

## ORGANOLEPTIC PROPERTIES OF DEVELOPED MULTIGRAIN FLOUR MIX - A FUNCTIONAL FOOD

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### ABSTRACT

**Background:** Functional foods are foods that provide additional physiological or health promoting benefits beyond the functions of nutrients contained in foods<sup>4</sup>. Functional food is a balanced formulated product created to deliver all the nutrients in per ordained proportions. **Objectives:** to develop multigrain flour blends using very strong functional ingredients and to assess its desirable rate of supplementation in common breakfast recipe i.e. chapatti. **Methodology:** Three very strong functional ingredients soybean, oats and Psyllium husk were selected to develop the four flour blends, these blends mixed with wheat flour to prepare chapatti and sensory evaluation was conducted. Most accepted flour blend was further tested using sensory technique to find out desirable range of supplementation. **Result:** After first evaluation variation 1 was selected as most acceptable product when compare to basic as evident from ANOVA at 5% level of significance. Variation 1 was further mixed in wheat flour in different ratios to find out desirable range of supplementation, in the second sensory evaluation chapatti made of variation 1 and wheat flour 70:30 ratio was found to be comparable with basic. No statistical difference was observed at 5% level of significance as evident from ANOVA. **Conclusion:** Results indicated that the development of value added products using functional ingredients may benefit consumers who are looking for healthy food alternatives.

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### INTRODUCTION

Functional foods can be considered to be those whole, fortified, enriched or enhanced foods that provide health benefits beyond the provision of essential nutrients (e.g. vitamins and minerals), when they are consumed at efficacious levels as part of a varied diet on a regular basis (C M Hasler 2002). Functional foods include whole foods, fortified, enriched or enhanced foods. Some foods that have been traditionally ascribed health benefits are milk, turmeric, fenugreek, cloves, chilies, amla, garlic, apple, soybean, barley etc. (Ramesh C K *et al* 2012). Public health issues related to diet and nutrition have received a lot of attention recently and many food companies now factor functional foods in their strategies. Functional foods are designed both to meet the daily nutritional requirements of healthy individuals with different life styles as well as are targeted to address specific health issues such as obesity, diabetes anemia etc. (gurupreetkalsi 2012). In most countries there is no legislative definition of the term and drawing a border line

between conventional and functional foods is challenging even for nutrition and food experts (IstavanSiro *et al*). In India, several terms like functional foods or nutraceuticals are used for foods used that have special dietary uses. Functional foods should have the sensory properties i.e., taste, flavor, satiety as well. With its strong tradition of eating healthy foods, India ranks among the top ten nations in buying functional foods and the market size is expected to nearly double in the next five years. Consumers now being more aware and interested in improving the quality of their diet and thereby life, want to make an informed choice. (Dr. Ana Abraham Sinha 2012). In so many available brands labelled as functional foods, supplementation rate of functional ingredients is as below as 7-12%. This study was undertaken to develop a functional food with a higher percentages of functional ingredients suitable for incorporating in daily Indian breakfast recipe.

### MATERIALS AND METHODS

**Selection and procurement of ingredients:** three very strong functional ingredients soy bean, oats and psyllium husk were selected to develop functional flour mix and soya and green gram dhal was also mixed to complement these ingredients.

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Sorghum (pearl millet) is rich source of fiber and green gram dhal is fair protein source. Addition of these ingredients not only enhances the nutritive value of product but also improve the quality of protein by mutual supplementation. Rolled Oat meal, germinated soybean flour and Psyllium along with sorghum and green dhal were purchased from local market and placed in airtight container till further processing.

**Experimental Treatments:** These ingredients were first grounded separately homogenized using sieve and mixed in different proportion to develop 4 flour blends. Cereals and Psyllium husk proportion was kept constant in all four variations soybean flour and green gram quantity were altered to develop four variations. All ingredients were mixed in different ratio to prepare 100g flour on dry weight basis. Table 2 represents Nutrient composition of flour blends. These flour mixes were further mixed with wheat flour in 70:30 ratios to develop a value added multigrain flour blends and this was further made into Indian flat bread i.e. chapatti.

**Organoleptic evaluation of value added chapatti:** Sensory evaluation has been defined as the scientific method use to evoke, measure, analyze and interpret those responses to products as perceived through the senses of sight, smell, Touch, taste and hearing (Ranganna 1992).

Quality attributes were assessed using sensory evaluation technique by 61 trained and untrained (consumer) panel members. Panel members were selected based on following criteria:

Healthy adult (male and female) aged between 18-45 years, individuals with normal taste sensitivity. It was made sure that no participants had any past history of allergic reaction with any ingredients used in the product. Sensory evaluation was conducted at 11 o'clock well before lunch time so as to make sure panel members will neither be too hungry or full and evaluation will be correct.

Recipe (chapatti) was served in a clean hygienic room free from smells and dirt etc. clean drinking water were placed so as to facilitate rinsing the mouth after tasting each product.

### Statistical Analysis

Statistical analysis was performed with SPSS version 6. Data represented as mean and standard deviation unless stated differently. One way analysis of variance was used to compare the means.

## RESULTS AND DISCUSSION

For selecting the acceptable product chapatti supplemented with multigrain flour blend subjected to organoleptic evaluation by a panel of 61 semi trained and trained members. Sensory evaluation were conducted using 5 perceivable sensory attributes like appearance, taste, flavor etc. on 5 point Hedonic rating score card, to assess the quality of the product where maximum score of 5 was rated as excellent and minimum score 1 was rated as poor. There was no significant difference observed in terms of appearance, flavor, taste and Overall acceptability of basic and variation 1, 2, 3 and 4 as evident from ANOVA, level of significance was reported at ( $P \geq 0.005$ ). A significant difference was found in terms of texture of variation 4 when compared to basic at 0.033. Whereas the variation 1, 2, 3 were found to comparable with basic with significant difference (Figure 1). Variation 1 got the highest rank in terms of texture, flavor, overall acceptability hence found to be the most accepted and highly comparable with the basic chapatti. The reason for this might be soybean flour content which is comparably low in this variation which mostly imparts bitter after taste to the recipe. Nutrient composition of composite multigrain flour blends were calculated using Indian food composition tables, NIN ICMR (Table 2). Protein composition of variation 2 and 4 were found to be comparably higher than the variation 1 and two. Variation 4 had maximum fiber than all other blends. Least fat content was found in variation 1.

**Table 1. Mean sensory scores of multigrain chapatti (n= 61)**

	Appearance	Texture	Flavor	Taste	Overall Acceptability
CONTROL WF :: 100%	4.5± 0.868	3.93±0.92	4.1±0.84	4.15±0.9	4.12±0.75
VARIATION 1	4± 0.887	3.93±0.94	3.84±0.91	3.79± 0.98	4.02±0.859
VARIATION 2	3.45± 0.905	3.65±0.98	3.89±0.96	3.65± 0.1	4±0.91
VARIATION 3	3.85± 0.955	3.71±0.93	3.84±0.91	3.01*±1.04	4.02±0.86
VARIATION 4	4.2± 0.727	2.92*±0.58	3.75±0.35	3.75*±0.55	3.19±0.39

Scores grading poor -1, satisfactory -2, good -3, very good - 4, excellent -5.  
Values represented as mean and standard deviation, WF = Wheat Flour

**Table 2. Nutrient composition of multigrain flour blends**

	Variation 1	Variation 2	Variation 3	Variation 4
Energy (Kcal)	364.79	369.94	367.31	372.47
Protein (g)	17.067	18.62	17.92	19.32
Fat(g)	6.32	8.132	7.23	9.04
Carbohydrate (g)	58.49	44.25	56.37	52.12
Fiber (g)	18.14	19.46	18.85	20.12
Iron (mg)	3.90	4.39	4.11	4.62
Calcium (mg)	59.14	74.32	66.73	81.92

**Table 3. Standardized Recipe of Multigrain Chapatti**

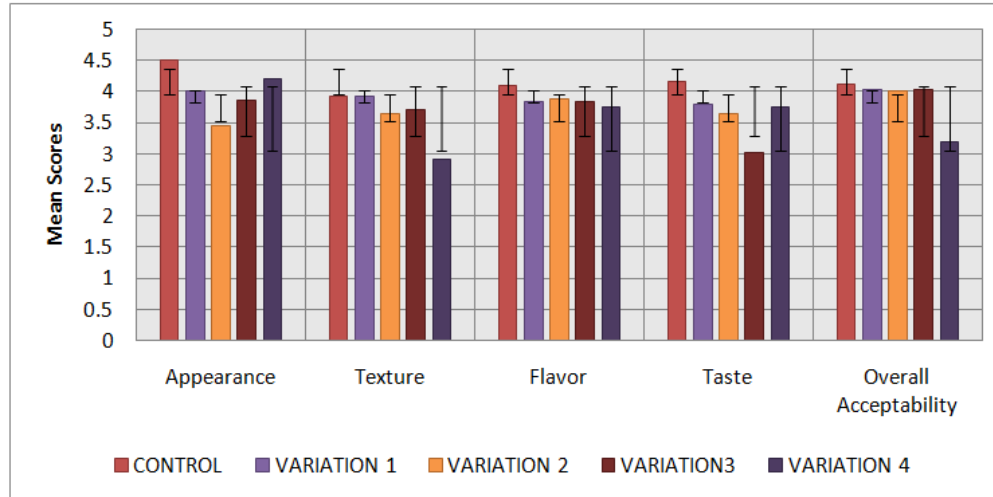
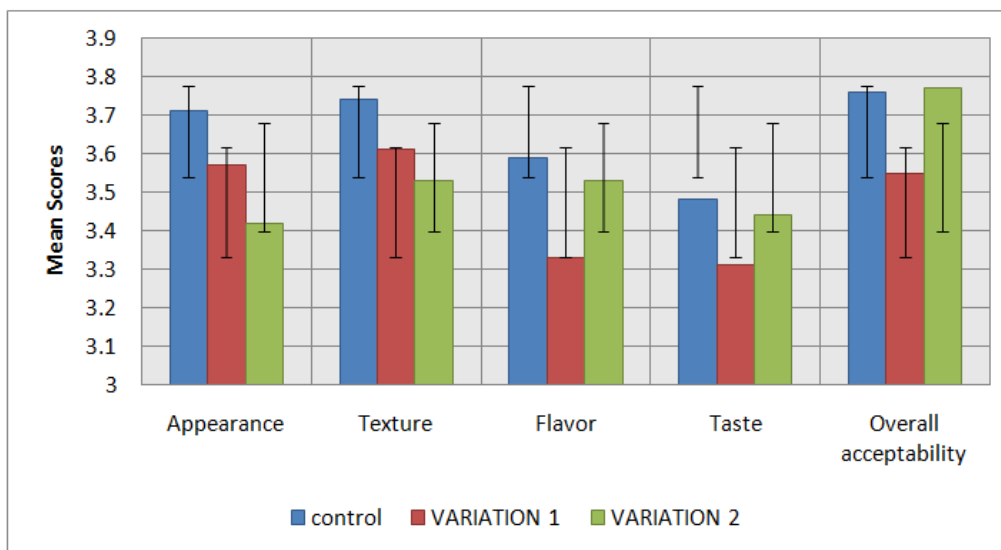
	Wheat flour (g)	Multigrain flour blend (g)	Total (g)
Variation 1	60	40	100
Variation 2	70	30	100

**Table 4. Mean sensory scores of multigrain chapatti**

n=86

	Appearance	Texture	Flavor	Taste	Overall Acceptability
Control (WF: 100%)	3.71±0.86	3.74± 0.901	3.59± 0.09	3.48±0.101	3.76±0.097
VARIATION 1	3.57±0.08	3.61± 0.811	3.33 ± 0.96	3.31 ± 0.09	3.55 ± 0.841
VARIATION 2	3.42 ± 1.00	3.53 ± 0.85	3.53 ± 1.03	3.44 ± 0.96	3.77 ± 1.47

Scores grading poor -1, satisfactory -2, good -3, very good - 4, excellent -5.  
Values represented as mean and standard deviation. WF= wheat flour

**Figure 1. Mean sensory scores of control and of multigrain chapatti****Figure 2. Mean sensory score of multigrain chapatti and control**

The most accepted variation i.e. variation 1 was further subjected to sensory evaluation to find out suitable rate of supplementation. The recipe of chapatti was first standardized table 3. Two variations of chapatti prepared with multigrain flour blends and control (100% wheat flour) were presented to the panel of 86 members to sensory evaluation (Table 3). There was no significant difference among the recipe in different sensory characteristics tested as well as overall quality as evident from ANOVA. A level of significance was reported at ( $P < 0.05$ ). Variation 1 had got the highest rank in terms of texture, flavor, overall acceptability after basic preparation i.e. chapatti hence considered as highly comparable with the basic chapatti.

### Conclusion

The present study was conducted to develop a value added functional flour blends which can be supplemented in a regular

breakfast recipe to enhance the nutrient density of individual's diet. Multigrain flour blends were safely supplemented in the preparation like chapatti without much altering the taste having an added advantage of functional ingredients with various health benefits. Thus it is recommended that this flour blend can be supplemented in regular preparation on household as well as commercial level.

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