



Formulation and Standardization of Vegetable Crunches by Incorporating Guar gum

KEYWORDS

Guar gum, Food Industry, Fiber and Standardization.

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ABSTRACT Guar gum is a novel agrochemical processed from endosperm of cluster bean. It is largely used in the form of guar gum powder as an additive in food. Industrial applications of guar gum are possible because of its ability to form hydrogen bonding with water molecule. Thus it is chiefly used as thickener and stabilizer. It is also beneficial in the control of many health problems like diabetes, bowel movements, heart disease and colon cancer. Consumer appeal for ready to eat products in forecast to grow rapidly over the next five years as consumer demand convenient snack with exciting sensory and textural properties. Hence an attempt has been carried out to develop ready to eat snack "Vegetablecrunches" by incorporating guar gum. Various trials were carried out using different proportions of guar gum powder. All the samples were subjected to sensory evaluation with trained panel. The formulation which was acceptable by majority of panel was chosen as standardized formulae. The nutrient composition of the product was assessed by using the Nutritive Value of Indian Foods. The acceptability studies were carried out with different age groups. The results reveal that the fiber rich vegetable crunches were highly acceptable by all age groups. The incorporation of guar gum, beans, carrot and peas enrich the nutrient composition especially fiber content of the product. Now a days the consumers are giving importance to the products which were good for health, easy to digest, natural ingredients less in spices and additives, price and at the same time tasty.

Introduction:

Guar gum, a natural gum, is an edible thickening agent extracted from the guar bean. Guar beans have a large endosperm which contains galactomannan gum which forms a gel in water. The guar bean is principally grown in India, Pakistan, US, China, Australia and Africa (Chandirami, 1957). India produces 2.5-3.5 million tonnes of guar annually, making it the largest producer with about 80% of World production. Chemically, guar gum is a polysaccharide composed of the sugars galactose and mannose. The backbone is a linear chain of B 1, 4 – linked mannose residues to which galactose residues are 1, 6 – linked at every second mannose, forming short side- branches. Guar gum is more soluble than locust bean gum and is a better stabilizer, as it has more galactose branch points. Unlike locust bean gum, it is not self- gelling. The largest market for guar gum is in the food industry (FDA.gov). In the US, different percentages are set for its all allowable concentration in various food applications. Xanthan gum and guar gum are the most frequently used gums in gluten – free recipes and gluten – free products. In baked goods, it increases dough yield (NOW Foods), in dairy products it thickens milk, in condiments it improves the stability, in canned soup it is used as a thickener and stabilizer. It is also used in dry soups, instant oatmeal, sweet desserts, canned fish in sauce, frozen food items and animal feed. Consumer appeal for ready to eat products in forecast to grow rapidly over the next five years as consumer demand convenient snack with exciting sensory and textural properties. Consumers are giving more priority to health beneficial foods. Guar gum has been considered of interest in regard to both weight loss and diabetic diets. It is a thermogenic substance (JC Brown et.al 1994). Guar gum, though, is also capable of reducing the absorbability of dietary minerals (other than calcium), when foods or nutritional

supplements containing them are consumed concomitantly with it, but this is less of concern with guar gum than with various insoluble dietary fibers. However, there exists a potential to manipulate the nutrient composition of extruded RTEs by altering the digestion potentials of starch and protein and by the incorporation of bioactive components such as dietary fiber.

Materials and Methods:

Vegetable crunches are ready to eat crunches prepared by using various ingredients and different compositions of guar gum powder. Beans, carrot, green peas, ghee, chillipowder, salt, refined flour, ginger garlic paste were purchased from local supermarket in Tirupati. Guar gum was procured from Pharma foods, Chennai. Beans, carrot, green peas were washed with clean tap water to remove extraneous matter such as dirt, dust and pesticide residues. Then beans, carrot were made into small pieces. The vegetables and peas were boiled for 15 minutes. Refined flour was mixed with baking powder and guar gum was added. The desirable quantities of fat were mixed thoroughly and boiled vegetables, spices were added to flour mix. The whole mixture was made into pliable dough. The prepared dough was made into desired thickness and shapes and subjected to baking at 175°C for 20 minutes. The formulations designed using various proportions of ingredients to standardize the product are presented in Table 1.

Table 1: Composition of various samples for standardization of the product

S. NO	Ingredients	Sample -1	Sample -2	Sample -3
1	Guar gum powder(g)	5	10	15
2	Refined flour (g)	20	20	20
3	Beans(g)	20	20	20
4	Carrot(g)	20	20	20
5	Peas(g)	15	15	15
6	Fat(g)	5	5	5
7	Ginger garlic paste(g)	10	10	10
8	Chilli powder (g)	5	5	5
9	Salt	A pinch	A pinch	A pinch

Three different samples were worked out to develop fiber rich vegetable crunches in laboratory. In sample -1 flour, bean, carrot and peas were taken in the ratio of 20:20:15 and 5 g guar gum powder was added. In sample- 2 flour, bean, carrot and peas were taken in the same proportion as sample-1 but guar gum powder was increased to 10gm respectively. The ratio of ingredients in sample -3 20:20:20:15 and 15 g of guar gum powder was added to it. All the samples were subjected to sensory evaluation with trained panel. Five point hedonic scale was used for sensory evaluation. Sample-3 got highest score for overall acceptability, Hence that formula was standardized in terms of ingredients and procedure. Nutrient composition of the product was calculated using nutritive value of Indian foods (Gopalan C, 2004).

Results and Discussions:

The formulation in terms of ingredients used to develop value added crunches is presented in Table 2.

Table 2: Composition of fiber rich vegetable crunches

S.NO	Ingredients	Quantity
1	Guar gum powder(g)	15
2	Refined flour (g)	20
3	Beans(g)	20
4	Carrot(g)	20
5	Peas(g)	15
6	Fat(g)	10
7	Ginger garlic paste(g)	10
8	Chilli powder (g)	5
9	Salt	A pinch
	Baking time	175°C/20 minutes

Among various formulations tested in the laboratory to obtain desirable product attributes, the formulae (Table-2) was chosen to standardize the product. This process was made after through evaluation of organoleptic properties of the product by trained panel. The standardized formulae was applied to develop the product in the laboratory. Adolescents and adults were chosen as community panel to evaluate the product. They were given the instructions about scoring produce to evaluate the product. The developed crunches were subjected for sensory evaluation by two different age groups. The sensory scores obtained by the panel are presented in table -3.

Table 3: Sensory Evaluation of fiber rich vegetable crunches

S.No	Sensory Attributes	Panel Members	
		Adults	Adolescents
1	Appearance	5.0	4.9
2	Color	4.7	4.9
3	Flavor	4.5	3.8
4	Taste	5.0	4.8
5	Texture	4.9	4.7
6	Mouth Feel	4.8	4.9
7	Overall acceptability	4.6	4.6

The sensory scores obtained to all the attributes by different groups of panel were almost similar. The vegetable crunches which were prepared from different vegetables impart very good color and taste to the product. Guar gum binds all the ingredients together and appears well. Hence the scores the maximum for majority of the attributes and both groups were well accepted the product.

Guar gum is not only used as a stabilizer and binding agent in the product development, it also provides nutritional benefits to the product. The nutrient composition of the product is presented in table – 4.

Table No 4: Nutrient Composition of fiber rich vegetable crunches

S.No	Nutrients	Amount
1	Energy(k.cal)	283.2
2	Protein(g)	7.04
3	Fat(g)	9.69
4	Fiber(g)	16.01
5	Calcium(mg)	87.1
6	Vitamin-A (µg)	423.5
7	Iron(mg)	2.89

The nutrient composition of fiber rich vegetable crunches were calculated using the Nutritive Value of Indian Foods (Gopalan et al.)The essential nutrients like energy, protein, fat, fiber, calcium and vitamin – A were calculated and presented in Table 4. Vegetable crunches (100g) contains 283.2k.cal, 7.04 g of protein,9.7 g of fat,16.01 g of fiber,87.1 mg of calcium and 423.5µg of vitamin –A.The Indian adult RDA for Fiber,Calcium,Iron and Vitamin-A was 37g,400mg,28-30mg and Vitamin-A 2400µg per day.The product meets the 43% of fiber,20% of calcium,17.6% of Iron and 9.6% of Vitamin-A of RDA per day for the adolescence.

Dietary fibers are considered as important nutritive component for human health and especially water soluble dietary fibers have received much attention due to its various physiological functions. A WHO study group has recommended a daily intake of about 37 g total dietary fiber. Incorporation of guar gum powder in the product enriched the fiber content.

The fiber present in the product will meet almost 43% of the daily intake. Mostly the snacks available in the market were rich in carbohydrates, protein and fat. But they

were lack in vitamins and minerals especially fiber. Vegetable crunches with guar gum will provide the most important nutrients and the product was acceptable by all age groups. Vegetable crunches can suggest as an ideal snack for health conscious consumers.

Conclusion

Health plays an important role in day to day life from time immemorial. People are becoming more health and nutrition conscious. Food industry has been spending lot of effort in designing health products to meet the demands of the people. Guar gum is an important agrochemical containing numerous health benefits. Vegetable crunches are ready to eat Indian food which is acceptable by all age groups. The incorporation of guar gum powder into crunches enhanced the nutritive value especially the fiber content of the product.

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