

DEVELOPMENT OF MICRONUTRIENT RICH TRADITIONAL SNACK

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Abstract: Modern society lifestyle comprises of exercise and healthy food which will provide nutrition without bargaining its taste. Triticum aestivum (Wheatgrass), the young green plant which grows to give us cereal grain is considered to be one of the functional food that is gaining popularity due to its medicinal and health benefits. Various studies showed that Wheatgrass is a super food with a fine bundle of essential micronutrients like Vitamin A, Vitamin E, Vitamin C, Iron, Calcium and Chlorophyll. The formulated product using wheatgrass as a main ingredient was analyzed for its physical, biochemical and sensory properties to determine the quality and safety of the product. The formulation was analyzed for its physiochemical properties such as Moisture (3.2%), Ash (2.6%), Fat (25%), and Protein (18%), Vitamins (Vitamin A 1.57% and Vitamin E 0.08%), Minerals (Ca- 100.83% and Fe- 26.9% and organoleptic analysis.

Keywords - *Wheatgrass chikki, Physiochemical, Chlorophyll, Micronutrients-rich, Organoleptic. Green blood, Kjeldahl Method, Hedonic Scale Method.*

I. INTRODUCTION

Micronutrients are food ingredients needed by the body in small quantities for growth and functioning of the immune and reproductive system. Micronutrients includes vitamins and minerals. Modern lifestyle has led to increase in the risk of micronutrient malnutrition. India with divergent food habits has a number of traditional foods, including sweet products. Chikki is one of such popular Indian traditional sweet snack. It is mainly prepared using jaggery as sweetener with roasted peanuts, Sesame and coconut. Since the product is popular among all age group in the country, an attempt was made to further enrich it with Nutrients by incorporating wheat grass (shoot of Triticum aestivum). Sweets or confectionaries of jaggery are gaining popularity due to awareness of its health benefits. [1] It has a sweet winy flavor. It is rich in important minerals such as calcium, magnesium, potassium, phosphorus, copper, chloride, vitamins and proteins. [2]

Triticum aestivum (Wheatgrass) is a good source of minerals, nutrients, contains significant amount of iron phosphorus, magnesium, copper, zinc and also rich source of vitamin E and vitamin A. [3] The WG is reported to be effective in the treatment of chronic disease such as cancer, ulcerative colitis, and bronchial disorder. It revitalizes blood and oxygenates due to presence of high amount of chlorophylls. [4] This chlorophyll is also known as "Green blood". It possess superoxide scavenging activity. The various enzymes responsible for its pharmacological actions are protease, amylase, lipase, cytochrome oxidase, transhydrogenase and super oxide dismutase (SOD). The other notable feature of wheatgrass is its high proportion of amino acids such as aspartic acid, glutamic acid, arginine, alanine and serine. It also has a high content of bioflavonoids like apigenin, quercetin and luteolin. All of these enzymes contribute to its antioxidant activity. [5]

Peanuts are nutrient dense foods with complex matrices rich in unsaturated fatty and bioactive compound: high quality vegetable protein, fiber, minerals, tocopherol, phytosterols and phenolic compounds [6]

Sesame seeds also known as til or Gingelly seeds. It contains 20% of protein and 50 % of oil. It reduces the plasma cholesterol level and increases plasma tocopherol level. It is rich in amino acids such as Methionine, Cysteine, Arginine and Leucine. Sesame oil contains linoleic acid, oleic acid, palmitic acid. It is also rich in calcium. [7]

Chia seeds Chia seeds contains large amount of calcium, Iron, antioxidants, all the essential amino acids, vitamins(B,D,E).It is rich source of omega 3 fatty acids. Chia seeds promotes hydration and helps in weight loss. It is high in energy and hence it's a choice for long distance runner. [8]

II. MATERIALS

FOR PRODUCT DEVELOPMENT

- Wheatgrass Powder
- Peanuts Black Sesame seeds
- White Sesame seeds
- Chia seeds
- Jaggery

III. PRODUCT DEVELOPEMENT PROCESS

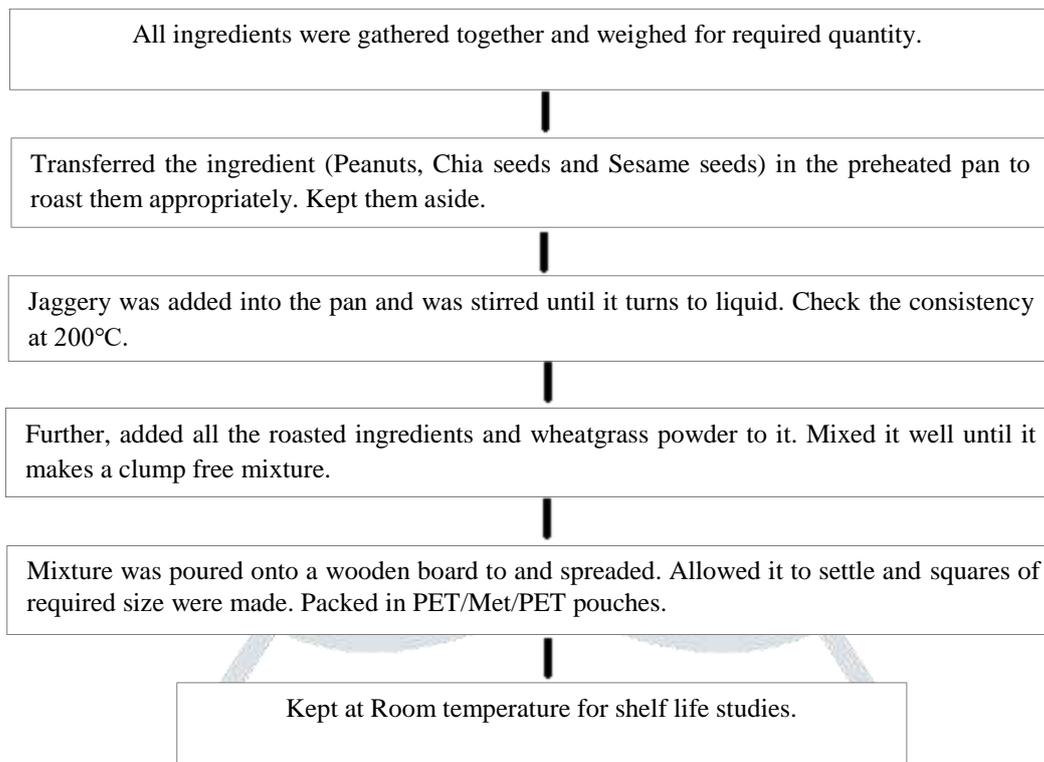


Fig.1 Final product- Chikki

IV. PROXIMATE ANALYSIS

Proximate analysis was carried out to ascertain the level of macromolecules in the developed product.

4.1 MOISTURE

Moisture content of the food that has a significant impact on factors such as the product's taste, texture, appearance, shape, shelf life and weight. It also helps to select the packaging material for product. A known amount of crushed chikki sample is weighed and dried in hot air oven maintained at 130°C for 2 hrs. The loss in weight is equated to the moisture content of food. [9]

4.2 TOTAL ASH

Ash Content is total mineral content in the foods. It is foremost when foods are high in minerals. Ash content of powder chikki sample was determined using Muffle Furnace. [9]

4.3 CRUDE FIBER

The crude fiber was evaluated by Acid-Alkali Hydrolysis method described in A.O.A.C manual.

4.4 FAT

As the product was developed using oilseeds such as sesame and peanuts its fat content was evaluated using Soxhlet method described in A.O.A.C manual.

4.5 CARBOHYDRATES

The carbohydrate content of chikki was estimated using Weight Difference Method.

4.6 PROTEIN

The protein content of the product was evaluated by using Kjeldahl Method.

4.7 ENERGY

Energy was determined by multiplying crude protein, Crude carbohydrates and Fat by water factors.

V. MICRONUTRINT ANALYSIS

5.1 Estimation of Minerals

Mineral (Fe and Ca) content of the Chikki was estimated using FTIR method.

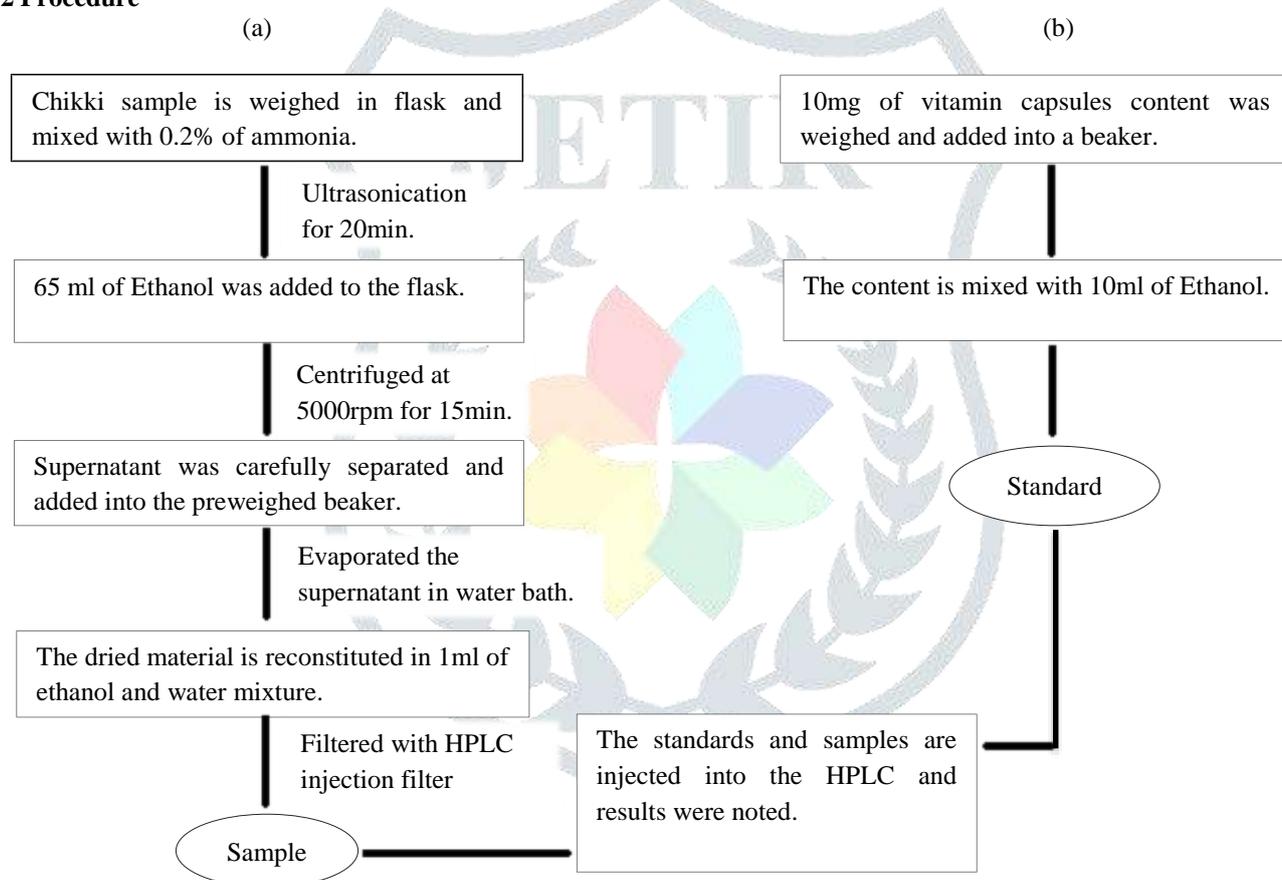
5.2 Estimation of Vitamin A and Vitamin E

Vitamin A and Vitamin E content was determined using HPLC Technique.

5.2.1 Chromatography Condition

- Mobile Phase- Methanol: Water (90:10)
- Flow rate- 1ml/min
- Injecting Volume- 20µl
- Column Temperature- 35°C
- Detector- 294nm(Vitamin E) and 325nm(Vitamin A)
- Column- C18
- Standards- Vitamin A and Vitamin E capsules.
- Sample- Powdered Chikki

5.2.2 Procedure



VI. MICROBIAL ANALYSIS

Growth of Microorganisms in the food sample leads to spoilage of food this spoilage can be range from off taste, Odour to deleterious effects on consumer.

- Name of the Method- Pour Plate Technique
- Name of the Media/s- Sterile Nutrient agar plates and Sterile Sabouroud's agar plate.

VII. SHELF LIFE DETERMINATIONS

The shelf life of developed product depends on environmental conditions to which the product is exposed, during its distributions and storage. The product was stored in a selected packaging material at RT for 15 days. Later the product was evaluated by its sensory attributes.

VIII. SENSORY EVALUATION

The sensory evaluation is the identification and scientific evaluation of the food product. The sensory evaluation was done using 9 point Hedonic scale Method. The panellist were provided with the sample and questionnaire wherein he or she were asked to rate the attributes of the provided sample on scale 1-9.

IX. FOOD PACKAGING AND LABELLING

9.1 Food Packaging

The sole objective of packaging is to maintain safety and quality of the food. For chikki like solid product medium sized opaque/transparent pouches were selected. PET/MET/PET films are durable, Heat resistant and also acts as a good oxygen barrier. PET with metalized foil increases the shelf of the chikki.

9.2 Food Labeling

Food labeling is a primary communication between the producer, seller and consumer. It is a tool for information and marketing.



1. Product Name
2. Ingredients list
3. Nutritional facts
4. Manufacturer's name and Address
5. Storage instructions
6. Manufacture and Best before date
7. Allergen information
8. Net Weight
9. Vegetarian logo
10. Ingredient's benefit
11. Consumer helpline
12. MRP

Figure 2 Polyethylene terephthalate pouches with metal foil. These pouches are good oxygen barrier and heat resistant to increase the shelf life of Chikki

Figure 3 Food Package (Rear view) Chikki Labelling according to food regulations.

X. RESULTS

10.1 Proximate analysis

Table1. Results of Proximate analysis and mineral estimation

Parameter	Quantity per 100gm
Energy	537.6Kcal
Protein	18.15gm
Carbohydrates	60gm
Fats	25gm
Total Ash	2.62%
Crude Fiber	1.50%
Moisture content	3.2%
Calcium	100.83mg
Iron	26.9mg

10.2 Vitamin Estimation

Figure 4 HPLC Chromatogram for Vitamin A analysis. (a)Chromatogram of standard Vitamin A at 325nm; (b) Chromatogram of Sample chikki at 325nm.

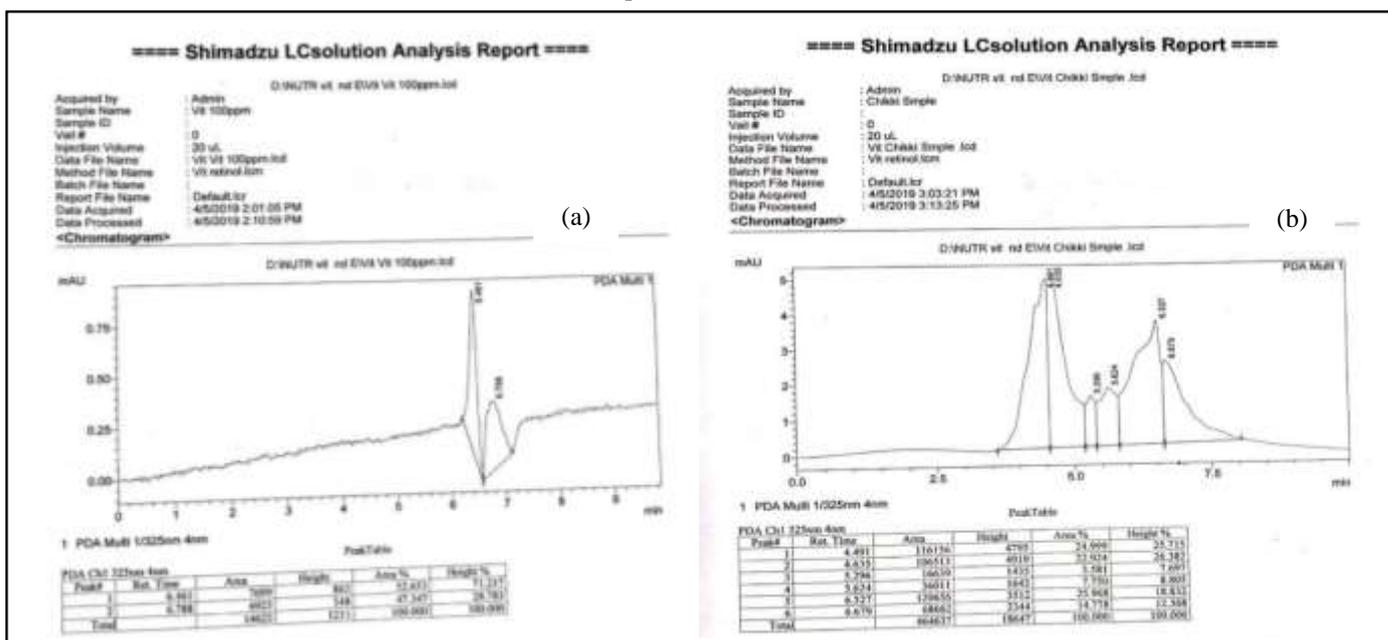


Figure 5 HPLC Chromatogram for Vitamin E analysis. (c)Chromatogram of standard Vitamin E at 294nm; (d) Chromatogram of Sample chikki at 294nm.

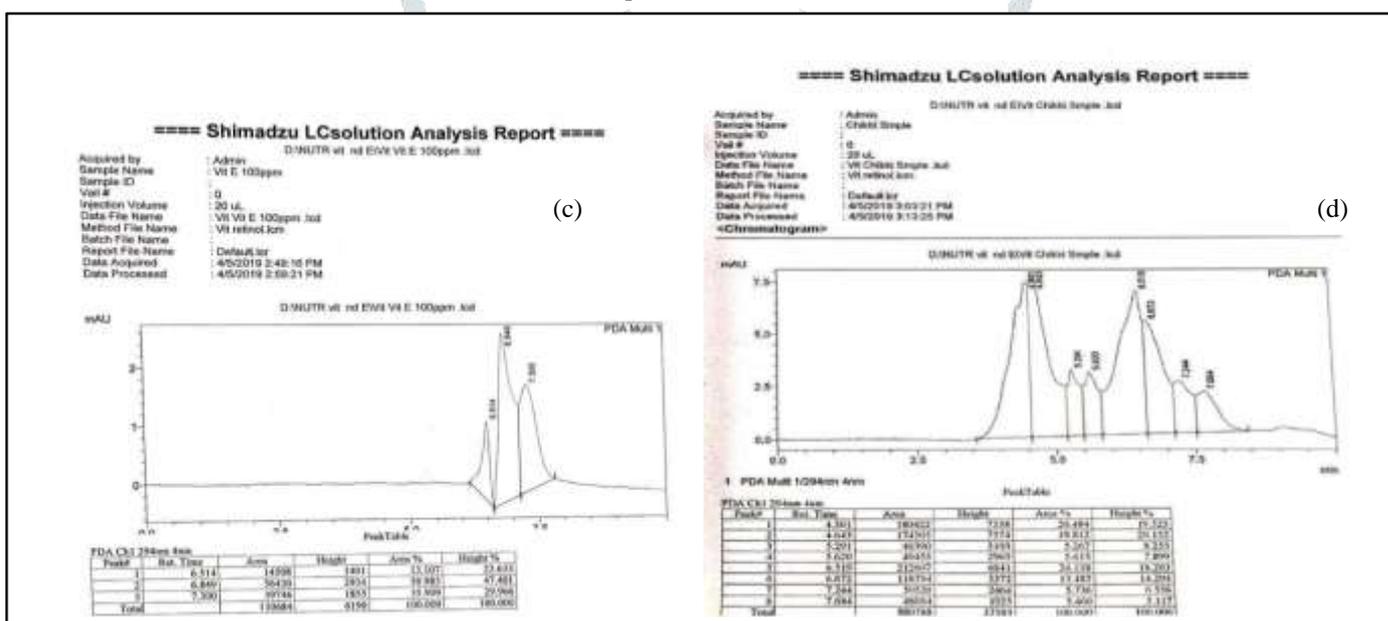


Table 2 Estimation of Vitamin A and Vitamin E

Parameters	Vitamin A	Vitamin B
Concentration (10mg of sample)	1.56	0.08

10.3 Microbial Analysis

The microbial count for developed snack on both Nutrient agar and Sabouraud’s agar plates was found to be less than 30.

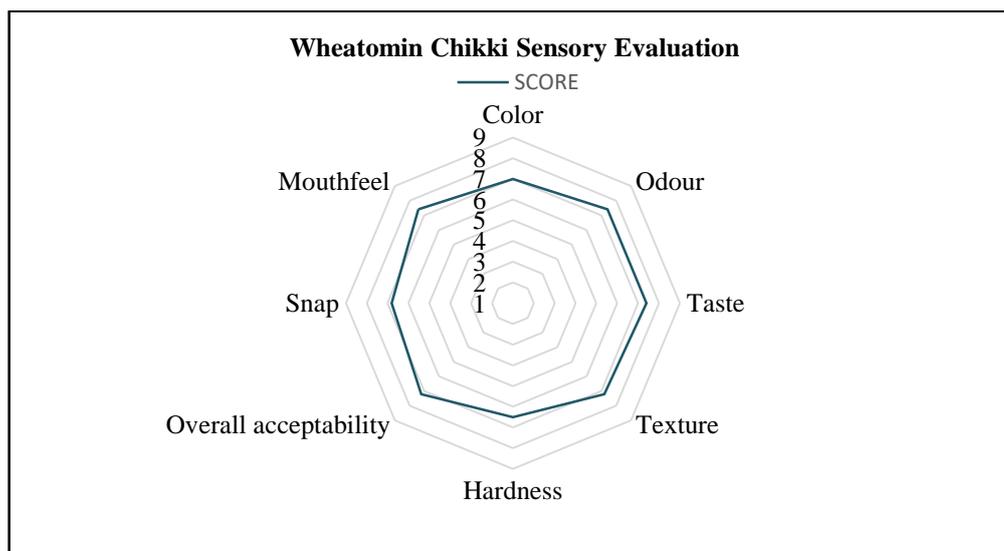
10.4 Shelf Life Studies

The shelf life was carried out for Wheatamin chikki .the product was stored in selected packaging pouch at room temperature for 15 days. It was observed that the product showed no change in colour, texture, Odour and taste within the duration of 15 days.

So, it can be concluded that the shelf life of the product is 15 days from the date of manufacturing.

10.5 Sensory Evaluation

Figure 6 Sensory evaluation results of wheatamin chikki



XI. CONCLUSION

The micro-nutrient rich traditional snack was prepared and analyzed. The analysis showed that the product is rich source of micronutrients like Vitamin A (1.57mg/10gm.), and Vitamin E (0.08mg/10gm.), Calcium (100mg/gm.) and Iron (26mg/gm.). Hence it can be concluded that formulated product-chikki is a rich source of micronutrients and can be a healthier snack option for health conscious young population.

XII. ACKNOWLEDGEMENT

I would like to acknowledge Ms. Subhashini Maharana and Ms. Suhana Kulavoor professor at G.N. Khalsa College for their support and guidance. I wish to extend my special thanks to Ms. Minal Jain Research Scholar in GNIRD who rendered her help for completion of our project work.

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