

Development of Iron and Fiber Rich Food Product from Animal Fodder

Luxita Sharma

Associate Professor & Head Amity Medical School and Dept. of Dietetics and Applied Nutrition Amity University,
Gurgaon, Haryana

*Corresponding Author: lsharma@ggn.amity.edu

Food is any substance consumed by human beings or any living organism to get energy and nutrition. In other words, food is the fuel to the human body. So, to complete the nutritional requirements sometimes we have to eat some supplements or nutritious food products. In the present study, we have prepared a nutrition-rich food product from the waste of plants and vegetables. A lot of leaves/vegetable parts are wasted because of a lack of knowledge and information. Green vegetables are rich in nutrients and dietary fibre. Leafy vegetables have fewer calories and fat. They are rich in protein, vitamins like A, K and C, carotenoids, folate, and manganese. A healthy diet includes whole grains, vegetables, green vegetables and fruits.

Cauliflower waste and beet plant greens are rich in iron, calcium and beta-carotene but they are used as animal fodder. The present study was conducted to utilize these leaves to formulate a food product rich in iron and other micronutrients. Rice flakes were also used to increase the nutritional content of the product. The final product Vermicelli was prepared by using iron-rich powder. Iron-rich powder was obtained by mixing powder of beet greens and cauliflower greens in a ratio of 50:50. Wheat flour was used as the binder to make the final food product.

Beetroot, one of the highly nutritious vegetables, was cultivated in the ancient Middle East by Romans, Greeks, and Ancient Egyptians. Beets have an ancient Latin name which is Beta. Beta name is of Celtic origin. Around 1400, in old English language beta name is converted into Bete. Beet plant greens are rich in Iron, magnesium, calcium, copper. They are also rich in vitamins like A and ascorbic acid. They are rich in carotene which is a natural antioxidant and it also contain retinol. The antioxidant activity of beet plant greens is higher than any green leafy vegetables. Leaves are rich in iron content but

due to the lack of knowledge, these leaves are used as a animal fodder.

Cauliflower is one of the highly nutritious vegetables, that originated in northeast Mediterranean. Cauliflower name is originated from "Cavolfiore" which means "cabbage flower". In Latin "Caulis" means stalk and "Floris" means flower. Additions of cauliflower greens in the diet reduce the chances to anaemia and increase haemoglobin level in the blood. Cauliflower greens contain a good amount of calcium, iron and fibre. Because of its good calcium and iron content, it helps in the formation and maintenance of the bones. The high amount of fibre helps in digestion and better functioning of the gut. Cauliflower greens powder have a good amount of vitamin C and beta carotene. The powder contains 60.78 mg/ 100 gm iron. Many products can also be formed by the addition of the powder and these products can be used in the daily diet for the improvement of the nutritional status of people. So, a Low-cost and Iron, fibre-rich product can be made out of the greens instead the cauliflower greens are fed to animals.

Rice flakes are the flattened rice. These flakes are flat in shape and dry in weight. These are the native of the Indian subcontinent. For the formation of rice flakes, rice is semiboiled and the process is known as parboiling. Rice flakes a good amount of iron, calcium, carbohydrates and protein. Shelf life of Poha is 2 to 3 months which is quite long. A study was conducted by M, 2019 to examine the effect of laddoo made up of rice flakes and jaggery on haemoglobin level of adolescent girls. The level of haemoglobin was tested before and after the supplementation of laddoos. Results indicates the laddoo intake increase the level of haemoglobin in blood.

Material and Methods

The present study was conducted in department 'Dietetics & Applied Nutrition' faculty

'Amity Medical School' of 'Amity University Haryana'. The main aim of the study was to formulate a Iron Rich Vermicelli to prevent iron deficiency disease. **Collection of beet leaves:** Leaves green colour without bulb was selected. Collected leaves were long to medium in size with enough maturity.

Washing of leaves: To remove the dirt and soil leaves were washed under the running tap water. These washed leaves were collected in a utensil.

Blanching of beet leaves: Washed leaves were blanched for 2 minutes. The blanching was carried out by putting leaves in hot water for 2 minutes and then placed them in cold water immediately. Blanching increases the availability of moisture, fat, crude fibre and beta carotene amount in leaves. Anti-nutritional factors were reduced to bare minimum.

Drying of leaves: Blanching leaves were placed on a tissue paper. Leaves were dried into sunlight for 2 days.

Powder of leaves: After drying, leaves were reduced into powder using laboratory grinders and the powder was stored in labelled air-tight containers.

Washing of cauliflower greens: Cauliflower greens were washed under running tap water to remove dirt and dust for their surface.

Cutting into pieces: Greens were cut into small pieces because it was easier to dry small pieces than larger ones. These small pieces of cauliflower were washed again under running tap water.

Drying: Pieces were dried into sunlight for 3 days.

Powder of greens: Dried pieces of cauliflower greens were reduced into powder using laboratory grinders and powder was stored in air-tight containers.

Powder of rice flakes: Rice flakes were converting into powder by using laboratory grinders.

Development of Vermicelli

A powder of cauliflower greens, beet leaves and rice flakes were used to prepare a product. Wheat flour was used for the binding of vermicelli. An iron-rich powder was prepared and the amount was 100 grams. Ratio of powder and wheat flour was 50:50.

Variation in samples of vermicelli: Four sample variations were prepared 100 grams each.

Table 1: The variations of the sample prepared for Vermicelli

Ingredients	Sample A	Sample B	Sample C	Sample D
Rice flakes powder	45g	40g	35g	30
Iron rich powder	5g	10g	15g	20g
Refined wheat flour	50g	50g	50g	50g
Total	100 g	100 g	100g	100g

Preparation of dough

All samples were prepared separately with same procedure. All ingredients were mixed properly to get a consistent dough. Less 50 ml water was used for the preparation of dough. To prepare vermicelli dough should be little hard in consistency.

Procedure for preparation of vermicelli

- Uncooked and raw vermicelli was prepared by hands without using any machine.
- A little amount of ghee was used on the both hands so that dough does not stick.
- All samples of raw vermicelli were dried under shade for 3 to 4 days.
- Dried vermicelli was used for cooking.
- Each sample was cooked separately.

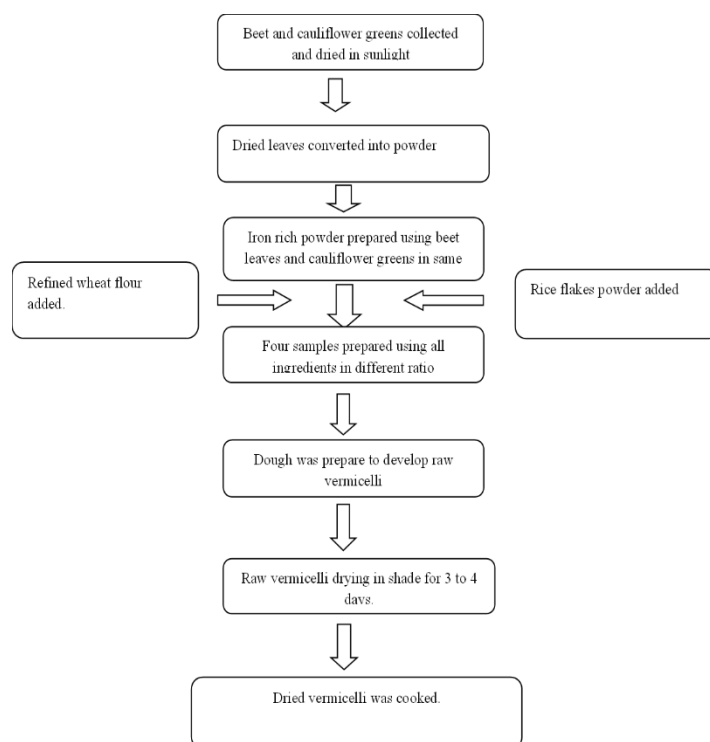


Fig 1. Flow chart of preparation of vermicelli



1. Beetroot Plant



2. Washed leaves



3. Fresh



4. dried cauliflowers



5. Blanched



6. Dried cauliflower leaves



7. Cauliflower greens powder



8. beet leaves powder



9. Rice flakes



10. Refined wheat flour



11 to 14. Four samples of raw vermicelli



15 to 18: The cooked four samples of vermicelli

Fig 1: Images of processing preparing vermicelli

Discussion

The sensory evaluation was carried out by panel of twenty semi-trained experts. The result based on the sensory evaluation indicated that all samples were accepted in terms of taste but sample A was highly accepted by the panel members. Sample D was less accepted.

Sample A, sample B, sample C and sample D of rice vermicelli was prepared using refined wheat flour: rice flakes: iron rich powder in the ratio of 50:45:5, 50:40:10, 50:35:15 and 50:30:20. The sensory evaluations of all products were carried out by 10 panel members on the basis of taste, colour, texture, firmness, stickiness and overall acceptability. The sample A contains 5 g of iron rich powder was highly accepted by the panel members. The least accepted sample D contains 20 g of iron rich powder.

Sample A contains 5 g of iron rich powder per 100 gram and highly accepted in terms of taste. High amount of iron rich powder lowers the rate of taste. Sample C and sample B were well accepted but sample D was less acceptable in terms of the colors. Sample A was light green on color because it contains only 5 g of powder but sample D had 20 g powder of greens which gives dark green color to product. The uncooked vermicelli of sample A was attractive in color and different from every sample because of its light color.

It was also difficult to prepare vermicelli from the dough of sample D which contains 20 g powder. Sample A was highly accepted on the basis of firmness. The high amount of greens powders in sample D causes instability in product. On the basis of stickiness sample A got high scores during sensory evaluation. Sample B and sample C were well accepted on the basis of stickiness. Sample D shows high amount of stickiness and less accepted by the panel members. Sample A was high overall acceptability on the basis of texture, taste and color. Sample A had good color and better taste among all the samples. Texture and firmness of the sample was

maintained after the cooking. Sample B was less accepted than sample A and sample C on the basis of firmness, taste, texture and color and had less overall acceptability. Sample D got less overall acceptability on the basis of texture, color, taste, firmness and stickiness among all samples.

The prepared rice vermicelli was cheap in price and loaded with nutrients like iron, calcium and dietary fiber. Rice vermicelli was used to prevent certain disease like hypertension, iron deficiency anemia, diabetes and shows therapeutic effects.

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