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DEVELOPMENT OF A UNIQUE SNACK ITS SHELF-LIFE STUDY

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ABSTRACT

A nutrient rich healthy snack was designed to meet the common mans need and it can be used as a healthy therapeutic snack. An innovative nutritious product was standardised which had an, unique blend of premium nuts and seeds. This product was gluten-free, had low-cholesterol, was rich in protein, fibre and was prepared using roasted mix (pumpkin seeds, rice crispies, fennel seeds, till, moong, green peas). It also includes herbs like basil and mint leaves which show anti-diabetic and anti-cancerous properties respectively. A shelf life study was done using a scoring test on a 7 point sensory scale for a period of one month and was found to be highly acceptable. The product was packed in Zip lock stand up pouch made with kraft material with Inner Polythene Lamination and other aspects covered in the study were labelling, budgeting and marketing.

Keywords: gluten-free, low-cholesterol, protein and fibre enriched premium nuts and seeds, pumpkin seeds, sensory evaluation, chemical analysis, microbial analysis.

INTRODUCTION

Hara Bhara Charge is a snack which provides good amount of calories, protein, fibre and provides satiety value. It was designed to target the common mans need and can also be used as healthy therapeutic snack. It was made using rice crispies, moong (green gram), green peas, amla, seeds like (sunflower, pumpkin, fennel and sesame) and herbs like mint and basil leaves.

The objective of the study is

1) To standardize an innovative nutritious product which is also cost effective as per the acceptance of consumer.
2) To study the shelf life of the product using sensory evaluation.
3) To design an innovative nutritional label.
4) Packaging of the product.
5) To understand the budgeting and marketing aspects of product development and to develop entrepreneurship skills.

A food product had to be designed and developed under the course "Food Product Development" in the under graduate third year studies. The product hara-bhara charge was finalised based on the consumer acceptability and sensory evaluation. The product provides good amounts of biological proteins, vitamins and minerals, fibre and has a good satiety value.

Moong (Green Gram)-Moong bean seeds are particularly rich in protein, containing about 20.97–31.32% protein content . The chemical score of 76% for mung bean amino acids, which was calculated based on the Food and Agriculture Organisation of the United Nations (FAO)/the World Health Organisation (WHO) guidelines. Therefore, due to its high protein content and digestibility, consumption of mung bean seeds in combination with cereals has been recommended to significantly increase the quality of protein intake as part of a vegetarian diet. (1)

Green Peas- The vitamin and mineral contents of peas may play important roles in the prevention of deficiency-related diseases, specifically those related to deficiencies of Se or folate. (2) Green peas are healthy sources of **ascorbic acid.** Vitamin-C is a powerful natural water-soluble antioxidant, it helps the human body develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radicals from the body. (5)

Sunflower seeds – sunflower seeds are known to soothe nerves and ease stress and migraine. Sunflower seeds enhance the immune response, thereby decreasing the risk of certain cancers. The vitamin E and high fiber content in sunflower seeds reduce the possibility of colon cancer. Selenium in sunflower seeds induces DNA repair and synthesis of damaged cells, inhibiting the proliferation of cancer cells. (6) sunflower seeds contains fat, mainly monounsaturated and polyunsaturated fats, principally linoleic acid. Additionally, the seeds contain phytosterols which may contribute toward lower levels of blood cholesterol. (7)

Pumpkin seeds - pumpkin seeds, are one of the best sources of plant-based omega-3s (alpha-linolenic acid or ALA). Studies show that pumpkin seeds may help improve insulin regulation and help prevent diabetic complications by decreasing oxidative stress. Pumpkin seeds are a rich source of tryptophan, an amino acid (protein building block) that your body converts into serotonin, which in turn is converted into melatonin, the "sleep hormone." (8)

Fennel seeds - Fennel has long been used as a remedy for flatulence and indigestion in traditional medicines. Fennel seeds are a rich source of dietary fibre, dietary fibers bind to bile salts (produced from cholesterol) and decrease their re-absorption in the colon. It thus helps lower serum LDL cholesterol levels. Together with flavonoid anti-oxidants, fiber composition of fennel helps protect the colon mucosa from cancers. (9)

Mint leaves – The amazing health benefits of mint include improved digestion, weight loss, relief from nausea, depression, fatigue, and headache. It is also used in the treatment of asthma, memory loss, and skin care problems. (11)

Basil leaves - Basil Contains Powerful Antioxidants, is an Anti-inflammatory Herb, Help Fight Cancer, Contains Natural Antibacterial Properties. (10)

MATERIALS

Materials used to prepare this product in trial 1 are:

Table 1

Ingredients	Amount (gms)
Rice crispies	30
Pumpkin seeds	25
Green peas	50
Amla	50
Fennel seeds	25
Sunflower seeds	25
Sesame seeds	25
Mint leaves	10
Basil leaves	10
Salt	5
Black pepper	5
Jeera powder	5
Amchur powder	5
Total	270

As can be observed from Table 1 the hara-bhara charge was tried out with the given ingredients. The dry ingredients were roasted, leaves were dehydrated. All the ingredients were mixed. The consumer acceptability test was carried out for this product and it was not accepted by the consumers as the spices did not coat on the ingredients and had settled down. It was then modified with additional moong (green gram) and oil.

STANDARDISATION

The recipe which was modified and standardised is given in Table 2:

Table 2

Ingredients	Amount in (gms)
Rice crispies	30
Pumpkin seeds	25
Moong (green gram)	20
Green peas	50
Amla	50
Fennel seeds	25
Sunflower seeds	25
Sesame seeds	25
Mint leaves	10
Basil leaves	10
Salt	5
Black pepper	5
Jeera powder	5
Amchur powder	5
Oil	20
Total	310

The recipe was modified with addition of 50gms of moong (green gram) to improve the biological value of protein, and oil for proper coating of spices. There was no addition of preservatives in the making of hara-bhara charge.

METHOD AND PREPARATION

Weighing of all the raw materials

Roast all the seeds, rice crispies separately

Mix all the ingredients (except the spices)

Mix all the spices with oil for flavouring

Add the spices mixture to the dry ingredients

Special tips to be followed

- Roast all the ingredients at low flame to avoid burning.
- Roast all the seeds separately
- After mixing the spices mixture to the other ingredients, gently mix for some time for even coating of the flavor.

SENSORY EVALUATION FOR SHELF LIFE STUDY

Sensory analysis (or sensory evaluation) is a scientific discipline that applies principles of experimental design and statistical analysis to the use of human senses (sight, smell, taste, touch and hearing) for the purposes of evaluating consumer products. [12]

In order to study the shelf life of the product, sensory evaluation was done periodically for four weeks. For the evaluation, scoring test with a seven-point scale was used which was done by 12 semi-trained panel members. Characteristics evaluated were colour, taste, texture, after taste, and overall acceptability; where,

1 = dislike extremely

2 = dislike very much

3 = dislike slightly

4 = neither like nor dislike

5 = like slightly

6 = like very much

7 = like extremely

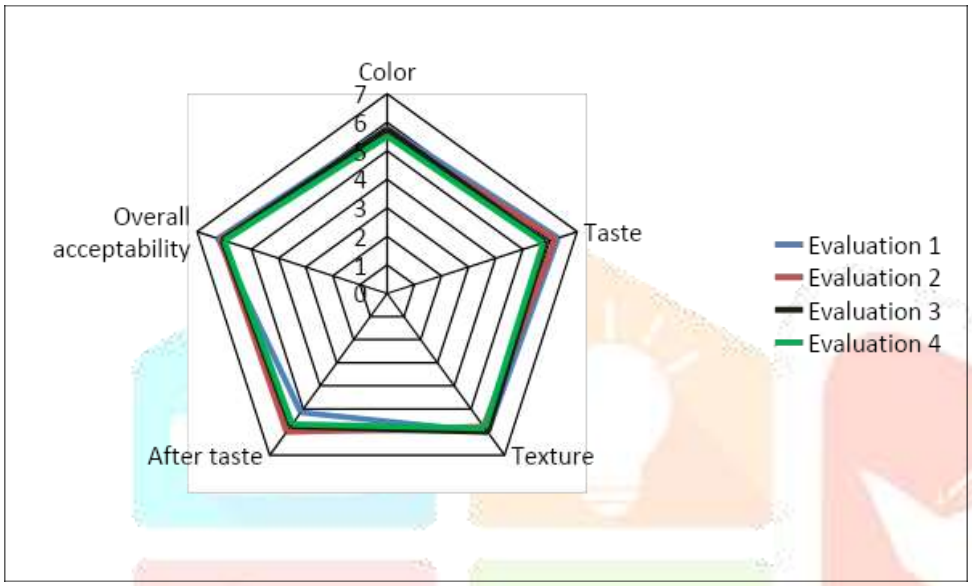

Figure 1: Sensory Evaluation

The sensory parameters did not deviate much for all the 4 sensory evaluation. The product was found to be highly acceptable and was scored between 5 and 6 score i.e. like slightly and like very much.

NUTRITIONAL LABEL

Functional foods that are approved for marketing must be labelled according to standards promulgated under the labelling regulation for conventional food. [13] Nutritional label informs the consumers about the nutrient content of the food. Nutrition information on food labels could be a cost-effective method of communicating nutrition information to consumers because the information appears at the point of sale for most packaged foods. [3]

In general, the label requires inclusion of the product name, list of ingredients, net content, manufacturing date, expiry date, batch no., MRP, vegetarian or non-vegetarian marks, information and contact of the manufacturing and marketing bodies, special recommendation and storage information. The label should be truthful and not mislead consumers. It should also be eye catching and attractive to improve sales.

Table 3:

Nutrition Facts

Serving Size: (35g)

Amount Per Serving

Calories 110	Calories from Fat 60
	% Daily Value*
Total Fat 7g	**11%**
Saturated Fat 2.5g	**13%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 25mg	**1%**
Potassium 180mg	**5%**
Total Carbohydrate 9g	**3%**
Dietary Fiber 3g	**12%**
Sugars 2g	
Protein 4g	**8%**
Vitamin A 6% •	Vitamin C 8%
Calcium 10% •	Iron 20%

* Percent Daily Values are based on a 2,000 calorie diet.

PACKAGING MATERIAL

Increased environmental concerns over the use of certain synthetic packaging and coatings in combination with consumer demands for both higher quality and longer shelf life have led to increased interest in alternative packaging materials research. [4] So, instead of synthetic or polythene packaging recyclable polymers can be used. A stand-up pouch made from kraft material that is laminated to other layers of film IS recyclable and landfill friendly. To be clear, kraft — once it is laminated — is NOT biodegradable, but it is recyclable. [14] For the packaging of Lacto Munchies, chocolate foil was used to wrap the laddu and was then packed in Zip lock stand up pouch made with kraft material with inner polythene lamination. The lamination retards unwanted moisture transfer in food products, are good oxygen and oil barriers and keeps the product fresh.

BUDGETING

Budgeting is an important aspect to be considered in food product development. It makes it easier for people with incomes and expenses of all sizes with conscious decisions about the allocation of money. For bulk production food items were brought from wholesale market to reduce the cost.

Table 4:

Materials	Cost
Rice crispies	12
Pumpkin seeds	13.5
Moong (Green Gram)	1.2
Green peas	10
Amla	15
Fennel seeds	3
Sunflower seeds	7
Sesame seeds	2.3
Mint leaves	5
Basil leaves	10
Black salt	0.19
Black pepper	2.3
Jeera powder	1.6
Amchur powder	0.5
Oil	2
Packaging material	27
Labelling	27
Other Expenses	90
Total	229.59

The cost of 1 packet = Rs.25.5/- for 35gm but would be sold at Rs. 30/- with the profit of Rs. 4.5/- per packet.

MICROBIAL AND CHEMICAL ANALYSIS FOR SHELF LIFE STUDY

Microbial analysis was done on the first week and fourth week after packing the snack. Pour plate method was used using nutrient agar. The snack was diluted twice and 1ml of each diluted sample was poured in two different petri dishes with nutrient agar. The petri dishes were incubated for 24hours at 37 degrees.

Table 5:

Microbial analysis for 1st week

DILUTIONS	NUMBER OF COLONIES
10^1	7
10^2	5

Table 6:

Microbial analysis for 4th week

DILUTIONS	NUMBER OF COLONIES
10^1	10
10^2	7

From table 5 and 6, the number of colonies formed in the 1st and 4th week were in the acceptable range. Hence, the product was proved to be safe for consumption upto the period of 1month.

For chemical analysis, the moisture percentage was analysed. For the analysis a crucible was weighed (W) after which 5gms of sample was weighed. The crucible was kept in the muffle furnace for 24hours, the crucible was weighed and the reading was taken. After the 1st reading, the crucible was kept in the muffle furnace for 4 hour and weighed till 3 constant readings were obtained.

Weight of crucible (W) – 18.28g

Weight of crucible + weight of sample (W_1) – 18.28 + 5g = 23.28g

Constant reading (W_2) – 22.73g

Table 7:

	Readings
1st reading after 24hours	22.73 g
2nd reading after 4hours	22.73 g
3rd reading after 4hours	22.73 g
4th reading after 4hours	22.73 g

Calculation: moisture % $= \frac{100(W_1 - W_2)}{(W_1 - W)}$

$= \frac{100(0.55)}{5}$

= 11% moisture

CONCLUSION

Hara-Bhara Charge is a product providing good amount of calories, protein, fibre and satiety value. This product is mainly designed and developed to cope up with common mans need and can also be used as a therapeutic snack. It can be consumed by all age groups (even for pregnant and lactating woman) due to its high nutritional value. The microbial analysis of the product proved to be safe for consumption upto the period of 1 month and for improving the shelf life of the product addition of class-I preservatives may prove to be helpful.

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