*Original Research Article*

# Assessment of Nutritional Composition and Quality Attributes Of Gram Flour Snack by Incorporation of Rice Bran

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## ABSTRACT

Rice bran was selected and used to supplement the snack by incorporation of processed rice bran by the microwave heat treatment. The nutritional quality of Microwave Processed Rice Bran (MPRB) was evaluated using AOAC methods. Proximate composition of MPRB for moisture, protein, fat, ash, fiber, carbohydrate and energy were 3.12 g, 10.78 g, 20.57 g, 9.23 g, 18.47 g 37.84 g and 379.57 Kcal per 100 g respectively. Rice bran supplemented gram flour snack was standardized with the different percentage of rice bran (0%, 10%, 15% and 20%) and named as S, A, B and C respectively. Rice bran supplemented gram flour snack with 0% (S) rice bran was treated as control. In the evaluation of organoleptic characteristics, there was a significant difference (P<0.05) among the treatments (S, B and C) of rice bran supplemented snack besides in treatment A and control (S) there was a non significant difference (P>0.05) in terms of appearance/color, texture and taste/flavor. There was also a reduction in the nutritive value of different products particularly in protein and carbohydrate from 17.68 g/100g to 16.22 g/100g and 50.83 g/100g to 48.55 g/100g respectively. Incorporation of processed rice bran in different products with 10% was found to be effectively used in everyone's life to obtain the better health conditions.

*Keywords:* Rice bran, incorporation, sensory evaluation, nutritional value.

## INTRODUCTION

Rice *(Oryza sativa)* is the most common staple food which is consumed by half of the World's human population. It is the 3rd highest agricultural commodity with the worldwide production after sugarcane and maize. [1] Being the outer covering of rice kernel, rice bran is highly under exploited product which is comprised of pericarp, aleurone, subaluerone layer, seed coat, nucellus, part of germ and small part of starchy endosperm. [2, 3] In this study, the nutritional evaluation of rice bran supplemented sev would be undertaken to harness the nutritive value of the rice bran. Sev is a common snack food in every Indian home as evening snack as it has the longer shelf life, better acceptability in all age groups and it taste good so this study was undertaken for the enhancement of its nutritional quality by incorporation of rice bran as rice bran is a good source of all essential nutrients.

## MATERIALS AND METHODS

### PROCUREMENT OF RICE BRAN:

Rice bran was procured from local rice mill of Gautam Budh Nagar District of Uttar Pradesh for this study in a single lot.

### PROCESSING OF RICE BRAN:

Rice bran was processed by microwave heat treatment to enhance its shelf life by inactivating lipase enzyme which reduces the rancidity develops due to this enzyme

activity. Microwave heat treatment was given to rice bran by following the method given below:

Firstly 100 g rice bran sample was sieved (Sieve Size: 40) to attain the uniform size of particles and the microwave heat treatment was given in LG microwave (Model No.: MC-7880PSR) at 2450 MHz for 5 min. To avoid the char in bran, 10 ml of water was added to it and then dried it in the hot air oven for 30 min at 60°C.

## NUTRITIONAL AND CHEMICAL COMPOSITION OF PROCESSED RICE BRAN:

All determinations of chemical composition of MPRB were done by using standard procedure. Moisture, protein, fat, ash crude fiber and carbohydrates were measured by following the method of [4] Weight loss after drying at 105°C until constant weight was used to determine moisture content. Protein content was determined by Micro-Kjeldahl method using the conversion factor of 6.25. Total Fat was measured by Soxhlet extraction method using petroleum ether as a solvent. Total ash was calculated by Muffle Furnace Incineration at 600°C (dry ashing). Crude fiber was obtained by

digesting the sample with diluted acid, alkali and alcohol. Carbohydrate was calculated by difference method i.e. by subtracting from 100 the sum of the value (per 100 g) for moisture, protein, fat, ash, crude fiber. Energy was calculated by using the formula given below:

Energy = [Protein (g) X 4] + [Carbohydrate (g) X4] + [Fat (g) X9]

## DEVELOPMENT OF RICE BRAN SUPPLEMENTED SNACK:

MPRB was supplemented in Gram flour to prepare rice bran supplemented sev at 0, 10, 15 and 20% level (Table 1) and incorporation of MPRB and other ingredients in different treatments of rice bran supplemented sev (Table 2).

**Table 1: Treatments Used for Preparation of Rice Bran Supplemented Sev**

| Treatments | Gram Flour (%) | MPRB (%) |
|---|---|---|
| S | 100 | 0 |
| A | 90 | 10 |
| B | 85 | 15 |
| C | 80 | 20 |

S (100% commercial straight grade flour) acts as Control: Sev with 0% MPRB
A: Snack with 10% MPRB
B: Snack with 15% MPRB
C: Snack with 20% MPRB

**Table 2: Incorporation of MPRB and Other Ingredients in Different Treatments of Rice Bran Supplemented Sev**

| Sr. No. | Ingredients (gm) | Control (S) | A | B | C |
|---|---|---|---|---|---|
| 1 | Gram Flour | 90 | 80 | 75 | 70 |
| 2 | MPRB | 0 | 10 | 15 | 20 |
| 3 | Turmeric Powder | 1 | 1 | 1 | 1 |
| 4 | Carom Seed Powder | 2 | 2 | 2 | 2 |
| 5 | Cumin Seed Powder | 1 | 1 | 1 | 1 |
| 6 | Salt | to taste | to taste | to taste | to taste |
| 7 | Black Pepper Powder | 1 | 1 | 1 | 1 |
| 8 | Soybean Refined Oil | 5 | 5 | 5 | 5 |
| | Total | 100 | 100 | 100 | 100 |

Gram Flour Sev is a common Indian snack. [5] It is usually eaten with the evening tea and in some parts it is taken as a topping on dishes like Bhelpuri, Sevpuri as well as along with the lunch and dinner. [6] The product was standardized by making the dough of 100 g Gram Flour seasoned with turmeric powder, carom seed powder,

cumin powder, salt and black pepper and then deep-fried in rice bran oil and treated as control (S with 0% MPRB). The different treatments were made by replacing the main ingredients i.e. gram flour with the different percentage of microwave processed rice bran, 10%, 15%, and 20% and named as (A), (B), and (C) respectively (Figure 1).
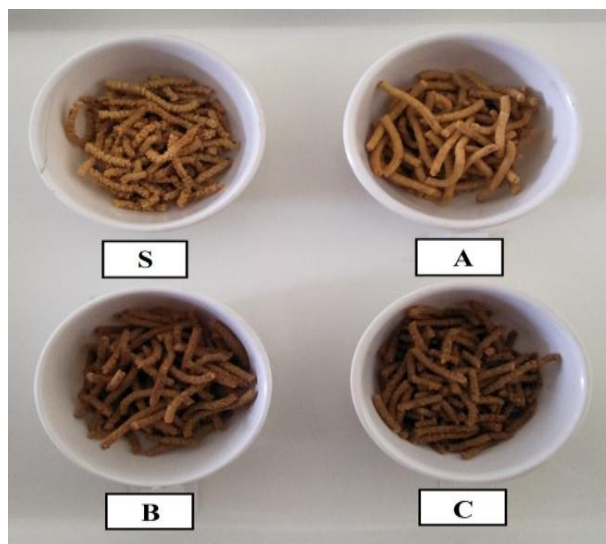
**Figure 1: Different Treatments of Rice Bran Supplemented Sev**
S (100% commercial straight grade flour) acts as Control: Sev with 0% MPRB
A: Sev with 10% MPRB
B: Sev with 15% MPRB
C: Sev with 20% MPRB

Nutritive Value and overall acceptability of control and all other treatments were evaluated by the organoleptic characteristics. The sensory score of the developed sev of all the four treatments was determined by the 15 semi-trained panelists selected by triangle test in triplicates.

**SENSORY EVALUATION:**

Firstly for selecting the semi trained panel members triangle test was performed to conduct sensory evaluation and then the overall acceptability of rice bran supplemented sev in terms of appearance/color, texture, taste/flavor was done by semi trained panel of 15 members using 9-point hedonic scale in triplicates. 9-1 score was given by panelists to the product, ranging from 'like extremely' to 'disliked extremely' to find out the most appropriate treatment of rice bran supplemented sev.

**STATISTICAL ANALYSIS:**

ANOVA (Analysis of Variance) and significant difference among means of rice bran supplemented sev were examined by one way ANOVA using Microsoft Excel 2007 and GraphPad Prism (Version 5.03).

**RESULTS AND DISCUSSION**

Nutritional quality of rice bran was evaluated with the different values reported by other researchers in Table 3.

The results revealed that mean score of proximate principles of microwave processed rice bran were 3.12 g, 10.78 g, 20.57 g, 9.23 g, 18.47 g and 37.84 g for moisture, protein, fat, ash, crude fiber and carbohydrate respectively had some similarity and variation as reported by other workers. In present study, the mean content of crude fat was reported to be 20.57 g/100 g whereas by different authors it was reported between 13 g/100 g to 20 g/100 g. comparatively lower mean content of protein (10.78 g/100 g) was depicted in present study as in Table 3.

**Table 3: Comparison of Proximate Composition of Rice Bran per 100g**

| References | Moisture | Protein | Fat | Ash | Dietary /Crude Fibre | CHO |
|---|---|---|---|---|---|---|
| Present Study | 3.12±0.2 | 10.78±0.78 | 20.57±0.35 | 9.23±0.11 | 18.47±1.54 | 37.84±0.47 |
| [7] | - | 18.17±0.16 | 0.57±0.06 | 9.54±0.76 | 11.85±0.48 | - |
| [8] | 6.28±0.1 | 19.38±0.30 | 20.05±0.40 | 6.98±0.04 | 25.38 | 28.21 |
| [9] | 4.19 | 13.16 | 12.15 | 7.56 | 19.33 | 43.69 |
| [10] | 5.3 | 16.67 | 14.23 | 5.62 | 23.34/7.85 | 44.68 |
| [11] | 4.30 | 17.50 | 13.10 | 4.92 | 23.34/7.85 | 52.33 |

The evaluation of proximate principles in present study was found to be varied in comparison to others studies this was due to the various reasons such as the processing conditions and the variety of rice from which rice bran is derived. [12] The characteristics of the grain and rice bran were also influenced by the time of polishing and pressure applied on them and also by the adulteration. [13]

The nutritional value of different treatments of rice bran supplemented sev (S,

A, B and C) per 100 g was evaluated (Table 4) and found that in terms of nutritional quality 10% incorporation was better than the other treatments. Rice bran supplemented sev with 10% incorporation (Treatment A) was found more acceptable than the other two treatments (B and C). Significant difference (P<0.05) was demonstrated among all the treatments of rice bran supplemented sev whereas a non significant difference was reported in treatment A (Table 5).

**Table 4: Nutritional Value of Different Treatments of Rice Bran Supplemented Sev per 100g**

| S. No. | Treatments / Nutrients | S (Control, 0%) | A (10%) | B (15%) | C (20%) |
|---|---|---|---|---|---|
| 1 | Protein(g) | 17.68 | 16.95 | 16.59 | 16.22 |
| 2 | Fat(g) | 19.76 | 20.82 | 21.35 | 26.88 |
| 3 | Carbohydrate(g) | 50.83 | 49.69 | 49.12 | 48.55 |
| 4 | Energy(Kcal) | 451.20 | 453.30 | 452.35 | 445.40 |
| 5 | Calcium(mg) | 47.60 | 48.70 | 49.25 | 49.80 |
| 6 | Iron(mg) | 4.5 | 7.48 | 8.96 | 10.45 |

**Table 5: Effect of Rice Bran Incorporation on Organoleptic Characteristics of Rice Bran Supplemented Sev**

| Sensory Characteristics of Treatments | Appearance/Color | Texture | Flavour /Taste | Overall Acceptability |
|---|---|---|---|---|
| S (Control) | 8.52±0.37 | 8.15±0.54 | 8.52±0.52 | 8.4±0.33 |
| A (10%) | 8.84±0.103[NS] | 8.47±0.27[NS] | 8.81±0.25[NS] | 8.71±0.12[S] |
| B (15%) | 6.39±0.78[S] | 6.19±0.33[S] | 6.48±0.398[S] | 6.36±0.43[S] |
| C (20%) | 4.69±0.29[S] | 5.05±0.24[S] | 5.36±0.51[S] | 5.04±0.197[S] |

Values: Mean ± Standard Deviation
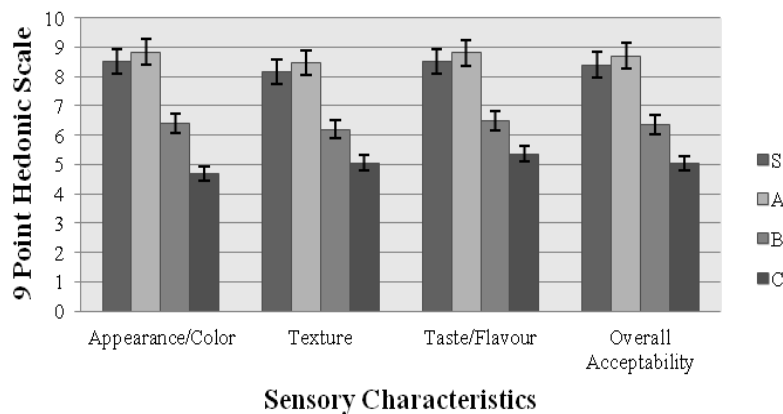S: Significant (<0.05)
NS: Non Significant (>0.05)



**Figure 2: Organoleptic Evaluation of Rice Bran Supplemented Sev**

**CONCLUSION**

The conclusion of this study is that 10% rice bran incorporated food products is more acceptable in terms of sensory attributes as well as nutritionally and hence it is used in the different home-made food products and improves the health of human being. It has abundant sources of nutrients but in our study it is particularly rich in fiber, calcium and iron as compared to control thus beneficial to all age groups. Besides nutritious these home-made products are economical to prepare in comparison to other nutrient supplements which are highly priced and not within the reach of below poverty line population.

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