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Development of fiber rich gummies

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ABSTRACT

The consumers demand for the functional foods and nutraceuticals have increased globally in the recent years. There is a shift towards natural colorants, low fat, low cholesterol, natural based ingredients and free of synthetic additives. The gummy food supplements are more acceptable having fewer limitations compared to other dosage forms. Fiber is a critically important nutrient in the everyday diet as it promotes healthy digestion, improves gut microbiotic composition, helps reduce cholesterol and improves cardiovascular health. Research has shown that the consumers are more likely to move towards fiber as a value added ingredient for a healthy lifestyle. The aim of our study was to produce a fiber-rich gummies. The key ingredients used includes watermelon juice, beetroot juice, plant-based pectin instead of gelatin and stevia. The present study showed that the product is a good source of dietary fiber (8.54%) and carbohydrates (64.52%). The product was liked very much by all the participants (score- 8.) Through various proximate analyses, nutritional value of gummies was estimated. Even the sensory analysis and microbiological analysis were conducted to analyze the safety and consumers preference respectively.

Keywords— *Gummies, Dietary Fiber, Watermelon Juice, Beetroot Juice, Sensory Evaluation, Nutritional Requirements*

1. INTRODUCTION

The demand for foods with a positive impact on human health and wellness has exploded globally over the past two decades. This growth is driven by socioeconomic and scientific factors, increases in population, disposable income, life expectancy and health care costs. The market for healthier foods is also enhanced by advancement in our understanding of dietary bioactive ingredients and their effects on various aspects of human health at a systems and molecular level. Food can even help to reduce the risk of chronic lifestyle-related diseases such as diabetes, dyslipidemia, hypertension, obesity, etc. caused by inadequate metabolic modulation, cancer, allergies, infections, etc., caused by broken body-protection Systems. The recent trend of reconsidering foods and the proper intakes

as the first line of defense against these abnormal modalities has grown from our increased understanding of physiological rather than nutritional benefits of foods.

The recent era is witnessing evaluation of medicinal and nutritional value of fruits and fruit juices for the management and prevention of diseases like headache, stress, anxiety, hypertension and Alzheimer's. Fruits possess various chemicals such as antioxidants and polyphenols, which reduce and balance the effect of hormone in brain responsible for brain diseases. Natural remedy is easily available, non-toxic, and easy to prepare and provides good mental health as compared to other remedies.^[3]

On these lines a product with functional foods like watermelon and beetroot was developed which may work as a healthier option and source of various nutrients. Watermelon is a sweet, commonly consumed fruit of summer, usually as fresh slices, diced in mixed fruit salads, or as juice. Watermelon juice can be blended with other fruit juices or made into wine.^[2]

The seeds have a nutty flavor and can be dried and roasted, or ground into flour. In China, the seeds are eaten at Chinese New Year celebrations. Watermelon rinds may be eaten, but their unappealing flavor may be overcome by pickling, sometimes eaten as a vegetable, stir-fried or stewed.^[2]

Beets were domesticated in the ancient Middle East, primarily for their greens, and were grown by the Ancient Egyptians, Greeks and Romans. By the Roman era, it is thought that they were cultivated for their roots as well. From the middle Ages, beetroot was used as a treatment for a variety of conditions, especially illnesses relating to digestion and the blood.^[1]

2. METHODOLOGIES

2.1 Materials

Watermelon juice, beetroot juice, plant based pectin, stevia, sugar, glucose syrup, citric acid were procured from the market and NUTRIOSE FB06 dietary fiber (Roquette).

2.2 Method

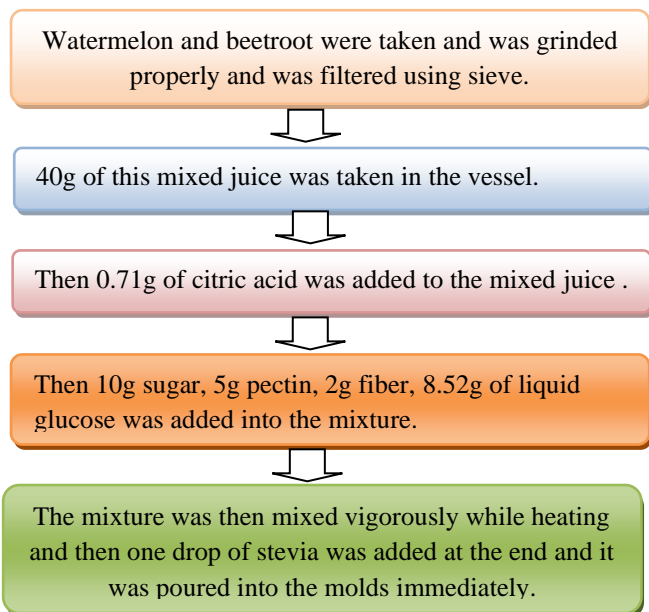


Fig. 1: A flowchart presenting standard preparation method fiber rich gummies

3. FINAL PRODUCT FORMULATION



Fig. 2: Fiber rich gummies

4. PROXIMATE ANALYSIS OF THE PRODUCT

Proximate analysis of the product was done using different methods.

4.1 Estimation of moisture content

Moisture content of the product was estimated using Oven-drying method. The weighed sample was treated at 102°C for 2 hours. [10]

4.2 Estimation of Ash content

Ash content was estimated using the Muffle Furnace. The weighed sample was incinerated and ignited at 550°C in Muffle Furnace. [10]

4.3 Estimation of carbohydrate content

Carbohydrate content was obtained by using weight difference method. Subtracting the value of Proteins, Fats, Ash and Moisture by 100.

4.4 Estimation of fat content

The fat content was estimated using the liquid-liquid extraction method. [10]

4.5 Estimation of protein content

The protein content was estimated using the Biuret method. The samples and standards were prepared and checked using colorimeter at 540nm.

4.6 Estimation of reducing sugar

IS 6287: 2002 (RA 2010) standard method was used to estimate the amount of reducing sugars present in the sample. [11]

4.7 Estimation of Vitamin C content

The Vitamin C content was estimated using Iodometric method/ Redox titration method. [10]

4.8 Estimation 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.

4.9 Estimation of Dietary Fiber

AOAC 985.29 Standard method was used to estimate the amount of dietary fiber present in the sample. [13]

5. MICROBIAL ANALYSIS OF THE PRODUCT

The microbiological analysis was done using Total Plate Count Method and the samples were prepared with the serial dilutions. [14]

6. SENSORY EVALUATION

Sensory evaluation is a scientific discipline used to evoke measure, analyze and interpret reactions to those characteristics of food and materials as they are perceived by the senses of sight, taste, touch, and hearing. Several areas of investigations are involved in the determination of acceptance of foods and description of foods in terms of their sensory properties. The 9-point hedonic scale is a balanced bipolar scale around neutral at the center with The categories are labeled with phrases representing various degrees of affect and those labels are arranged successively to suggest a single continuum of likes and dislikes. [5]

7. RESULTS AND CONCLUSIONS

7.1 Evaluation of proximate analysis

Parameters	Quantity (per 100gram)
Energy	258.08kcal
Carbohydrate	64.52%
Protein	0%
Fat	0%
Ash	0.48%
Moisture	35%
Reducing sugar	6.8%
Dietary fiber	8.54%
Vitamin C	17.6mg

7.2 Evaluation of sensory analysis

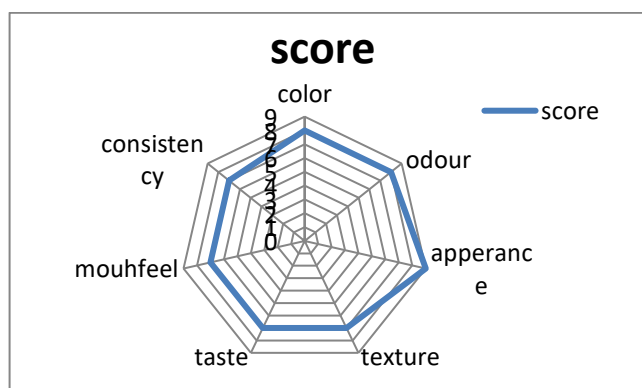


Fig. 3: Score

8. PACKAGING

The packaging of the product – Melobeet gummies was done using PETE (Polyethylene Terephthalate) based plastics container/jars as they are durable, heat resistant and also have good oxygen barrier properties. Packaging contains, protects, preserves, transport, informs and sells in many countries it is fully integrated into government, business, and institutional, industrial and personal use.



Fig. 4: Product packaging and labeling

9. FOOD LABELLING

Food labeling for the products manufactured in India and /or manufactured for the purpose of sale in India should comply certain labeling regulation stated by FSSAI and FSSR. Certain Indian labeling regulations are listed below:

Nutritional information or nutritional facts per 100g of serving of the product shall be given on the label containing the following

- Energy value in Kcal;
- The amounts of protein, carbohydrates, (specify quantity of sugar) and fats in grams (g) or millilitre (ml);
- The amount of any other nutrient for which a nutrition or health claim is made;
- Wherever, numerical information on vitamins or minerals is declared, it shall be expressed in metric units
- Where the nutrition declaration is made per serving, the amount in grams (g) or ml shall be included for reference beside the serving measure.

10. DECLARATION OF VEG/ NON- VEG

- As the product is pure vegetarian it consists of the following declaration
- The symbol is a green color filled circle inside a square of specified diameter.

10.1 Ingredients

The ingredients used in the product are mentioned in their descending order of quantities used.

10.2 Declaration of Additives

The product contains synthetic artificial flavor; thus the following declaration is mentioned on the label.

10.3 Name of Manufacturer

The name of manufacturer; melobeet gummies mentioned on the label.

10.4 Net Quantity

The net content of melobeet is also mentioned on the packet.

10.5 Maximum Retail Price of the Product

The maximum retail price of the gummies is mentioned on the label

10.6 Best Before Date

As the given product contains preservatives, and contains sensitive ingredients it is recommended that it should be consumed within three month from date of packing.

10.7 Storage Conditions

The storage condition is also mentioned on to the label.

10.8 Customer Contact Details

If the customers have any suggestions, complaints, grievances regarding the product a customer care email address is mentioned on the packet. [4]

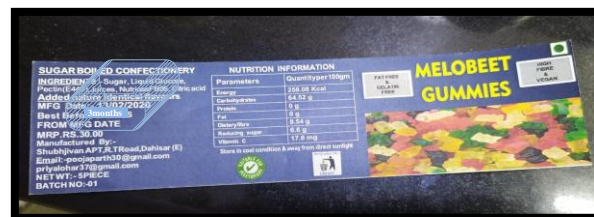


Fig. 5: Product label

11. CONCLUSION

A dietary fiber rich product was developed and its nutritional analysis was carried out. From the results, it is evident that the product is rich in dietary fibers, vitamin c, carbohydrates and contains moderate amount of other nutrients.

The ash and moisture content of the formulated product was found to be 0.48% and 35.013% respectively. It was within limits specified by FSSAI regulations for products under the category of sugar boiled confectionery. The moisture content was high owing to the use of water while cooking and processing.

The total dietary fiber of the product was estimated to be 8.54% or 8.54g/100. Which is higher than the dietary fiber content of 100g juices. The dietary fiber content is more than 6g/100g of the product and more than 3g in 100 Kcal of the product, hence it can be claimed that the product is 'Rich in Fiber', according to FSSAI notification for advertising claims. [13]

Using the iodometric titration method, vitamin C was estimated, which was found to be 8.8mg/100g. the RDA for vitamin C is 60mg/day, however not more than 1g is recommended, as that may lower its absorption in the body. The energy content of the product was found to be 258.08 kcal/100g.

Microbial analysis was carried out using standard plate count method, by pour plate technique. According to WHO, the bacterial growth limit and fungal growth limit are 10 and 10 respectively from 5 days of analysis, it was evident that the product showed microbial growth of <10 CFU/g and fungal growth of <10 CFU/g at room temperature and were found to be within limits. The product was liked very much by all the participants (score- 8).

The shelf life studies carried out for samples kept at room temperature and in the refrigerator showed that the product was stable in the refrigerator condition for 3 months from the date of manufacturing.

12. FUTURE PROSPECTS

Gummies are growing popular in market industry, as people are getting aware about healthy midlife style. Melobeet gummies have a scope to produce in the market industry with different variety of ingredients, and they are ready to be marketed. They can also be improved by adding various nutraceutical ingredients. These gummies can be modified by various others flavors. Sugar reduction is also possible if you want to minimize the sugar content through different ways.

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