

# Development of Nutritionally Enriched Khakhra

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## ABSTRACT –

Snack foods, being one of the major food categories of the global health and wellness market, are becoming a major focus of new product development in the food industry. Generally, a snack is a smaller portion of food than our regular meal can consume between meals. Snacks are of different varieties can make quickly, satisfy the consumers, less perishable, more durable and more portable than prepared food. Khakhra is a very thin, crispy, crunchy, healthy and flavoured snack product usually served as a breakfast dish and mostly common in the Gujrat and Rajasthan. The present study was conducted to determine the sensory quality and nutrient content of khakhra prepared with the incorporation of rajma flour (Kidney beans) as a protein source and Spinach as it is rich in iron and has many health benefits. This khakhra were prepared by using 700 g wheat flour, 300 g rajma flour and 500 gm spinach leaves paste along with some spices, and veg Manchurian seasoning is also used. This nutritionally enriched khakhra were evaluated organoleptically using nine point scale. It provides (195.9) Kcal energy, (5.2 g) protein, (42.2 g) carbohydrates, (0.7 g) fat, (4.9 mg) iron, (3.0 mg) calcium, and (1.8 %) moisture as compared to control khakhra. Thus, the results of the present study suggest that the incorporation of Rajma flour and Spinach paste improves the nutritional quality of the product.

Key words - *Indian Traditional Snacks, Rajma flour, protein, Iron*

## INTRODUCTION

Snack food is a portion of food which is smaller than regular meal and can be consumed between meals. It is convenient because it is quick and easy to eat. Snack food comes into variety such as processed food and traditional foods. Most of the snack foods are intended for immediate consumption and have shelf life of 1-2 days only. Mostly sold in loose, without packaging, or in small polythene or paper packages. The shelf life can be extended by using adequate packaging. Generally, Snack foods is considered unhealthy and should be avoided but same can be made nutritious if enriched with addition of fruits, vegetables, pulses or cereals into it which. It will not only solve health problems but also provide sufficient energy. (2,5) Therefore, an attempt to make local snacks item nutritious and if these snack foods are made part of diet it will be beneficial for poorer strata of our society.

Khakhra is a thin cracker common in the Gujarati and Rajasthan cuisines of western India, especially among Jain community. It is traditionally made from wheat flour and oil. Khakhra are individually hand-made and roasted to provide a crunchy and healthy snack that can be enjoyed with a selection of spicy pickles and sweet chutneys. Khakhra is made in several varieties, such as *methi* (fenugreek), *jeera* (cumin), *bajri*, *pu dina*, garlic and *ajwain*, are among others. There are variations in the method of preparation, but generally the following method is observed. Wheat flour (and/or refined flour), salt and masala are mixed. Oil, water or milk are added and kneaded to make a soft dough. This dough is then rolled into small balls and flattened. These are then roasted over low heat and pressed via wooden press, until crisp and light brown in color. (1) The traditional Khakhra is enriched with protein by adding kidney bean flour. The nutritional and medicinal value of Kidney beans makes it suitable diet for asthma and diabetes patients, boosting their immune system. Such enriched Khakhra are great source of vitamin, minerals, proteins, dietary fibers and iron. It contains antioxidants that are beneficial to our health. Consumption of kidney beans on regular basis is good for hair and skin. These legumes are tasty and nutritious. They provide support for proper functioning of the nervous

system and brain (3). Red kidney beans have low sodium content and saturated fatty acids but are rich in unsaturated fatty acids (linoleic acid) (6). They are also a good source of soluble and insoluble dietary fiber and display health benefits, which include reduced risk of heart disease and colon cancer (7). However, red kidney beans' nutraceutical value is yet to gain popularity in the prevention of chronic diseases (8)

Spinach provides good amount of vitamin B6, riboflavin, folate, niacin, soluble dietary fibers and minerals. Spinach is rich in iron which prevents from diseases like osteoporosis, anemia which are result of iron deficiency (4).

Nutri khakhra was prepared by adding wheat flour, kidney bean flour and spinach paste (7,3,7 %) along with oil, water and some spices, green chili paste, lime, salt as per taste. Soft dough was prepared. After resting it for 20 mins it was sheeted into 1mm thick sheet and given circular shape. Khakhra was precooked on low flame and then cooled at room temperature. Baking was done at 160°C temperature for 3-4 mins from both the sides, again cooled at room temperature and then packed in vacuum package and this change in production process enhanced the shelf life of 90 days.

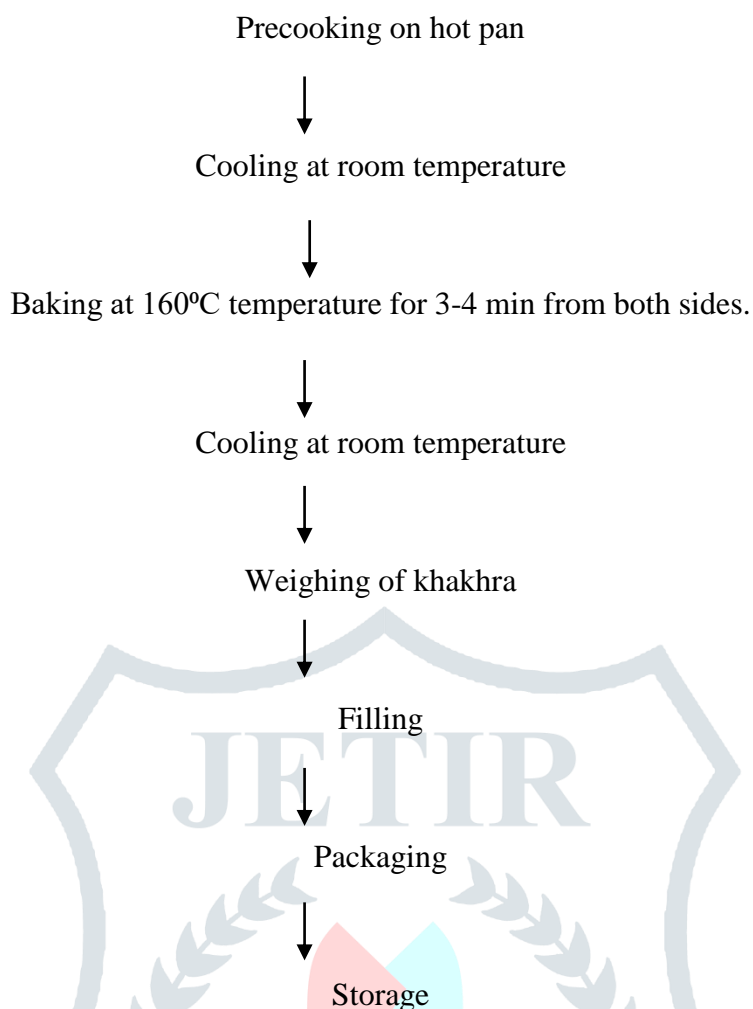
## METHODOLOGY

### Selection of ingredients for enrichment

To ensure that the cost of raw material is within limits and also keeping commercial viability in mind the ingredients are selected in such a way that they are available in local market at reasonable cost.

## PROCESS FLOW CHART





#### **Organoleptic evaluation of nutri khakhra:**

The organoleptic evaluation of prepared khakhra was conducted to find out maximum level of incorporation of selected nutritious ingredients such as red kidney bean flour and spinach.

#### **Sensory evaluation of nutri khakhra:**

Nutri khakhra was prepared with different levels of incorporation of selected nutritious ingredients. All the selected panel members were requested to evaluate the developed nutri khakhra. The judges were requested to score the recipes for different sensory characters namely color and appearance, taste, texture, flavor, mouth feel, overall acceptability by using nine point hedonic scale. Highly accepted variations were selected for nutritional analysis and shelf life study.

#### **Nutrient analysis of nutri khakhra:**

Nutrient analysis of nutri khakhra was done by chemical analysis in the laboratory. Various parameters considered for nutrient analysis were total energy, moisture, protein, carbohydrate, fat, ash, iron and calcium.

#### **OBSERVATION AND ASSESSMENT:**

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads:

### Organoleptic evaluation of nutrients enriched nutri khakhra:

Nutrients enriched nutri khakhra was prepared by incorporating wheat flour, red kidney bean flour, spinach paste at different levels such as variation 1 (7, 3, 4); variation 2 (6,4,5); variation 3 (5,5,6); variation 4 (7,3,7) percent. The prepared nutri khakhra was evaluated for various sensory characteristic. The data which gives clear idea about sensory score of nutri khakhra is presented in table no. 1

The sensory score for color of nutri khakhra for studied variation varied from 6 to 8 highest score was observed in variation 4 (8), taste 6.5 to 8.5 and highest score was observed in variation 4 (8.5), texture 7 to 8.5 highest score was observed in variation 4 (8.5), flavor 6.5 to 8.8 highest score was observed in variation 4 (8.8), mouth feel 6.5 to 8.7 and highest score was observed in variation 4 (8.7).

Overall acceptability scores ranged between 6.5 and 8.5 like other sensory parameters the significantly highest score 8.5 was acquire by variation 4. On the whole, it can be said that addition of wheat flour, red kidney bean flour, spinach paste at the rate 7, 3 and 7 percent, respectively this nutri khakhra exhibited better acceptability than other variation. Hence such combination of ingredients for preparation of value-added nutri khakhra stands better.

#### Level of incorporation (%)

Variation	Wheat flour	Kidney bean flour	Spinach puree
1	7	3	4
2	6	4	5
3	5	5	6
4	7	3	7

#### Sensory evaluation-

The sensory evaluation of different organoleptic characteristics i.e., colour and appearance, taste, texture, flavour, mouth feel, and overall acceptability were carried out by semi trained panelists on 9 point hedonic scale with “9 as Like Extremely and 1 as Dislike extremely”. The average score was calculated for individual organoleptic properties. Sensory evaluation is carried out by 10 evaluators for various quality attributes on following scale:

Variation	Colour and appearance	Taste	Texture	Flavor	Mouth feel	Overall acceptability
1	6	6.5	7	6.5	6.5	6.5
2	6.9	7.2	7.5	7.2	7.3	7.2
3	7.5	7.6	6.8	7.9	6.5	7.2
4	8	8.5	8.5	8.8	8.7	8.5

### Nutritional content of nutri khakhra:

As per new norms of FDA and FSSAI, it is mandatory to have nutritional value analysis displayed on food container. Hence same was carried out for nutri khakhra. The result for 100 gm sample is as follows.

The values for basic and value added nutri khakhra were moisture 2 and 1.8 percent, protein 3 and 5.2 percent, carbohydrate 2 and 4.2 percent, fat 0.5 and 0.8 percent, iron 1.1 mg/100 g and 2.5 mg/ 100g, calcium 10.4mg/100 g and 14mg/100g.

Nutrients	Values for traditional product	Values for enriched product
Moisture	2 %	1.8 %
Protein	3 %	5.2 %
Carbohydrate	2 %	4.2 %
Fat	0.5 %	0.8 %
Iron	1.1 mg/100 g	2.5 mg/ 100g
Calcium	10.4mg/100 g	14mg/100g

### Biochemical and Microbial Analysis and Quality Control:

The quality testing is an important aspect of product before releasing into market. The Biochemical and Microbial analysis is established process for snack products testing and same was used for testing this product. The results are acceptable to release the product in market

### CONCLUSION:

Value added Product “Nutri khakhra” can be prepared by incorporating nutritious ingredients. The simple and successful process can be used to improve the essential nutrient content with special reference to protein, carbohydrate, fat, iron, calcium. The developed value added nutri khakhra can be stored for 90 days.

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