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Proximate Analysis And Shelf Life Evaluation Of The Millet Based Nutritious Porridge Powder

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ABSTRACT

In order to examine the numerous components, including moisture content, ash content, protein content, crude fiber, crude fat, carbohydrate, and total energy, a proximate analysis of the product was carried out for the study. Moisture was estimated to be 0.9%, ash to be 5.2%, crude fat to be 3.4%, crude fiber to be 7.35%, protein to be 9.8%, carbohydrates to be 80.7%, and total energy to be 392 kcal. The product's nutritious content was shown by the results, suggesting that it might fulfill an individual's daily needs.

Estimating the prepared product's shelf life was done. The prepared product sample was analyzed for microbial growth using the pour plate method for the shelf-life study. The plates were then incubated for 24 hours, and the CFU was counted. The prepared sample's CFU was determined to be 5×10^3 CFU/ml. The plates underwent a 48-hour incubation period. The results did not change.

Key words: millet, porridge powder, proximate analysis, shelf life, serial dilution

1. Introduction

Millet-based products such as millet flour, flakes, and snacks have gained popularity in recent years. These value-added products not only diversify the market but also create opportunities for entrepreneurship and small-scale industries. By encouraging innovation and product development, the economic potential of millet porridge can be further maximized. Its affordability makes it a staple food for many communities, especially in regions where resources are limited. By showcasing the economic advantage of millet porridge. Millet grains are the source of high-quality protein and

nutritive substitute for cereal protein preferred as a substitute of wheat. The millets were incorporated with normal porridge ingredients to make it more nutritious.

For the preparation of the millet based nutritious porridge powder; millets such as foxtail and finger millet were used along with oats, mung bean, cardamom and cinnamon.

One technique to ascertain the nutritional makeup of food items is proximate analysis. It aids in our comprehension of the various ingredients and their amounts in the dish. We may evaluate the nutritional worth and quality of the food we eat by looking at elements like moisture, protein, fat, carbs, and ash levels. By giving us useful knowledge on the nutritional makeup of food products, proximate analysis enables us to make educated dietary decisions. It assists in ascertaining the energy content of food, evaluating its appropriateness for particular dietary requirements, and guaranteeing adherence to legal requirements.

A set of microbiological, chemical, and sensory tests on food goods is called a shelf life study, and its purpose is to identify when the product has lost its peak quality indicators and is no longer safe to eat. Furthermore, the shelf life serves as a consumer guide that indicates how long food can be stored before it starts to go bad, assuming that the recommended storage guidelines are adhered to. The specified storage conditions, which can be ambient, frozen, or refrigerated depending on the product, are particularly crucial to its shelf life.

2. Materials and Method

2.1 Source of experimental materials

The study was to develop millet based nutritious porridge powder and the preparation was done in the Department of Food and Nutrition, School of Home Science, Babasaheb Bhimrao Ambedkar University, Lucknow-226025, Uttar Pradesh, India. Foxtail millet, finger millet, mung bean, oats, cinnamon and cardamom were collected from the hyper market of Lucknow area.

2.2 Preparation of the product

Millets: Millet grains are the source of high-quality protein and nutritive substitute for cereal protein preferred as a substitute of wheat. The millets were incorporated with normal porridge ingredients to make it more nutritious. For the preparation of the millet based nutritious porridge powder; millets such as foxtail and finger millet were used along with oats, mung bean, cardamom and cinnamon. The ingredients were weighed; Foxtail millet, finger millet and mung bean were pan fried at 55-60°C for 30 min. and then added the rest ingredients; oats, cinnamon and cardamom were pan fried at same temperature and time. After that they were cooled in room temperature. In a clean and moisture free grinder and the ingredients were grinded to make powder. The powder was collected, sieved and transferred to moisture free and sterile glass container.

2.3 Proximate analysis

A. Determination of moisture content

In a hot air oven, a predetermined volume of the sample was evaporated, and the moisture content that was recovered was calculated (AOAC, 2000).

Moisture Content (%) = (B-C) × 100÷(B-A)

B. Determination of ash content

The principle of ashing to burning off the organic matter and to determine the inorganic matter remained. The percent ash content was calculated by on the basis of initial sample (AOAC, 2000).

Total ash content (%) = (W3-W1) ×100÷(W2-W1)

C. Protein content

According to the Kjeldahl method, total protein is equal to the amount of nitrogen discovered through experimentation multiplied by the proper conversion factor. The 15. 7219-1973 RA technique was used to assess the protein content of the jam sample. Three stops are included in the Kjeldhal technique of estimating nitrogen.

(a) Digestion: 20ml of concentrated sulfuric acid, 2g of digestion mixture, and 0.2g of sample. For at least three to five hours, boil. 100ml is made up of the digested sample and distilled water.

(b) The process of distillation: 500 ml of 40% NaOH, 50 ml of distiled water, 10 ml of digested sample, 30 ml of 4% boric acid, and 200 °C were all beaten into a dastillation flask.

(c) Titration: Put two to three drops of methyl red indicator into a conical flask along with 10 to 20 milliliters of sample and 0.1N HCI. It was titrated for 3 to 4 times.

Protein (g/100g) = (c-b) ×14d×6.25 ×100 ÷(a×1000)

D. Crude fat

The Soxhlet extraction method for determining the crude fat content of food samples. A moisture-free sample weighing three grams was stored in a thimble. After that, the sample-containing thimble holder was filled with 250 ml of diethyl ether. The soxhlet device was then turned on, with a temperature setting of 34.2°C, and it ran for six hours. Subsequently, the extracted sample that was placed in the bottom flask was weighed. The following formula was used to determine the fat content:

Crude fat (%) = (W4-W3) ×100÷(W2-W1)

Where,

W1- weight of empty thimble

W2- weight of thimble +sample

W3-weight of empty flask

W4- weight of flask +fat

E. Crude fiber

By using the sequential acid and alkali hydrolysis method, the AOAC was able to quantify the crude dietary fiber content of the produced porridge powder sample. The boil in base was 0.313 sodium hydroxide, and the boil in acid was 0.128 M sulfuric acid. First, two grams of sample were weighed, then boiled in acid for thirty minutes before being filtered. After another 30-minute boil in the base solution, the filtrate was filtered. Weight was determined by ashing the filtrate for five hours in a muffle furnace after it had been dried for two hours in an oven. Next, the formula was applied to obtain the crude fiber.

Crude fiber (%) = (W1-W2) × 100 ÷ W

Where,

W1- weight of the sample before ashing

W2- weight of the sample after ashing

w- weight of the sample

F. Carbohydrate

The carbohydrate was determined by the SP 18 (P-6) 1981 method. By substracting the moisture, protein, and ash content from the total mass, the carbohydrate content can

be determined.

Carbohydrate content = [100 – (moisture + protein + fat + ash)]

G. Energy

The total energy is determined by using the formula;

Total Energy = 4(carbon + protein) + 9 fat

2.4 Determination of shelf-life

The sample was serially diluted and the shelf life analysis was carried out on nutrient agar medium. The microbial colony was ascertained using the pour plate method. The petri-plates were examined for 24 to 48 hours. The number of colonies (CFU) was noted for the outcomes.

- Sample Preparation: To prepare the sample, weigh 10 grams and combine it with 80 milliliters of sterile water. It produced a sample dilution of 1:10 (101).
- Serial Dilution: Next, a further dilution of the produced sample was applied. Nine milliliters of distilled water were added to each of the five test tubes after they had been taken and labeled appropriately. Dilutions were made up to 104 times from the 101 dilution. For this, a diluent tube with the number 102 was filled with 1 milliliter of a 1:10 dilution, which was then added to the next diluent and so on. Each time a test tube was transferred, it was violently rattled.

3. Results and Discussion

3.1 Proximate analysis

The prepared millet based nutritious porridge powder was analysed for moisture content, ash content, crude fat, crude fiber, protein, carbohydrate, and total energy was found to be 0.9%, 5.2%, 15.2%, 7.35%, 9.8%,68.9% and 451.6 kcal. Respectively.

S.No.	Parameter	Results
1	Moisture content	0.9%.
2	Ash content	5.2 %.
3	Crude fat	15.2%
4	Crude fiber	7.35%
5	Protein content	9.8%.
6	Carbohydrate	68.9 %.
7	Energy	451.6 kcal

Table no. 3.1: Results of proximate analysis

3.2 Shelf-life evaluation

For the shelf-life study the prepared product sample was analysed for the microbial growth by pour plate method and the plates for incubated for 24 hrs. and CFU was counted. The cfu of the prepared sample was found to be 5×10^3 Cfu/ml. The plates were further incubated for 48 hrs. No change in result were found.

S.No	Incubation period	Dilution number	No. of colonies	Cfu/ml
1	24 hours	10^2	5	5×10^3
2	48 hours	10^2	5	5×10^3

Table no. 3.2: Result of microbial growth

4. Conclusion

The product's proximate analysis showed that its moisture content was 0.9%, ash content was 5.2%, crude fat content was 3.4%, crude fiber content was 7.35%, protein content was 9.8%, 80.7%, and its total energy was 392.6 kcal. The product has a good number of nutrients, all of which are essential for maintaining human health. When developing new products, microbiological examination is a crucial component that ensures consumer safety. It establishes the product's shelf life and identifies the microbe responsible for the degradation. The pour plate method was employed in this analysis to determine the product's CFU value. Following a 24-hour incubation period, the outcome was determined to be 5×103. After being held for a further 48 hours, the colony plates' growth culture remained unchanged.

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