Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3288-3291 | ISSN:2251-6727

# Physicochemical Characterization and Extraction Optimization of Kaempferia parviflora

**Shagufta Mahdi[1], Dr. Shikha Singh[2], Dr. Shariq Mian[3], Dr. Kahkashan Parvin[4]**

[1]Research Scholar, Department of Food and Nutrition, Era University, Sarfarazganj, Hardoi Road, lucknow-226003, Uttar Pradesh, India.

[2]Assistant Professor, Department of Food and Nutrition, Era University, Sarfarazganj, Hardoi Road, lucknow-226003, Uttar Pradesh, India.

[3] Assistant Professor, Department of Food and Nutrition, Era University, Sarfarazganj, Hardoi Road, lucknow-226003, Uttar Pradesh, India.

[4]Associate Professor & Head, Department of Food and Nutrition, Era University, Sarfarazganj, Hardoi Road, lucknow-226003, Uttar Pradesh, India.

***(Received: 25 October 2025 Revised: 27 November 2025 Accepted: 16 December 2025)***

**KEYWORDS**

*Kaempferia parviflora*, extraction, moisture, ash, yield

**ABSTRACT:**

**Introduction**: Black ginger (*Kaempferia parviflora*) is a food crop belonging to the family of Zingiberacea. It is known as *Kaempferia parviflora Wall ex. Baker*. The other name are Thai ginseng, Thai black ginger, Kali Adrak, Karchaidum. In India, it is mainly cultivated in assam and Mizoram. The compounds of black ginger have shown to possess many medicinal properties, it has anti allergic effects, cardio protective effects, energy enhancement effects, anti-aging effects, anti-inflammatory effects.

**Objectives:** To assess the physio chemical characteristics and yield percentage in different solvents**.**

**Methods**: The physiochemical characteristics of black ginger powder was assessed by using the standard protocol. It includes moisture, ash content, extraction optimization, percentage yield and solubility of black ginger powder. The Soxhlet process were used for extraction at different solvents.

**Results:** The moisture content was found to be 50.32%. It was found that the moisture and ash content of black ginger was much higher than that of *Zingiber officinale*. The yield percentage was higher in the ethanol as compared to other solvents.

**Conclusions**: It was concluded that the rhizomes of black ginger have higher amount of moisture content as compared to the other variety of ginger (*Zingiber officinale*). The Soxhlet extraction shows that the yield percentage was higher in ethanol i.e. the solubility was higher in ethanol.

## 1. Introduction

Black ginger *(Kaempferia parviflora)* is a food crop belonging to the family of Zingiberacea. It is known as *Kaempferia parviflora Wall ex. Baker*. The other name of *Kaempferia parviflora* is Thai ginseng, Thai black ginger, Kali Adrak, Karchaidum. It mainly belongs to the South Asian countries such as Thailand and Japan. It is widely distributed in India, Bhutan, Myanmar and Bangladesh. In India it is majorly cultivated in Nagaland Mizoram and Manipur. There are about 60 species of genus Kaempferia. Major species are *Kaempferia galanga, Kaempferia parviflora, Kaempferia rotunda, Kaempferia angustifolia and Kaempferia pulchra*. It is highly rich in flavonoids. Due to the presence of phytochemicals, it significantly contributes to the prevention of many health issues. The two main chemicals derived from *Kaempferia parviflora* root are 5,7-dimethoxyflavone and 5,7,4'-trimethoxyflavone [1].

Studies reported that it possesses the potential for the treatment of allergies, breast cancer, inflammatory-related illnesses, and energy enhancement. Apart from medicinal uses it has many cosmetic uses also such anti-aging effects and skin whitening effects. Furthermore, it is shown to have strong anti-inflammatory effects and is

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(6), 3288-3291 | ISSN:2251-6727

reported to have shown anticancer, liver protective, anti-microbial, vascular relaxing property [2].

Herbal products are gaining popularity in both progressive and developing nations. Medicinal herbs have been utilized for thousands of years as part of traditional and folk remedies, and their significance in treating mild to severe illnesses is only increasing [3]. Recent research findings highlighted the potential therapeutic use of bioactive compounds extracted from plants and also gain significant importance in the field of medicine. This has led to the development of the novel plant-based medicine. These bioactive compounds offer safer alternative than conventional drug [4].

## 2. Objectives

- To assess the physio chemical characteristics of black ginger powder.
- To assess the yield percentage of black ginger powder in different solvents.

## 3. Materials and Methods

**Procurement of crude:** *Kaempferia parviflora wall ex baker* (Zingiberaceae) rhizomes were purchased from Assam, India. They were properly cleaned and then the rhizomes were subjected to drying at the temperature of 60°C in oven. The dried rhizomes were powdered and were sealed in air tight container [5].

**Authentication:** Authentication and identification are important to ensure authenticity of herb used in formulation. Herb identification considered as an essential process of precisely identifying the botanical species of herb. The rhizomes were authenticated at National Botanical Research Institute (NBRI) Lucknow for validating the quality and variety of rhizomes procured [6].

**Physical characteristics:** The assessment of the physical or organoleptic characteristics was an important step in identification of the crude in formulation of drug. It entails examination of observable characteristics like size, shape, colour, odour, taste, and texture without the use of a microscope or other complex tools. In order to identify and describe raw plant material, this evaluation was essential [7].

**Processing:** The processing of black ginger involves many steps to obtain desired powder for further analysis. The steps involved are washing, shade drying, peeling, crushing coarsely for optimum drying in hot air oven at $60^0$ C and grinding or pulverizing the dried ginger to obtained powder [8]. The processing of *Kaempferia parviflora* was shown in figure 1.

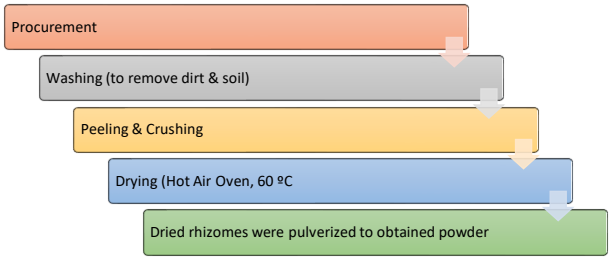


Figure 1: Processing of Black Ginger

Source: Adakole et al.,2020

**Loss On Drying (LOD)**

In moisture analyser the loss on drying was measured by using the digital moisture analyser. The sample was heated using halogen heating technology to the drying temperature i.e.105ºC during the heating phase and following the iso- thermal phase the weight of the sample was continuously measured. When the drying criterion defined in the measurement method was reached, the corresponding moisture contents was calculated [9].

**Total Ash**

The total ash content was assessed as per the AOAC guidelines. The crucible was heated in muffle furnace at 550°C then cooled in desiccator for 30 min. Then the crucible was weighted till 3 decimal places. Then 5 gm of sample was taken and heated on low Bunsen burner till there are no fumes. Then the crucible was placed in furnace at the temperature 550°C. Then the sample was cooled in desiccator. Weight the ash with crucible when the sample turns grey. The process was triplicated. The calculation was done as per the following formula.

$$\text{Ash (\%)} = \frac{\text{Weight of ash}}{\text{Weight of sample}} X\ 100$$

**Solubility**

It was a well-established fact that extraction was an important step for any experimental procedure. The solvent used affects the extraction of bioactive compounds. Precursor plant material, the extraction process, and solvent determine the quality of the extract. The choice of solvent was crucial in solvent extraction [10]. The extraction was carried out in Petroleum Ether, Distilled water and Ethanol to assess the solubility.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2025) 15(6), 3288-3291 | ISSN:2251-6727

**Extraction**

The extraction process was carried out using Soxhlet method. It is considered a high-efficiency automatic continuous extraction technique. The Soxhlet extraction process uses less solvent and requires less time than other techniques [11]. For extraction in Ethanol, 20 gm of crude in powdered form was taken in 250 ml of solvent. For extraction in water 20 gm of crude was taken in 250 ml of Distilled Water. Similarly, 20 gm of crude was taken in 250 ml Petroleum Ether. The crude was wrapped in filter paper and placed in thimble. The solvent was heated in distillation flask. The process was repeated till the extraction was completed.

**Percentage Yield**

The Yield percentage was calculated using the formula [12].

$$\text{Yield (\%)} = \frac{\text{Wt.of extract}}{\text{Wt.of sample}} \; X \; 100$$

Where:

Wt. of extract = Wt. of beaker with extract

Wt. of sample = Wt. of beaker without extract

## 4. Results and Discussion

The physical characteristics of rhizomes of *Kaempferia parviflora* was assessed on the basis of attributes such as colour, odour, smell, taste. The rhizomes are small, brown in colour and rounded. The interior was fleshy with a distinct dark purplish-blue colour thus commonly known as black ginger. The odour was strong and pungent. The taste was little bitter.

Figure 2: Kaempferia parviflora wall. Ex baker rhizome

The moisture content was an important parameter to assess the stability and microbial contamination during storage. The higher moisture content results in fungal contamination of product [13]. The moisture content was found to be 50.32%. The results were expressed in % and are presented in the Table 1. According to Ibeabuchi, et al., 2023 the moisture content of *Zingiber officinale* was 11.42 % which was lesser than black ginger variety [14].

The ash content analysis shows that the inorganic residue remaining after the organic matter has been incinerated. This stage is considered as the standard quality control parameter in herbal drug formulation and in food products. The ash content in black ginger was found to be 90.67 % which is higher than the ash content in *Zingiber officinale* i.e. 6.57 [15]. The moisture and ash content were presented in the table 1.

**Table 1: Moisture and Ash content in *Kaempferia parviflora***

| | Fresh Rhizome (%) |
|---|---|
| Moisture | 50.32 |
| Ash | 90.67 |

The extraction was done in three solvents such as Petroleum Ether, Ethanol and Distilled Water. The yield % for petroleum ether was 1.35%, for Ethanol the percentage yield was 8.95%. The study done by Yoshida Izumi *et al.* found that extraction of black ginger in ethanol using maceration process gives the yield around 6.8 % [16]. For distilled water the percentage yield was 2.35% respectively. The yield percentage was higher for ethanol which was around 8.95% among all the three solvents. The least percentage yield was for petroleum ether which was around 1.35%. The results are presented in table 2.

**Table 2: Percentage yield in different solvents**

| SOLVENT | PERCENTAGE YIELD (%) |
|---|---|
| Ethanol | 8.95 |
| Petroleum Ether | 1.35 |
| Distilled Water | 2.35 |

**Conclusion**

The present study was done to assess the parameters like loss on drying, ash content, yield percentage and extraction. It was concluded that the rhizomes of black ginger have higher amount of moisture content as compared to the other variety of ginger (*Zingiber officinale*). The Soxhlet extraction shows that the yield

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(6), 3288-3291 | ISSN:2251-6727

percentage was higher in ethanol i.e. the solubility is higher in ethanol.

**References**

1.Sutthanut, K.; Sripanidkulchai, B.; Yenjai, C.; Jay, M. Simultaneous identification and quantitation of 11 flavonoid constituents in Kaempferia parviflora by gas chromatography. J. Chromatogr. A 2007, 1143 (1–2), 227–233. https://doi.org/10.1016/j.chroma.2007.01.086

2. Hashiguchi, A.; San Thawtar, M.; Duangsodsri, T.; Kusano, M.; Watanabe, K. N, 2022 may 1. Biofunctional properties and plant physiology of Kaempferia spp.: Status and trends. J. Funct. Foods, 92, 105029.

3.Gohil, K. J.; Patel, J. A.; Gajjar, A. K.,2010. Pharmacological review on Centella asiatica: A potential herbal cure-all. Indian J. Pharm. Sci., 72 (5), 546.

4.Shityakov, S.; Bigdelian, E.; Hussein, A. A.; Hussain, M. B.; Tripathi, Y. C.; Khan, M. U.; Shariati, M. A.,2019. Phytochemical and pharmacological attributes of piperine: A bioactive ingredient of black pepper. Eur. J. Med. Chem., 176, 149–161.

5.Hafeez, B.; Azam, H.; Haq, I. U.; Firdous, N.; Muddassir, M.; Saleem, H.; Usman, M.,2021. Optimization of drying conditions to preserve gingerol in ginger. Acta Sci. Agric., 5 (7).

6.Wang, H.; Chen, Y.; Wang, L.; Liu, Q.; Yang, S.; Wang, C.,2023. Advancing herbal medicine: Enhancing product quality and safety through robust quality control practices. Front. Pharmacol., 14, 1265178.

7.Sonawane, S. D.; Bais, S. K.; Dhumal, D. D.,2024. A review: Different evaluation methods of crude drugs. Int. J. Pharm. Herb. Technol., 2 (1), 1295–1322.

8.Bag, B. B.,2018. Ginger processing in India (Zingiber officinale): A review. Int. J. Curr. Microbiol. Appl. Sci., 7 (4), 1639–1651.

9. Schubnell, M.; De Caro, C.; Kunz, R.,2020. Moisture content, water content, loss on drying—Part 1: What exactly is meant and how are these quantities determined. Therm. Anal. User Com., 1 (51), 1–8.

10. Sinha, D.; Mukherjee, S.; Chowdhury, S.,2022. Methods of extraction of phytochemicals. In Isolation, Characterization, and Therapeutic Applications of Natural Bioactive Compounds; IGI Global Scientific Publishing., pp 250–279.

11.Al-Areer, N. W.; Al Azzam, K. M.; Al Omari, R. H.; Al-Deeb, I.; Bekbayeva, L.; Negim, E. S.,2023. Quantitative analysis of total phenolic and flavonoid compounds in different extracts from ginger plant (Zingiber officinale) and evaluation of their anticancer effect against colorectal cancer cell lines. Pharmacia, 70, 905–919.

12. Duniya, S. V.; Ojonugwa, M. C.; Adamu, A. D.; Mathias, O. J.; Eleojo, S. I.; Salifu, U. O.,2018. Phytochemical constituent, percentage yield and phenolic content estimation of different solvent system of Carica papaya leaves. Int. J. Chem. Pharm. Sci., 6 (7), 201–205.

13. Smith, W. A.; Wendt, L. M.; Bonner, I. J.; Murphy, J. A.,2020. Effects of storage moisture content on corn stover biomass stability, composition, and conversion efficacy. Front. Bioeng. Biotechnol., 8, 716.

14. Ibeabuchi, C.; Patrick-Iwuanyanwu, K. C.; Oyeike, E. N.; Akaninwor, J. O.,2023. Proximate analysis, vitamins, and mineral compositions of Zingiber officinale, Ocimum gratissimum and their herbal blend. IPS J. Nutr. Food Sci., 2 (2), 27–32.

15. Ogbuewu, I. P.; Jiwuba, P. D.; Ezeokeke, C. T.; Uchegbu, M. C.; Okoli, I. C.; Iloeje, M. U 2014. Evaluation of phytochemical and nutritional composition of ginger rhizome powder. Int. J. Agric. Rural Dev., 17 (1), 1663–1670.

16. Yoshida, I.; Mishima, T.; Kumagai, M.; Takahashi, Y.; Fujita, K.; Igarashi, T.,2023. Black ginger (Kaempferia parviflora) extract enhances circadian rhythm and promotes lipolysis in mice fed a high-fat diet. J. Funct. Foods, 107, 105649.