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Development of protein rich product

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ABSTRACT

The growing public awareness of nutrition & healthcare research substantiates the potential of phytonutrients such as polyphenols, saponins, essential amino acids, dietary fibres, flavonoids on their health benefits. Proteins are the major macronutrient required by the body. Protein-energy Malnutrition (PEM) develops in children whose consumption of protein and energy is insufficient to satisfy the body's nutritional needs. 91% of Vegetarians in India suffer from PEM. Hence, there is a need to develop a Protein-rich product. Chickpea, Mung & Soy Flour was used in the preparation of chips. These chips were analyzed for their Nutritional, phytochemical, microbial and sensory parameters & a suitable packaging for the product was also developed. The present study showed that the product is a good source of protein (20%) and carbohydrates (62%). The product was liked very much by all the participants (score- 8). High quality 40 microns PET/MET was used as packaging material for the Product which are durable, heat resistant films with very good oxygen barrier properties.

Keywords— *chips, protein, chickpea, mung, soybean, Nutritional evaluation and sensory evaluation.*

1. INTRODUCTION

Functional food may include such items as cereals, bread, beverages, that are fortified with vitamins, some herbs and nutraceuticals.

A growing consciousness among consumers regarding their health and proper diet is expected to aid the overall industry over the next eight years. Foods are not only intended to satisfy one's hunger but also to eliminate nutrition-related diseases. Such a factor is anticipated to affect the global industry demand positively. [4]

Proteins are the major macronutrient required by the body. Protein-energy Malnutrition (PEM) develops in children whose consumption of protein and energy is insufficient to satisfy the body's nutritional needs. 53% of Indian's suffers from PEM.

Protein consumption in Diet of adult Indians, a consumer survey (PRODIGY) was conducted in seven major cities in 1260 respondents across India in order to assess the consumer understanding of protein in their day to day life. It was observed that around 9 out of 10 consumers had a diet deficient in proteins. This shows that the overall level of the amount of protein consumption is extremely low in India. Higher Vegetarians (91%) show a protein deficit as compared to Non-Vegetarians (85%). [28]

Hence, there is a need to develop a Protein-rich product.

"**CHIPS**" which are a savoury snack and very trendy in markets for years. So, incorporating a functional food ingredient into it may lead to the best way to introduce healthy and functional food into our day to day life.

Chickpea, Mung and soybean have received significant interest because of their high protein content.

Cicer arietinum, commonly known as chickpea is a legume of the family Fabaceae, subfamily Faboideae. Its different types are variously known as Gram or Bengal gram, Garbanzo bean or Egyptian pea. Its seeds are high in protein. It is a nutrient dense food. [3]

Vigna Radiata, commonly known as the mung bean alternatively known as moong bean, monggo, green gram or mung. Mung beans are commonly used in cuisines across Asia. It is vegan. Its flour is gluten-free and high in protein. [1]

Glycine max, commonly known as soya bean in North America or soya bean, is a species of legume native to East Asia, widely grown for its edible bean which has numerous uses. Soy protein products can be good substitutes for animal products because unlike some other beans, soy offers a 'complete' protein profile. Soy Protein products can replace animal-based foods – which also have complete protein but tend to contain more fats, especially saturated fat- without requiring major adjustments elsewhere in the diet. The Protein Digestibility Collected Amino Acid Score (PDCAAS) of soy proteins is the nutritional equivalent of meats, eggs and casein for human growth and health. Soybean protein isolate has a biological value of 74, whole soybeans 96, soybean milk 91 & eggs 97. [2]

2. METHODOLOGIES

2.1. Materials

Chickpea Flour, Mung Flour and Soybean Flour Garlic Powder, Ginger Powder, Onion Powder, Chilli Powder, Salt, Yeast Extract, Olive Oil were procured from the Market.

2.2. Method

2.2.1 Cleaning: All pulses were taken and cleaned to remove the dirt, stones, chaff and other foreign particles.

2.2.2 Roasting/Grinding: The pulses were roasted for about 30 minutes and ground into a fine powder to make flours.

Fig. 1: A flowchart depicting standard preparation method Protein rich chips.

3. PRODUCT FORMULATION TRIALS

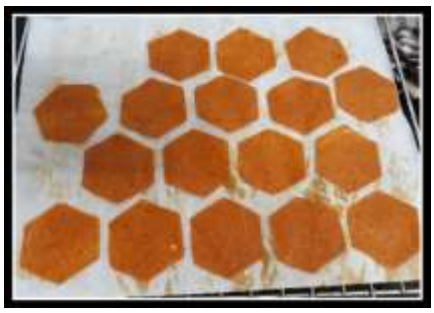

Fig. 2: Uncooked Chips

Fig. 3: Baked Chips

4. PROXIMATE EVALUATION OF THE PRODUCT

Proximate Analysis of the product was carried out by using different methods

4.1 Evaluation of Moisture Content

Moisture Content of the product was evaluated by using Oven Drying Method i.e. the conventional Method. The sample was weighed and treated at 102°C for 2 hours in the Hot Air Oven.

4.2 Evaluation of Ash Content

Ash Content of the product was evaluated by using Muffle Furnace. The sample was weighed and incinerated to remove the carbon molecules from the product and ignited at 550°C in the Muffle Furnace.

4.3 Evaluation of Protein Content

The protein content of the product was evaluated by using Kjehldahl method. The Nitrogen Content of the sample was determined by Digesting, Distillation and Titration against the working standard and the amount was multiplied by a factor of 6.25. Methods described in A.O.A.C.

4.4 Evaluation of Fat Content

Fat Content of the product was evaluated by using the Soxhlet Method. Crude fat was determined using the Soxhlet extractor and Petroleum Ether as a solvent. Methods described in A.O.A.C.

4.5 Evaluation of Carbohydrate Content

Carbohydrates Content was determined by subtracting from 100 the sum of the values moisture, protein, fat, ash, and crude fiber.

4.6 Evaluation of Crude Fibers

Crude Fiber was evaluated by Acid-Alkali Hydrolysis method described in A.O.A.C.

4.7 Evaluation of Gluten Content

Dry Gluten from Wet Gluten was determined by using an Oven drying method.

4.8 Evaluation of Energy Content

Energy content was determined by multiplying the Crude Proteins, Crude Carbohydrates and Crude Fats by water Factors 4, 4 and 9 respectively.

5. EVALUATION OF PHYTONUTRIENTS

The concentration of Phenols was estimated by Folin-Ciocalteau's method using colorimetry.

The concentration of Flavonoids was estimated by Aluminium Chloride Method using colorimetry.

6. MICROBIAL EVALUATION OF THE PRODUCT

The determination of Microbial load was done by using Total Plate Count Method. The samples were prepared using serial Dilution Method. The sample was spread on Nutrient Agar plate for the bacterial count and Sabouraud's Agar plate for the moulds and fungi count.

7. SENSORY EVALUATION OF THE PRODUCT

The sensory evaluation of the product was done by using a 09-point hedonic scale for various sensory parameters such as appearance, odour, colour, taste and its overall acceptability using 30 untrained Panelists. [25]

8. RESULTS AND CONCLUSIONS

8.1. Evaluation of proximate analysis

Table 1: Result of proximate analysis

Parameters	Quantity per 100g (Mean±SD)
Energy	381.08Kcal
Carbohydrate(g)	62.21g
Proteins (g)	20.1±0.0
Fats(g)	6.01±0.3535
Ash	7.73±0.9850
Moisture	3.8±0.2003
Crude fiber	3.10±0.848

8.2. Evaluation of phytonutrient analysis

Table 2: Result of phytonutrient analysis

Parameters	Quantity per 100g (Mean±SD)
Phenols (mg)	60±0.057
Flavonoids (mg)	620±0.115

8.3. Evaluation of microbial analysis

The microbial load of the sample on both the Nutrient Agar and Sabouraud's Agar was found to be less than 30 CFU.

8.4. Evaluation of sensory analysis

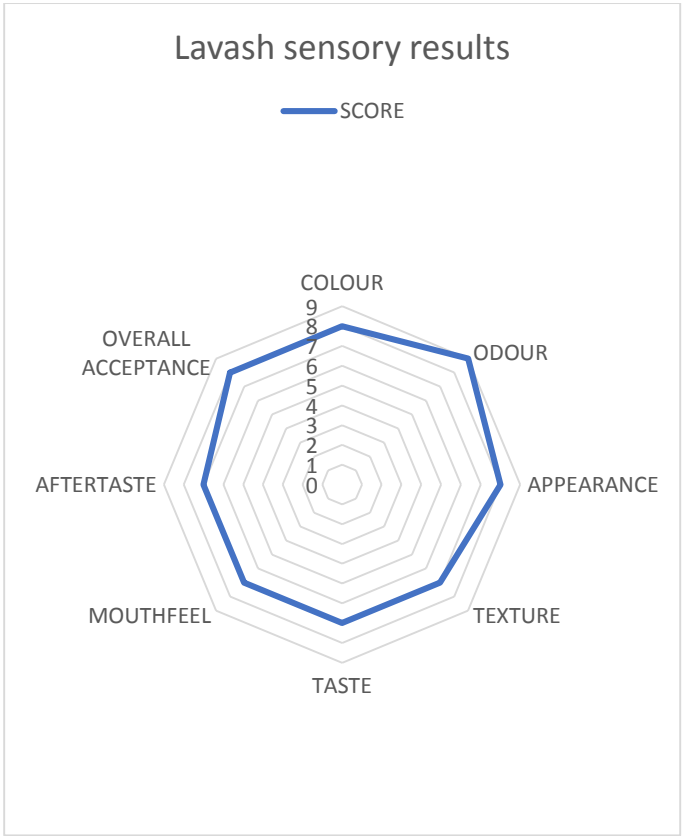

Fig. 4: Result of sensory evaluation (Radar Diagram)

8. FOOD LABELLING AND PACKAGING

8.1 Packaging material

Polyethene terephthalate (PET) films are durable, heat resistant films with very good oxygen barrier properties. When PET films are laminated with metal foils (MET /PET), it will increase the films oxygen-water barrier properties and block out UV rays. Hence, we selected high-quality PET/MET 40 microns as packaging material for the chips. [27]

Fig. 5: Front and Back label of the pack

8.2 Labelling

As per the packaging and labelling norms in India (FSSAI) and globally, a food label should include the following key features:

- Name of the food product
- A lot or batch identification
- Name and address of the manufacturer
- Warning or advisory statements
- Ingredient list
- Best before date
- Manufacturing date
- Directions to use and storage
- Nutritional information
- Net weight or volume
- Veg or non-veg label [5]

9. CONCLUSION

The protein-rich product was formulated and analyzed. The present study showed that the product is a good source of protein (20%) and carbohydrates (62%). The product was liked very much by all the participants (score- 8). The product can be stored for a longer duration as it has low moisture content (3.8%). This product can be a very good source of Proteins for the Vegetarian population.

10. FUTURE PROSPECTS

The Quality and Bioavailability of protein in the product can be further studied.

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