



## Development And Nutritional Analysis of Curry Leaves (*MURRAYA KOENIGII*) Incorporated Mathri

**Abstract:** Curry plant (*Murraya koenigii*) is a storehouse of nutrients, antioxidants, minerals, vitamins and other plant components which contribute immensely to therapeutic benefits. Its Incorporation in our meal could be great options to enhance flavour, test and nutrition quality. Mathri is one of the beloved and popular snacks. It is easy to make, store and consume at any time. This study aims to develop value added mathri incorporated with curry leaves powder. Incorporated Mathri were prepared with wheat flour and curry leaves powder (CLP) with 5, 7 and 9% for three treatments namely M1, M2 and M3 respectively and control mathri (M0) was prepared by wheat flour. Mathri were analysed for proximate composition using standard procedure of AOAC (2000) and mineral content i.e., zinc, potassium and magnesium were determined by Lindsey and Norwell (1969) method, phosphorus content was analysed according to method of chen *et al.* (1956) and sodium content was analysed by Ranganna (1986) method. The analysis revealed that mathri with incorporation of curry leaves powder was found with appreciable nutritional profile. Thus, incorporation of curry powder can bring considerable change in nutritional profile of developed product, and it could be a good choice for a healthy snack

**Nidhi Pathak<sup>1</sup>, Prof. Archana Singh<sup>2</sup>**

### Affiliation

<sup>1</sup>Research Scholar, Department of Food and Nutrition, Institute of home science, DBRAU, Agra

<sup>2</sup>Professor and H.O.D. (Dept. Of food and nutrition), Institute of home science, DBRAU, Agra

### Article History:

Received Date : Jul 03, 2025

Revised Date : Jul 15, 2025

Accepted Date : Jul 15, 2025

Published Date : Jul 22, 2025

### Introduction

Curry leaves known as *Murraya koenigii*, it belongs to *Rutaceae* family [9]. It is known by different names in India like Barsunga, Karivempu, Karipatta, meetha neem etc [6]. Curry leaves are popular leaf spice for their distinct aroma due to presence of volatile oil and it has quality to give a nice aroma to the dishes. The presence of pinene, sabinene, cadinol, caryophyllene and cadinene constituents are responsible for flavour and aroma, reported in previous studies. It has valuable properties like an anti-microbial, anti-diabetic, antioxidant properties, hypercholesterolaemic, anti-inflammatory and hepatoprotective etc [4]. From ancient time herbal Plants are being used for therapeutic and other purpose and also being promoted as a source of less expensive and comprehensive Medicare. In developing

countries, it is promoted because it is cheaper, safer and it has no major side effect.

In previous study it has been found that curry leaves are having ethnobotanical, pharmacognostic, phytochemical and pharmacological properties, contains various bioactive compounds and has potential to cure many ailments like diabetes, ulcer, high cholesterol, diarrhoea, wound healing, memory loss, cancer, dysentery, vomiting, cures piles, inflammation, itching, kidney associated pain, skin eruption etc and also have potential to treat the bite of poisonous animals [6], [3].

In this technical era people are multi-task oriented, having busy schedule and inclining towards ready to eat food and formulation of products with incorporation of herbs can bring considerable change in its nutritional profile. So, this study aims to develop and analyse proximate composition and mineral content of curry powder incorporated mathri.

### Material and Methods

To develop curry leaves powder, fresh leaves were cleaned and washed properly. Washed leaves were spread over the floor in fully ventilated room at a temperature of 27- 32°C for 15 days (Shade drying method) [8]. dried leaves were collected and fine powder was formed and stored. Formation of value added Mathri were prepared by adding different ratio of Wheat flour and curry leaves powder. Curry leaves powder was incorporated in wheat flour at 5, 7 and 9% level in addition of oil, ajwain, salt and water. All ingredients mixed well, added water and make

hard dough. Then the dough divided into small balls, roll the balls, make round shape and deep fried in edible oil.

#### Nutrients analysis: -

Curry leaves powder incorporated mathri were analysed for proximate composition i.e. moisture, ash, crude fibre, crude fat, crude protein and carbohydrates as well as mineral content namely phosphorus, zinc, sodium, potassium and magnesium. Proximate composition of mathri i.e. moisture, ash, crude fibre, crude fat and crude protein was determined by standard procedure of AOAC (2000) and carbohydrate content was determined using difference method. Mineral content of developed mathri namely zinc, potassium and magnesium analysed by Lindsey and Norwell (1969) procedure, phosphorus content was analysed according to procedure of Chen *et al.* (1956) whereas sodium content was analysed according to the method of Ranganna (1986).

**Moisture:** Five grams of sample weighed in China crucible and dried for 8 hours in hot air oven at 105°C. Then transferred it to a desiccator, weighed after cooled down. The loss in the weight was calculated as presence of moisture using below formula.

$$\text{Moisture (\%)} = \frac{\text{loss of weight (g)}}{\text{weight of sample (g)}} \times 100$$

**Ash:** 5 grams of sample was weighed in a crucible. Then, the sample was placed in a muffle furnace at 550°C for 4 hours. The left residue was weighed after cooled down.

$$\text{Ash (\%)} = \frac{\text{weight of ash (g)}}{\text{weight of sample (g)}} \times 100$$

**Crude fibre:** Crucibles (Fibra plus) were oven dried, cooled, weighed and marked as W1. For determination of crude fiber, 5g of sample was weighed kept into then placed the crucibles in metal adapters of Fibra plus. The acid, base and distilled water was heat up on a hot plate and added 150 ml of the 1.25% of H<sub>2</sub>SO<sub>4</sub> into the extractor unit of the equipment. Then switched on the equipment and set the initial temperature at 500°C after that temperature was reduced to 400°C. The sample was boiled in acid solution for 40 minutes. After boiling the solution, drained off

acid and rinsed with distilled water thrice in order to free the sample from acid residue. Then, acid washed sample was again boiled for 40 minutes with 150 ml of 1.25% NaOH in the same process as acid wash, rinsed the sample with distilled water thrice to free alkali residue from the sample. Removed, crucible with digested samples from the equipment and dried in hot air oven to make free the samples from moisture. The samples were cooled down in a desiccator and weighed the crucibles (W1). Then, crucibles with dried samples were placed in the muffle furnace for 4 hours at 550°C. After ashing, the crucibles were removed from the furnace, cooled down the sample in desiccator and weighed (W2).

The loss in weight was recorded and calculated fibre content of the sample using below formula:

$$\text{Crude fibre (\%)} = (W2 - W1)/W \times 100$$

here, W3= W1-W2

W1=Weight of residue before ignition

W2= Weight residue after ignition

W= Weight of sample

**Crude fat:** The empty beakers were weighed and mark W1 and Inserted the thimbles in the beakers. Two grams of sample weighed and transferred to the thimbles, placed the beakers in the system for boiling, set the temperature at 120°C then the temperature was reduced to 90°C and run the equipment for 45 minutes, after that the temperature of system was raised to 120°C, closed the nozzle and the equipment was run for 15 minutes. The beakers were put in hot air oven for 15 to 20 minutes then removed the beaker and put it into a desiccator and taken out the thimbles and weighed. The final weight of the beaker was marked as W2.

The crude fat of the sample was calculated by using below formula:

$$\text{Crude fat (\%)} = \frac{W2 - W1}{W} \times 100$$

Where,

W2 = final weight of the beaker

W1= initial weight of the beaker

W= weight of the sample



**Crude protein:** 200mg sample taken and kept in clean digestion tubes with 4 grams of digestion mixture with 10 ml of concentrated H<sub>2</sub>SO<sub>4</sub> and then tubes were placed in the digestion block equipment. The sample were completely (pre-digestion at 300°C and final digestion at 420°C). Cooled the digested sample and diluted with addition of 30 ml of distilled water. Distilled the sample using 40% NaOH for 9 minutes in Kjeldahl plus distillation. Collected distilled ammonia in 4% of boric acid. The determination of the amount of nitrogen trapped in the flask was done by titrating with a standard solution of 0.1N H<sub>2</sub>SO<sub>4</sub> then the nitrogen value was multiplied by 6.25 to obtain the protein content.

**Carbohydrate:** Carbohydrate was calculated by using following formula:

$$\text{Carbohydrate} = 100 - (\text{protein} + \text{fat} + \text{fibre} + \text{ash})$$

**Mineral content:** Mineral content (zinc, potassium and magnesium) in developed products were estimated wherein to one gram ground sample in a 150 ml conical flask, added 25-30 ml of diacid mixture (HNO<sub>3</sub>: HClO<sub>4</sub>: 5:1, v/v) and kept it for overnight. Digested the contents by heating until clear white precipitates were settled down at the bottom. Then, made the volume to 50 ml with double distilled water. Filtered the crystals to Whatman No. 42 paper and used for determination of mineral contents using procedure of Lindsay & Norwell (1969).

Phosphorus content in developed product were analysed according to method of Chen et al. (1956). Pipetted mineral extract (0.1ml) in attest tube and made volume to four ml with water, added four ml reagent C and mixed it well. Incubated the contents at 37°C in water bath for 90 minutes, removed and allowed it to cool at room temperature then recorded the absorbance against a suitable blank. Whereas sodium content was estimated by digital flame photometer according to the method of Ranganna (1986).

**Statistical analysis:** Statistical analysis was performed using mean and standard deviation

## Results and Discussion

The present study was undertaken to prepare curry leaves powder incorporated

Mathri. The data pertaining to the proximate composition and mineral content of control and CLP incorporated mathri are shown in table1 and table 2. The moisture content of all treatments were gradually decreased with incorporation of CLP at 5, 7 and 9% i.e.6.59, 6.51, 6.45g/100g respectively whereas control mathri was found with 6.66 g/100g moisture content. Ash was detected with 2.39g in control mathri to 3.84g ash in 9% CLP incorporated mathri, 5% and 7% CLP mathri contains 2.86g and 3.22g ash respectively, there was appreciable increase in ash content, it shows presence of minerals in valuable amount. It was observed consistent increase in the crude fiber content in CLP incorporated mathri at 5%, 7% and 9% i.e. 2.78 3.02, 3.93g/100g respectively in comparison to control mathri i.e. 2.45g/100g. The crude fat content was slightly decreased with the incorporation of CLP in mathri at 5, 7 and 9% i.e. 18.01, 17.96 and 17.91g/100g respectively whereas control mathri was found with 18.08g/100g. The protein content of CLP incorporated mathri were detected in appreciable amount at 5, 7 and 9% i.e. 8.98, 9.64and 10.08per 100g respectively, whereas control mathri contains 8.35g/100g, it can be considered as a good source of protein. Carbohydrate content in control Mathri was 68.73 whereas in 5, 7 and 9% CLP incorporated mathri carbohydrate content was 67.37, 66.16 and 64.24g respectively.

Phosphorus content increased from 119.98 mg in control mathri to 122.12mg in 9% CLP incorporated mathri, 5 and 7% supplemented mathri contain 120.65 and 121.25mg/100g respectively. Zinc content in supplemented mathri showed a substantial enhancement at 5,7 and 9% i.e. 1.78, 1.92, 2.36mg/100g respectively whereas control mathri had 1.62mg/100g zinc amount. Sodium content was increased with incorporation of CLP at 5, 7 and 9% i.e. 1.64, 2.27, 3.02mg/100g and control mathri found to be 1.03mg sodium. Potassium content elevated in appreciable value from 213.54 mg in control mathri to 216.28 mg in 9% CLP mathri, 5 and 7% CLP incorporated mathri contains 214.19 and 215.07.23mg respectively and magnesium content was detected in control and CLP incorporated at 5, 7 and 9% were found 87.89, 88.61, 89.36 and 90.16mg/100g respectively.



**Table:1 Proximate composition of control and CLP incorporated mathri**

| Proximate composition (g/100g) | M0         | M1         | M2         | M3         |
|--------------------------------|------------|------------|------------|------------|
| Moisture                       | 6.66±0.44  | 6.59±0.37  | 6.51±0.56  | 6.45±0.24  |
| Ash                            | 2.39±0.22  | 2.86±0.16  | 3.22±0.11  | 3.84±0.08  |
| Crude fiber                    | 2.45±0.06  | 2.78±0.13  | 3.02±0.09  | 3.93±0.10  |
| Crude fat                      | 18.08±0.25 | 18.01±0.19 | 17.96±0.26 | 17.91±0.14 |
| Crude protein                  | 8.35±0.84  | 8.98±0.63  | 9.64±0.73  | 10.08±0.78 |
| carbohydrate                   | 68.73      | 67.37      | 66.16      | 64.24      |

Triplicate values are expressed as mean± STD

**Table:2 Mineral content of control and CLP incorporated mathri**

| Mineral Content (mg/100g) | M0          | M1          | M2          | M3          |
|---------------------------|-------------|-------------|-------------|-------------|
| Phosphorus                | 119.98±0.34 | 120.65±0.40 | 121.25±0.66 | 122.12±0.42 |
| Zinc                      | 1.62±0.18   | 1.78±0.11   | 1.92±0.12   | 2.36±0.24   |
| Sodium                    | 1.03±0.10   | 1.64±0.23   | 2.27±0.30   | 3.02±0.20   |
| Potassium                 | 213.54±0.75 | 214.19±0.64 | 215.07±0.80 | 216.28±0.53 |
| Magnesium                 | 87.89±0.43  | 88.61±0.46  | 89.36±0.35  | 90.16±0.46  |

Triplicate values are expressed as mean± STD

### Conclusion

In this study, Mathri were prepared with incorporation of curry leaves powder at different level i.e. 5, 7 and 9% and incorporated mathri were found with increased levels of protein,

crude fiber, phosphorus, zinc, sodium, potassium, magnesium and low in carbohydrate and fat content in incorporated products. Curry leaves are abundant source of macro and micronutrients as well as other plant



components. So, incorporation of this herb in different snacks and diet could be better option to get nutritious food.

## References

- [1] AOAC Official methods of analysis. 16<sup>th</sup> Ed. Association of official analytical chemists. Arlyngton, Virginia, USA. 2000.
- [2] Chen, P.S., Toribara, T.T., & Warner, H. Micro determination of phosphorus. *Analytical chemistry*, 1956, 28(11), 1756-1758.
- [3] Handral, H. K., Pandith, A., & Shruthi, S. D. (2012). A review on *Murraya koenigii*: multipotential medicinal plant. *Asian Journal of pharmaceutical and clinical research*, 5(4), 5-14.
- [4] Lal, M., Godara, P., Upadhya, S., & Kaur, J. (2024). Effect of curry leaves supplementation on the sensorial and nutritional attributes of fermented food products. *International Journal of Home Science*, 10(3), 301-309.
- [5] Lindsey, W.L. & Norwell, M.A. A new DPTA-TEA soil test fir zinc and iron. *Agronomy Abstract*, 1969, 61: 84-89.
- [6] Nishan, M., & Subramanian, P. (2015). *Murraya koenigii* (curry leave)-A review on its potential. *Int. J. PharmTech Res*, 7(4), 566-572.
- [7] RANGANNA, S. Handbook of Analysis and Quality control for Fruits and Vegetable Products. *Tata McGraw Hill Pub. Co.Ltd.*, 1986, New Delhi.
- [8] Salve, R. V., Syed, H. M., More, S. G., & Shinde, E. M. Effect of different drying treatment on composition, nutritional and phytochemical content of curry leaves. *The Pharma Innovation Journal*, 2020, 9(7), 584-589
- [9] Sonia. V. R., Sindhu, S. C., Kumar, N., & John, J. (2021). Vitamin- A Enrichment in dhokla with *Murraya koenigi*: An Underutilized Medicinal Plant in India. *Environment and Ecology*, 39(4), 791-796.