

# Production of Spicy Pockets enriched by Omega 3 Fatty Acids and Calcium

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**Abstract-** Snacks are considered as dietary supplement for many consumers who are affected with nutritional related disorders. Hence the aim of this new food product development was to monitor the snacks pattern of consumer during their break-time. This study was also proposed to provide them with the Indian traditional snacks and find the preference of those snacks among the consumers. 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 (NPD) in the food industry. A snack food utilizing multigrain flour as its main ingredient was developed and characterized. Snack product was identified as they are low nutrient content and deep fat fried product with significantly high fat content. Variable samples were prepared by incorporating refined wheat flour, gram flour, rice flour, corn flour, spices, flax seeds, ragi flour etc. Calcium content of Spicy Pockets was almost doubled with the addition of ragi flour. There was an increase in Omega 3 fatty acids in Spicy pocket with addition of flax seeds. Spicy pockets were tried for the proportion of flax seed powder, ragi flour and thus standardized for 10%, 5%, respectively. Study was the most appropriate tool to find out the restoration of Indian traditional snacks among consumers and statistical calculation was carried out. Overall results from this study have shown that the crackers/ wafers were consumed by most of the consumers during their break-time. On the contrary a vast percentage of the consumers preferred our Indian traditional snacks. This study concludes that consumers are in urge to restore our Indian traditional snacks among the consumer..

**Keywords:** Indian Traditional Snacks, Omega -3, fatty acid, calcium.

## I. INTRODUCTION

A snack is a portion of food, which is smaller than a regular meal, it can be eaten between major meals like lunch or dinner of the day (6). There are multiple variations of snacks available in the form of packaged food some are homemade and some are in the form of processed foods. Though these are not major meals but they can impact on health as sometime due to good taste of snack make us to consume it in more quantity causing adverse effect on health (8). Conventionally, the snacks are prepared from those ingredients which are commonly available in the home like fruit, vegetables, nuts, leftover food, bread and sandwiches, etc. are used as snacks (8). With increased working hours, both member of family working it is bit impossible to make meals and snacks at home for all the days. Also spread of convenience stores made the choice available to substitute the home made one. Food processing industry saw business opportunity and they flooded the shops / stores with the snacks products focusing more on taste, convince in handling and less on nutritional value. Snack products are typically designed to be portable, quick, and taste satisfying. Snack foods are designed for convenience, less perishable, more durable, and more portable than prepared foods. To accomplish the perishability and longer shelf life of the food they are mostly added with large quantity of additives like sweeteners, preservatives, and some tempting and attracting ingredients such as chocolates, peanuts, and some flavoring

agents. For example, various types of flavoured potato chips are available in market like, tomato, salted, hot and sour, cream and onion. (11).

Most snack foods are intended for immediate consumption and have a shelf-life of only 1-2 days. Such food products may be sold loose without packaging, or in small polythene or paper packages. If required, the shelf-life may be extended considerably through the use of adequate packaging. There are few other methods to increase the shelf life like frying, baking, roasting etc.

Snack served also reflects on cultural, occasions and have lasting impact on the visitors and guests when offered. Snack foods are made from a wide range of raw materials and the preparation differs from product to product. The selection of ingredients does matter to ensure the food value of snack and impact of same on health of consumer (11).

## II. LITERATURE REVIEW

Snacks acts as a very important source to get energy and nutrients which we required for our daily activities. If we include snacks in our daily diet, surely, it can complete our daily need of many vitamins and minerals. For growing and active children need more energy to grow and play. The snacks provide them extra energy required for their better growth and overall development. There is one more important function of snacks is that it can keep you from getting hungry and overeating during mealtime (12).

Many of the best snack products are found in the lower three levels of the Food Guide Pyramid. Generally, there are very good snack products available like wheat crackers, toast, popcorn, some cereals, breads, cakes and muffins which are made from various food grains. Fresh fruits and vegetables with a low-fat dip made from cottage cheese or yogurt can also satisfy our want for crunchy, juicy and chewy foods. Low fat milk products like yogurt or cottage cheese also give us ample amount of nutrients with less amount of calories (12).

#### **Importance of Healthy Snacks:**

To meet Calories Requirement of body on regular basis- To get the extra nutrients and to overcome overeating problem during mealtime, there is a very effective way to have a small quantity of snack. There was a study published in "The Journal of Nutrition" in February 2010, approximately 97 % of Americans snack, getting an average of 24 % of their calories from the snacks. This study proves that snacking provides much of the day's calories, hence to choose healthy options is very critical. (9).

#### **Prevents Overeating-**

Many of the times snacking acts as hindrance in hunger at the main meals time hence when felt like hungry one should not wait for main meal and have a small portion of snack, to overcome the hunger. Combine a high carbohydrate contain food like whole grains, fruits or vegetables with high protein foods like nuts or dairy products for the most filling snacks (9).

#### **Maintains Blood Sugar Levels Steady-**

Healthy snacking supports to maintain our blood sugar levels even, especially when we eat a good amount of carbohydrates at each meal or snack. This is especially helpful for diabetic peoples as well as beneficial for non-diabetic people also. since large spikes and dips in blood sugar levels may make insulin resistance, Type 2 diabetes, obesity, heart disease and high blood pressure more likely over time (9).

#### **Provides Nutrients-**

When we choose nutritious snacks to eat, snacking will definitely help us to meet our daily requirement of nutrients. Most of our snacks should consist of nutrient enriched foods like fruits, vegetables, whole grains, low-fat dairy and nuts or seeds (9).

#### **Advantages and disadvantages of Snacking-**

As no two people are alike, peoples are having different types of opinions about snaking. Some people think that snacking is healthy while others believe that it can not be healthy rather than be responsible to gain weight. The main motivation behind snacking is the hunger, but there are various factors pay more attention towards snaking like different location, social environment, time of day and food availability as well. Generally, people often snack when there is delicious, tempting or mouthwatering food around,

even if they're not hungry. Many of the times people chose unhealthy snacks, the most common reasons are temptation, followed by being hungry and feeling low on energy (5). Both, the desire to snack and snacking's effects on health can vary from individual to individual. Other factors which can also stimulate snacking include different age group and opinions about whether snacking is healthy or not (15).

#### **Effects on Weight:**

Many of the scientists in their research proved that snacking between two major meals does not affect to gain weight (3, 4). While, some research advise that snacking can help to lose the body weight (1, 14). A Navas-Carretero S. et. al. reported that some diabetic peoples consuming snacks high in protein and slow-digesting carbohydrates resulted in an average weight loss of 2.2 pounds (1 kg) within four weeks (14). On the other hand, some studies in lean and obese people have found that snacking may lead to slower weight loss or even weight gain (2, 13). Koopman KE et. al. in their research study, 36 lean men increased their calorie intake by 40% by consuming excess calories as snacks between meals. There was a substantial increase in liver fat and belly fat (13). Interestingly, another research accomplished by Hibi M. et. al. suggests that the change in timing of snacks may be responsible to differentiate in weight changes. In their study, 11 lean women found that consuming a 190-calorie snack food product during the night time reduced the amount of fat they burned significantly more than consuming the same snack food product at different time i.e. during morning period. (7). Thus, this study results that weight responses to snacking probably also vary by person to person.

#### **Guidelines for Healthy Snacking**

To get the most beneficial effects from our snacks we should follow some guidelines.

- Frequency of Snacking: Snack foods complement variety to the diet which somewhat explains their popularity. The number of snacks we need will differ based on our daily activity level and quantity of our meals. If you're very active, you may prefer 2-3 snacks per day, while a more inactive person may be satisfied with only one snack or no snacks.
- Amount or quantity of snacks to eat: Generally, it's very good to eat snacks containing about 200 calories and at least 10 grams of protein to help you remain full until your next meal.
- Portability of snacks: Always carry portable snacks with you when you're out, doing shopping or traveling in case hunger strikes.
- Snacks to avoid: In general, high-sugar containing and processed snacks products may give us a brief jolt of

energy, but we will probably feel hungrier after one or two hours later (10).

## II. 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.

### Materials Used and Their Role in Product:

#### Coating Ingredient:

- Refined wheat flour: It is main ingredient in spicy pockets production. The material should be free flowing, dry to touch, should not packed when squeezed, cream white colour with characteristic smell.
- Bengal gram flour: It is rich in carbohydrate, protein content, used as binding agent in sheet of spicy pockets. It also impacts a colour to the dough of Spicy pocket.
- Rice flour: It is also called rice powder, is a form of flour made from finely milled rice, enhances crunchiness of the product.
- Corn flour: Magnesium and iron content in corn flour act as a digestive aid, it is used in dough making to maintain dough consistency which is gluten free product.
- Flax seeds: Flax seed powder is added in the dough. It is rich in Omega 3 fatty acids.

#### Stuffing Ingredient:

- Plain Shev: This is the main ingredient in stuffing of Spicy pockets. Made from flour of Bengal gram is rich in protein content. Also provide slight crispiness to inner stuffing.
- Desiccated coconut: It is a main ingredient for the stuffing of Spicy pocket.
- Sesame seed: The health benefits of sesame seeds are due to its nutritional content, including vitamins, minerals, natural oils, and organic compounds which consist of calcium, iron, magnesium, phosphorous, manganese, copper, Zinc, fiber, thiamin, Vitamin B6, folate, Protein and tryptophan.
- Poppy seeds: It is added in the stuffing for giving taste to stuffing.
- Ragi Flour: It is added in the stuffing. It is rich in Calcium and iron.
- Flax seeds: Flax seed powder is added in the stuffing as well as in the dough. It is rich in Omega 3 fatty acids.
- Fennel: Fennel is mainly added to impart flavour and taste to Spicy pockets. It imparts a cooling effect. It is rich source of dietary fibers, antioxidant, vitamin and essential compounds.
- Coriander powder: Coriander, commonly known as Dhania in the Indian Subcontinent and Cilantro in the

Americas and some parts of Europe, is an herb that is extensively used around the world as a condiment.

- Amchur: Dried mango powder (amchur) is a spice made by grinding dried mango. Source of vitamin A, E and selenium
- Sugar: Sugar impasses sweet taste and enhances the flavour of Spicy Pocket.
- Salt: Salt is mainly added to impart taste to Spicy pocket. It also brings the taste of other ingredients and helps to improve the flavour and characteristic of Spicy pocket.
- Red chilli powder: Red chilli powder is used for giving spicy taste.
- Turmeric powder: Haldi is every Indian household's go-to fix for a variety of health problems. Its incredible list of healing properties include antioxidant, anti-viral, anti-bacterial, anti-fungal, anti-carcinogenic, anti-mutagenic and anti-inflammatory.
- Garam masala: It is a blend of ground spices and herbs, which enhances flavor and aroma of the food.
- Cumin seeds: It is used as a spice for its distinctive flavour and aroma, which helps to add an earthy and warming feeling to food. It is nutritionally rich, providing fat, protein and dietary fiber, vitamins B, vitamin E, and several dietary minerals, especially iron.
- Dates and Tamarind chutney: It is having the sweet and sour taste, which gives the taste to Spicy Pocket and Dates syrup enhances iron content.
- Oil: Vegetable oil such as refined soybean oil is used for frying of Spicy pocket.

### Approximate Composition of ingredients for 1kg Spicy Pockets

Sr. No.	Particular	Quantity
For outer Coating		
1	Refined wheat flour	200gm
2	Bengal gram flour	125gm
3	Rice flour	50gm
4	Corn flour	100gm
5	Flaxseed powder	25gm
For Stuffing		
1	Plain Shev	100gm
2	Desiccated Coconut powder	175gm
3	Sesame seeds	25gm
4	Poppy seed	25gm
5	Ragi flour	25gm
6	Flaxseed powder	25gm
7	Fennel	25gm
8	Coriander powder	25gm
9	Amchur	5gm
10	Sugar	25gm

11	Salt	7.5gm
12	Red chilli powder	10gm
13	Turmeric powder	5gm
14	Garam masala	5gm
15	Cumin seeds	25gm
16	Dates and Tamarind chutney	12.5 gm
17	Oil	200 ml

### MANUFACTURING PROCESS:

The overall manufacturing process is divided in to following stages-

1. Preparation of dough.
2. Preparation of Stuffing.
3. Formation of sheeting
4. Filling the stuffing into pocket
5. Frying
6. Packing
7. Storage

#### 1. Preparation of dough:

The ingredients used for outer coating like refined wheat flour, Bengal gram flour, rice flour, corn flour, flax seeds and salt were collected in Dough kneader machine. All the ingredients mixed properly and then added hot vegetable oil and mixed well. Dough was prepared by adding enough water.

#### 2. Preparation of Stuffing:

Roasted some ingredients like Sesame seeds, Poppy seed, Flaxseed powder, Fennel, Ragi flour. Mix the remaining ingredients like Plain Shev, Desiccated Coconut powder, Coriander powder, Amchur, sugar, salt, red chilli powder, turmeric powder, garam masala, cumin seeds and dates and tamarind chutney with roasted ingredients and prepared stuffing for spicy pockets.

#### 3. Formation of Sheeting:

Formed the sheets of 1 mm thickness of dough with the help of sheeting machine and cut the square shapes of size 7 cm X 7 cm.

#### 4. Filling the stuffing into pocket:

Spreaded the stuffing on sheet (7cm X 7cm) and formed the pocket shapes. Closed the end and cut extra edges.

#### 5. Frying:

The spicy pockets were deep fried in soybean vegetable oil at 180o C for 4-5 minutes. Cooled all the fried spicy pockets at room temperature.

#### 6. Packing

For ease of handling, storage and transportation, avoidance of reusability and for cost effectiveness the PP boxes are used for packing purpose. The PP boxes (Trays) are used by most of the snack product manufacturers, which ensures the cost competitiveness with them by taking advantage of mass manufacturing.

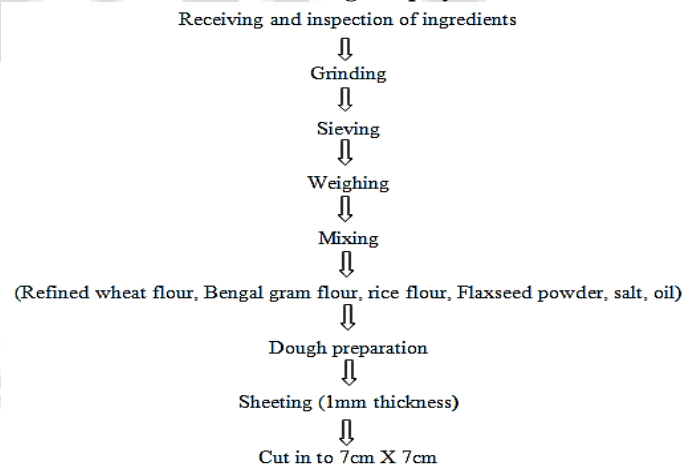
#### 7. Storage

The production is done in batches and supplied as per demand hence storage and shelf life is important for economic viability of the product. Hence storage practices place important role in profitability of this product. The experimentation was done and it is decided to store the product at room temperature.

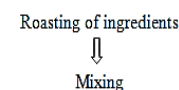
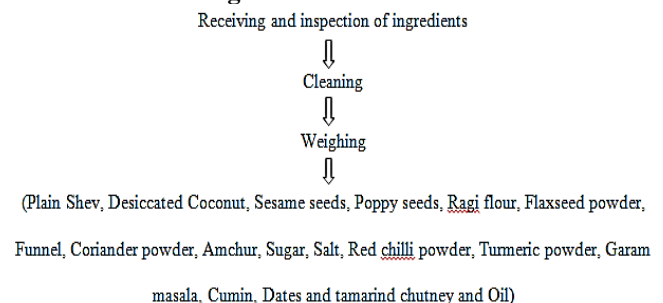
Above process is illustrated in flowchart with further details

### PROCESS FLOW CHART:

#### ➤ Part A – for outer covering of Spicy Pockets

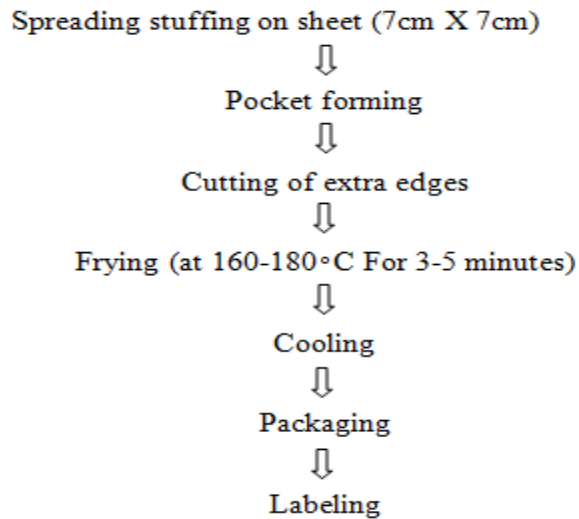


#### ➤ Part B – for stuffing



#### ➤ Part C- final step (For fried spicy pocket)





Iron	5.35mg
Sodium	211.93mg

**Fatty acid profile:**

1. Saturated fat	5.65	g/100g
2. Monounsaturated fat	10.97	g/100g
3. Polyunsaturated fat	14.64	g/100g
4. Trans fat	<0.01	g/100g
5. omega 3 fatty acids	1.07	-
6. omega 6 fatty acids	13.57	-
7. Ratio of omega 6 & 3	12.7	-

**TESTING OF PRODUCT:**

Product is tested for taste, nutritional value, proximate analysis to ensure the quality and taste.

**1. Sensory Evaluation (Taste)**

The sensory evaluation of different organoleptic characteristics i.e., colour and appearance, mouth feel, taste, flavour 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:

Sample	Colour and Appearance	Taste	Flavour	Overall acceptability
S <sub>1</sub>	7.0	6.5	6.5	6.5
S <sub>2</sub>	7.0	7.5	7.0	7.0
S <sub>3</sub>	7.5	7.0	7.5	7.5
S <sub>4</sub>	7.5	8.5	8.5	8.5

Values are average of 10 observations.

**2. Nutritional value per 100 gm:**

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 Spicy Pocket. The result for 100 gm sample is as follows.

Composition	For 100 g
Energy	551kcal
Carbohydrates	46.36g
Total sugar as sucrose	3.78
Proteins	10.97g
Fat	31.25g
Moisture content	5.4 gm
Calcium	393mg

**3. 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.

**III. RESULT AND DISCUSSIONS:**

With increased Gen “Y” population, sedentary life styles, increased travel times in city, work on desks, reduced physical activities, increased use of mental stressing work is leading to demand of snack products and giving food processing industry a challenge to meet same. Also unlike old days kids school’s timings, travel time for school has increased, forcing parents and schools to provide snack along with main tiffin. The demand is huge and food processing industry is trying to meet same for a quite some time with whatever is meeting / suiting the taste buds of the consumer. The ill results are visible now after few years the number cases of diabetics, obesity, hypertension etc., the lifestyle diseases can be correlated to the profit numbers published by food processing industry. Not all but part of this correlation can be attributed to the unhealthy snack products sold in the market.

The spicy pockets are an attempt to increase the nutritional value of exiting products consumed in the market. The modification in ingredients like addition of Ragi, Flax seeds to the exiting ingredients actually enhanced the food value of the product.

Ragi is a whole grain which is gluten-free, packed with calcium, good carbs, amino acids and Vitamin D, rich in fiber helps in digestion and weight loss and reduced possibility of prone to diabetes.

Flax seeds are rich in Omega 3 fatty acids, with traceable amount of vitamin B6, Iron, potassium, copper and zinc. It is also a good vegetable source of omega 6 fatty acids and contains high amounts of PUFA. This is one which can prevent heart diseases. Also helps in cholesterol control.

The technique used for processing spicy pockets has not impacted any of the nutritional values as shown above table.

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Production, sell and consumption of such healthy snack is going to help the consumer to get health benefits and may reduce the health risk. While selecting the snack we need to look at nutritional value more than the taste and appealing packaging of the product to avoid the health effect of high salt, excess sugar and preservatives used in such products.

#### IV. CONCLUSION

With the study of food ingredients, nutritional value and applied knowledge of food science surely, we can enrich some of the exiting snack items with small modification in ingredients and taste like spicy pockets.

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