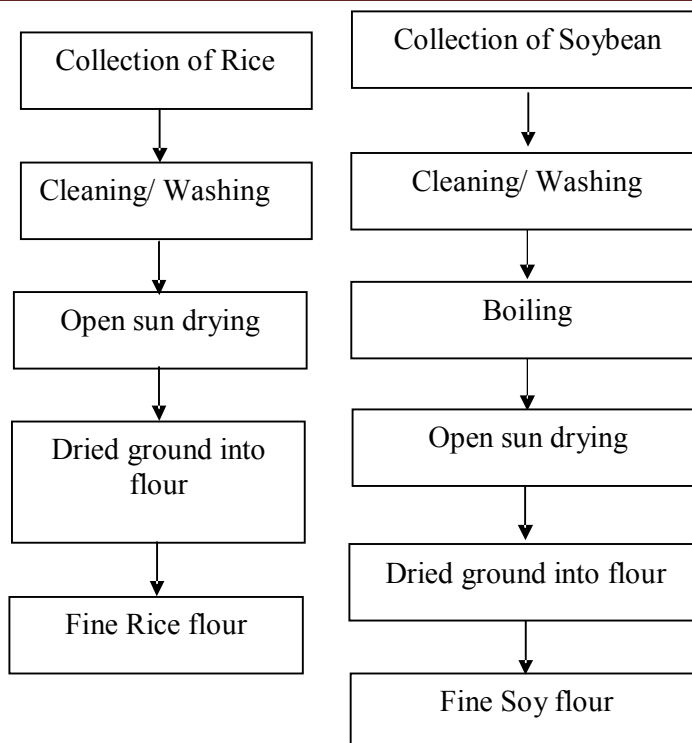
Sample name	Rice flour	Soy flour
A	100 %	0 %
B	90 %	10 %
C	80 %	20 %
D	75 %	25 %

Raw Material

In Present study, Soy flour and Rice flour was used to prepare new product. Soybean was purchased from local market. Rice was first cleaned followed by washing and kept in sun light for drying. After drying, rice was passed through grinder and sieved to get fine flour. Rice flour was kept in airtight container, until preparation of all variations of bland completed similar process was adapted for Soybean, to get soybean flour (Figure 1).

Product Development

Soy based bakery products are usually prepared using traditional creamy methods[4,5] and Soy based rice product was prepared by substituting rice flour them with soy four in various combinations. New product was prepared by substituting rice from with 10 %, 20 % and 25 % of full fat soy flour. The process production of soy fortified Pedia consisted of various steps. Rice flour was made from rice which had been soaked and dried in sunlight. All the ingredients were weighted accurately by balance. Rice was dipped in water for two hours. Then it was spread over muslin cloth to dry. Flour was prepared from dried rice. Dough was made by mixing curd with rice flour and kept for 10 minutes. Then it was fried in oil like noodles (Sev). Noodles (Sev) were cooled and then powdered to get fine flour. Sugar and cardamom powder was mixed for flavor and then shape of Pedia was given. Pedia was dipped in sugar water and then coconut powdered was spread over it.

Collection of Rice	Collection of Soybean
↓	↓
Cleaning/ Washing	Cleaning/ Washing
↓	↓
Open sun drying	Boiling
↓	↓
Dried ground into flour	Open sun drying
↓	↓
Fine Rice flour	Dried ground into flour
	↓
	Fine Soy flour

New soy fortified Pedia was prepared in the same manner as traditional Pedia was prepared. Various blends of Pedia were prepared by substituting soy flour to rice flour. While preparing Sample B only 10 % rice flour was substitute by 10 % soy flour and while preparing Sample C only 20 % and Sample D 25 % of soy flour respectively.

Proximate composition of raw material of developed product
Proximate principles namely moisture, protein, total fat, total ash, total fiber and carbohydrate were calculated by the standard procedures of National Institute of Nutrition[6].

Physical properties of soy fortified traditional product
Weight and volume was calculated as per[7] method.

Sensory Evaluation
Sensory evaluation of the developed product samples (A, B, C and D) was carried out for different qualities attributes and overall acceptability was carried out by a panel of 5 panelists using a 7 point hedonic scale. According to[8] the mean scores of attributes vise color, texture, flour taste; smell and overall acceptability were recorded.

Sample Code
Sample A- Plain simple Pedia product (Control), Sample B- 10 % of Soy fortified Pedia, Sample C- 20 % of soy fortified Pedia, Sample D- 25 % of soy fortified Pedia

Statistical Analysis
The collected data was compiled and analyzed by using the statistical package for social science (SPSS) version all for windows. The samples with significant mean were separated using the least significant difference (LSD) as prescribed by[9].

RESULTS AND DISCUSSION

Table 2: Proximate composition of raw flour and soy flour

Constituents	Soy flour	Rice flour
Moisture (%)	11.75	5.8
Crude Protein (g)	41.88	11.81
Fat (g)	18.8	0.8
Ash (g)	4.9	0.2
Carbohydrates (g)	18.97	81.22
Fiber	3.7	0.17
Energy value	413	379

Data on proximate Composition of raw rice flour and raw full fat soy flour Pedia has been indicated in Table 2. It was observed that the fat content of soy flour is higher than rice flour similarly the protein content of full fat soy flour is about four times that of rice flour. This indicates suitability of supplementation of soy flour to rice flour[10,11].

Effect of incorporation of soy flour on physical properties of rice based traditional product (Pedia)
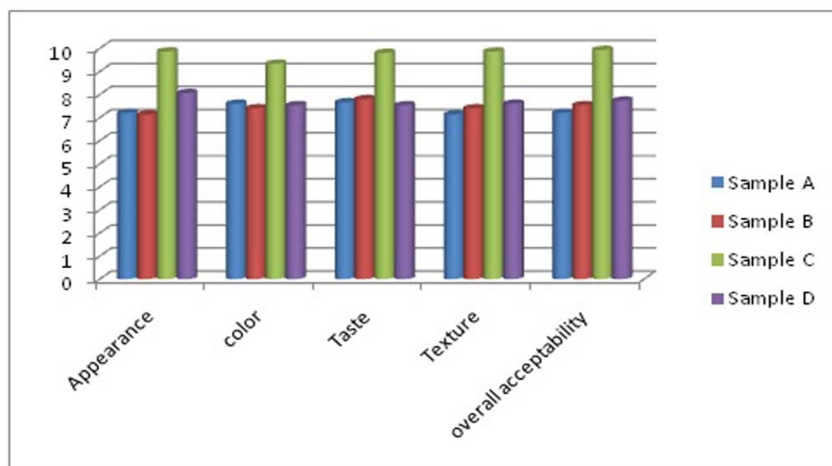
Table 3

Parameter	control	level of incorporation		
		10 %	20 %	25 %
weight (g)	50	50.12	50.31	50.32
volume	40.11	40.12	40.14	40.15

The physical properties of the control product and developed product developed. Product is given in Table 3. It was observed that with increasing level of soy flour weight volume was increased; similar results were observed by Nazni P. and Shalini S[13]

Table 4: Sensory evaluation of the soy incorporated traditional rice product

Samples	Appearance	Color	Taste	Texture	overall acceptability
A	7.20 + 0.77	7.60 + 0.98	7.66+ 0.89	7.13+ 1.06	7.20+ 0.67
B	7.13 + 0.83	7.40 + 1.35	7.80+ 0.94	7.40+ 0.82	7.53+ 0.74
C	9.86+ 0.35	9.33 + 0.72	9.80+ 0.41	9.86+ 0.51	9.93+ 0.25
D	8.06 +1.03	7.53+ 0.83	7.53+ 0.88	7.60+ 0.73	7.73+ 0.59

*significance level ($p < 0.05$) *Mean and S.D. values are obtained

Graph: Sensory evaluation of the soy incorporated traditional rice Product

Table 04 represents the organoleptic assessment of all products. The results reveal that in all parameters tested (Appearance, color, taste, texture and overall acceptability). There was no significant change in standard to experimental Pedia. It was observed that standard Pedia was comparable to variation sample name B, C and D. The taste of Sample B, C and D Pedia was better than standard Pedia. The overall result reveals that addition of soy flour at 20 % was highly acceptable by the panel of judges. Whereas the addition of soy flour at more than 25 %, the acceptability was decreased due to soybean's pungent smell, chewing gum, hardness and stickiness. Similar results were observed by Nazni P. and Shalini S[13].
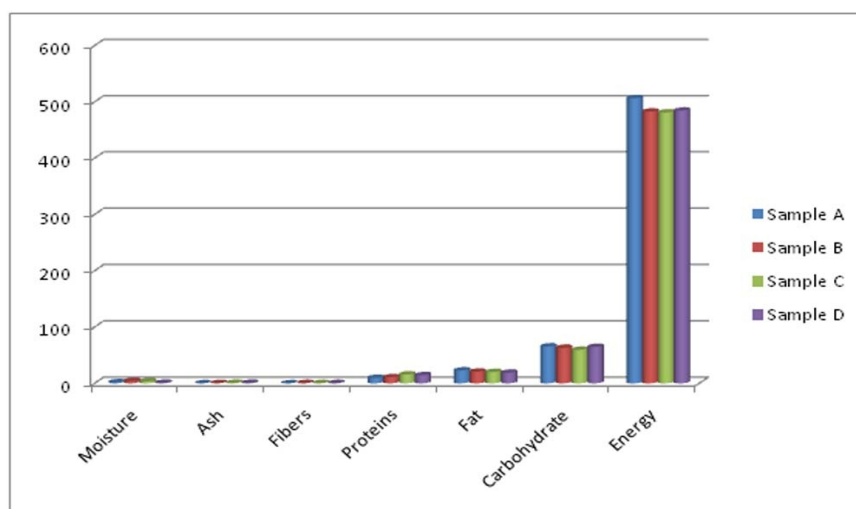
Proximate composition of soy fortified traditional product
The chemical analysis of soy fortified traditional was done proximate composition as discuss below.

Table 5: Proximate composition of soy fortified traditional rice based Product

Sample code	Moisture	Ash	Fibers	Proteins	Fat	Carbohydrate	Energy
A	1.87+ 0.04	0.10+ 0.01	0.03+ 0.005	9.62+ 0.04	22.80+ 0.10	65.48+ 0.01	506.33+ 0.57
B	4.08+ 0.03	0.50+ 0.01	0.57+ 0.01	10.94+ 0.005	20.80+ 0.01	63.10+ 0.01	482.66+ 1.52
C	3.52+ 0.04	0.80+ 0.02	0.51+ 0.005	15.75+ 0.02	20.03+ 0.05	59.42+ 0.02	481.00+ 1.00
D	0.84+ 0.01	0.90+ 0.01	0.54+ 0.005	14.45+ 0.01	18.73+ 0.15	64.68+ 0.01	484.33+ 0.57

*significance level ($p < 0.05$), *Mean and S. D. values are obtained, *Least significant difference

Graph 2: Proximate composition of soy fortified traditional rice based Product

The Table 5 shows the proximate composition of soy fortified traditional product. The overall data shows that with increasing soy flour the moisture content of the product was increased from 1.87 of control to 4.08 for 10 % soy flour 3.52 for 20 % soy flour and 0.84 for soy incorporated rice based traditional products. The result show that protein content was increased from $9.62 + .04$ for control ratio $10.94 + .005$ for 10 % $15.75 + .02$ for 20 % and $14.45 + .01$ for 25 % soy flour incorporation similarly the fat content was increased with increasing level of soy flour.

CONCLUSION

Efforts have been made to develop-soy-rice traditional products by incorporation of soy flour at 10 %, 20 % and 25 % level to rice flour. Proximate composition and sensory evaluation of soy - rice traditional products indicates that nutrient content of new product increases as the amount of soy flour increases. On the basis of sensory evaluation 20 % soy flour incorporated soy - rice traditional product was found best. The new product was highly appreciated and liked by school children when it was given after MDM.

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