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Development of protein enriched multigrain wheat flour

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Abstract
Good nutrition requires a satisfactory diet, which is capable of supporting the individual consuming it, in a state of good health by providing the desired nutrients in required amounts. It must provide the right amount of fuel to execute normal physical activity. If the total amount of nutrients provided in the diet is insufficient, a state of under nutrition will develop. The council of food and nutrition American medical association defines nutrition as "the science of foods, the nutrients and the substances there in their action, interaction and balance in relation to health and disease. Nutrition can help prevent disease and promote health, nutrients include proteins, carbohydrate, vitamins, minerals and fats and water. The grain flour in combination with wheat flour made in to chapatti with would provide a diet rich in protein, fiber and carbohydrates." Entitled Development of Protein Enriched Multigrain Wheat Flour" The study has been taken up as an experimental work. The entire experiment was conducted in the Department of Home Science Gandhigram Rural Institute-Deemed University Gandhigram. Ten grains excluding wheat were selected based their nutritive value wheat, varagu, samai, maize, horsegram, wholegram, bajra, cowpea, brownrice, soyabean, greengram, Multigrain chapathi enriched with protein was developed found significant changes, in taste, and flavor and texture.

Keywords: nutrition, protein, wheat flour, nutritive value

Introduction
Nutrition is the study of component of food and how they are used by the body to sustain life and health [4]. Nutrition is the science that deals with all the various factors of which food is composed and the way in which proper nourishment is brought about. The average nutritional requirements of group of people are fixed and depend on such measurable, characteristics such as age, sex, height, weight, degree of activity and rate of growth. The word protein is derived from the Greek word *Prtoso* meaning "first". Protein is the basic chemical unit of livening organisms and is essential for nutrition, growth and repair [1]. Wheat is a good source of protein and fiber. It contains carbohydrates 78.10%, protein 14.70%, fat 2.10%, minerals 2.10%. The nutrient content of grains is affected by many factors including grain variety (genetic factors), growing location (agronomic conditions) and the season (environmental factors). These factors leads to loss of essential nutrients, and also through processing of cereals and grain. Due to the loss above said factors protein was found low in Atta/flour. Hence the ingredients like enrich the wheat flour with protein fiber. By using wheat, samai, varagu, green gram, horse gram, soya bean, and cowpea protein enriched chapatti helps to promote the good health and to prevent the disease like Protein Energy Malnutrition.

Materials and Methods
The materials and methods adopted for Development of Protein Enriched Multigrain Wheat Flour. The entire experiment was conducted in The Department of Home Science Gandhigram Rural Institute-Deemed University. Ten grains including wheat were selected based on their nutritive value wheat, maize, ragi, horsegram, green gram, samai, varagu, cowpea, soybean, brownrice, were purchased from local market nilakottai. Millets such as bajra (pennistum typhodeum), thenai (setaria italic), varagu (pospolum suobiculatuohm) and white oats (graminae) are rich source of fiber and complex carbohydrates.

The grain flour in combination with wheat flour made in to chapathi with would provide a diet rich in fiber and complex carbohydrates [3]. The present study was under taken to standardize recipes incorporating millet flours, like the bajra, thenai, varagu and white oats to prepare chapatti assess the glycemic index of the millets flour incorporating chapatti and evaluate the glycemic response of the standard chapatti type II diabetic.

Table 1: Equipments used in the study

S. No	Equipments	USED
1	Muffle furnace	Ashing of sample
2	Centrifuge	Analytical work
3	Hot air oven	Heating
4	Weighing balance	Weighing chapatti chemicals and sample for
5	Electronic balance	Weighing the nutrient analysis
6	Spectrophotometer	Reading measures

Weighing balance, stainless steel vessels, on stick tawa, chapathi pressing, measuring spoons, measuring jar were used. Analytical reagent (AR), laboratory (LR) and distilled water was conducted by step wise form the selection of grains, cleaning and washing, sundried, dough (ball 20g). Sensory evaluation and analysis of the nutrient content(wet gluten percentage, protein, fiber).

The proportions of wheat flour was 500grams for control group for MGF(I) group it was 340g and for MGF(II) experimental group it was 300g and also the investigator added varagu, samai, bajra, cowpea, horsegram, green gram, brown rice, soya bean for MGF I. In MGF II the investigator mixed MGF I added, maize, ragi and the proportions are indicated in table -2

Table 2: The Proportion of Control Group and Experimental Group

S. No	Grains	Control(w)(g)	MGF I	MGF II
1	Wheat	500	340	300
2	Varagu	-	20	20
3	Samai	-	20	20
4	Maize	-	-	20
5	Bajra	-	20	20
6	Cowpea	-	20	20
7	Horse gram	-	20	20
8	Green gram	-	20	20
9	Brown rice	-	20	20
10	Soya bean	-	20	20
11	Ragi	-	-	20
Total weight		500	500	500

(MGF I-Multigrain Wheat Flour-I, MGF-II-Multigrain Wheat Flour-II)

Chapatti were prepared from control (w) MGF-Experimental-I and MGF-Experimental- II. The dough was prepared by measuring 100g of each variety and kept aside for 30 minutes the dough was then made into smaller balls weighing 20grams.Each ball was rolled manually in to thin chapatti (14cm diameters and 2mm thickness), then chapatti were baked on non stick tawa (for 1 minute on each side) and later allowed to puff completely.

Table 3: Nutrient Composition of Multigrain Wheat Flour

S. No	Variations	Protein composition of MGF100g	Fiber composition of MGF 100g	Percentage of gluten 100g
1	Control(w)	32.2	13.3	25.5
2	MGF I	43.6	10.4	4.1
3	MGF II	46.8	12.7	0.2

As indicated in the table-3 the protein composition of the control (w) MGF-I, MGF-II variation was about 45.2/100g repectively. Only MGF-I variation was found high in protein as 43.6g/100g as compared to the rest. Multigrain wheat flour. MGF I was found to posses low in fiber as 10.4 g/100g and MGF II (12.7g/100g) variation was found very low in fiber this might be due to the fact that MGF II,MGF I was mixture of whole wheat flour with samai, bajra, greengram, horse gram, brown rice, cowpea flours, protein content may resulted very high. This kind of chapatti will be good for protein energy malnutrition, children and elderly people diet. Regarding the percentage of gluten content of MGF I and MGF II. The control group possessed high gluten content (25.5/100g). while the all other developed MGF was found to be low in gluten.

Table 4: Evaluation of the Multigrain Wheat Flour (Control Vs MGF I)

Variations		Control N = n = 30					MGC (I) (n = 30)				
		✸	✸✸	✸✸✸	✸✸✸✸	✸✸✸✸✸	✸	✸✸	✸✸✸	✸✸✸✸	✸✸✸✸✸
Appearance	Sensory evaluation	10	12	5	3	-	3	3	12	5	7
	t value 4✸										
Taste	Sensory evaluation	6	15	8	1	-	2	5	10	9	4
	t value 4.610✸										
Flavor	Sensory evaluation	9	13	7	1	-	4	3	9	12	2
	t value 5.138✸										
Texture	Sensory evaluation	6	16	7	1	-	2	5	10	10	-
	t value 4.539✸										
Overall acceptability	Sensory evaluation	6	16	5	3	-	2	6	10	9	3
	t value 2.558✸										

From table 4-it was observed that there was no significant difference in the appearance of MGF I flour there was no difference among the control and experimental chapatti MGF I. Since the statistical "t" value (4) is higher table (2.365) value. Further it was found out that the taste (4.610), flavor (5.138), texture (4.539) and over all acceptability (2.558) had less than the table value (2.365). Hence was concluded that there was significant difference in taste, flavor, texture and overall acceptability of multigrain wheat flour (MGFI).

Table 5: Evaluation of the Multigrain Wheat Flour (Control Vs MGC II)

Variations		Control (N) n = 30					MGC (I) (n = 30)				
		✸	✸✸	✸✸✸	✸✸✸✸	✸✸✸✸✸	✸	✸✸	✸✸✸	✸✸✸✸	✸✸✸✸✸
Appearance	Sensory evaluation	10	12	5	3	-	3	13	4	4	3
	t value 2.558✸										
Taste	Sensory evaluation	6	15	8	1	-	3	8	7	6	5
	t value 4.352✸										
Flavor	Sensory evaluation	9	13	7	1	-	4	8	8	6	4
	t value 4✸										
Texture	Sensory evaluation	6	16	7	1	-	7	3	7	8	3
	t value 4.868✸										
Overall acceptability	Sensory evaluation	8	16	5	3	-	3	8	9	6	4
	t value 4.539✸										

It was observed from the table-5 that in the case of MGFII wheat flour there was significant difference among the control and experiment wheat flour (MGF II) In the appearance (2.558), taste (4.352) and overall acceptability (4.539) their respective statistical "t" value had the "t" value than the table value (2.365). Further it was found out that the flavor (4) and texture (4.868) had lower the "t" value (2.365). Hence it was conducted that there was a significant difference in flavor, and texture, overall acceptability of multigrain wheat flour (MGFII) [2]

Conclusion

Optimum nutrition may be defined as a process of taking appropriate amount of nutrition with proper schedule of to attain the best performance and for getting the life time longevity for good health. Multigrain wheat flour prepared from those raw materials which is easily available rural area. The protein enriched multigrain wheat flour was prepared from a mixture of ten excluding wheat grains, which makes it highly nutritious. It is nutritious, economical and attempts to meet required nutrients which are added for the maintenances of health. The multigrain flours add to the taste of rotis and parthas, thereby making them very soft, owing to its nutritional value. It is helpful in controlling various diseases with special references to metabolic syndrome.

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