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Evaluation of quality control parameters of *Curcuma aromatica* Salisb

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Abstract
The present article deals with study of Pharmacognostic, Phytochemical and Physicochemical analysis of *Curcuma aromatica* Salisb rhizome, a member of family Zingiberaceae. The rhizomes of *Curcuma aromatica* Salisb reported to have good medicinal values in traditional system of medicines. Pharmacognostic parameters were carried out. Phytochemical parameters of rhizomes were performed for the chemicals constituents like alkaloids, flavonoids, glycosides, tannins, amino acids and gum & mucilage. Physicochemical screening of the powdered rhizome showed 16.6% Total Ash, 2.8% Acid Insoluble Ash, 3.93% Water Soluble Ash, 0.4% Alcohol Soluble Extract, 0.8% Water Soluble Extract and 3.14% Moisture Content.

Keywords: *Curcuma aromatica* Salisb, pharmacognostic study, phytochemical parameters, physicochemical screening

1. Introduction
Herbs have provided all living organisms with medicine from the earliest beginnings of civilization. The word herb is used as herbal medicine and is also known as botanical medicine, means a plant or a part of plant that is used to make medicine to assist the curing process during illness and ailment [1]. Throughout history, various cultures have handed down their accumulated awareness of the medicinal use of herbs to successive generations. Herbal medicines are also in great demand in the developed world for primary health care because of their efficacy, safety and lesser side effects. This vast body of information serves as the basis for much allopathic medicine today [2]. WHO estimates indicate that 80% of the population, mostly in developing countries still relies on plant-based medicines for primary care WHO 1978. India is a country with a vast reserve of natural resources and a rich history of traditional medicine [3]. There are different systems of medicinal usage practiced in India, Ayurveda, Siddha, Unani, Amchi and local health traditions, utilize a large number of plants for treatment of human and animal diseases. Those plants used were called as medicinal plants [4].
Curcuma aromatica Salisb is a medicinally important species belonging to the family Zingiberaceae. It is occurring wild throughout India and cultivated chiefly in West Bengal and Travancore. The plant is commonly known as Junglee Haldi (wild turmeric). *C. aromatica* Salisb rhizome is a rich source of volatile oil, which consists of several major anti-tumor ingredients including demethoxycurcumin, β-elemene, curcumol, curdione, etc. It is used as anti-venom for Indian cobra, used as tonic, to treat digestive problems [5, 6].

1.1 Taxonomy

Domain	:	Eukaryota
Kingdom	:	Plantae
Subkingdom	:	Viridiplantae
Phylum	:	Tracheophyta
Subphylum	:	Euphyllophytina
Infraphylum	:	Radiatopses
Class	:	Liliopsida
Subclass	:	Commelinidae
Superorder	:	Zingiberanae
Order	:	Zingiberales
Family	:	Zingiberaceae
Subfamily	:	Zingiberoideae
Genus	:	*Curcuma*
Species	:	*aromatica*

1.2 Vernacular Name

Language	Vernacular name	Language	Vernacular name
Spanish	Curcuma	English	Turmeric
French	Saffron des Indes	Hindi	Haldi
German	Kurkuma gelbwurz	Bengali	Holud
Swedish	Gurkmeja	Gujarathi	Haldi
Burmese	Fanwin	Kannada	Arishina
Arabic	Kurkum	Malayalam	Halad
Dutch	Geelwortel	Sindhi	Halda
Thai	Kamin	Punjabi	Haldhor, Haldhar
Indonesian	Kunjit, Kunyit	Tami	Manjal
Italian	Curcuma	Telugu	Pasupu
Chinese	Yu.chin	Sanskrit	Haridra, Harita

2. Material and Methods

2.1 Collection of Plant Materials

The rhizomes of *Curcuma aromatica* Salisb were collected from local market of Khargone, Madhya Pradesh. Their identification and authentication was confirmed by Department of Botany, PG College, Khargone by correlating their morphological and microscopic characters with those given in literature. The rhizomes were collected, washed well to remove all the dirt and were shade dried and then powdered transferred into airtight containers with proper labeling for future use.

2.2 Preparation of Plant Extract

The powdered of rhizomes of *Curcuma aromatica* Salisb was used for the successive solvent extraction process. Crude plant extracts were prepared by Soxhlet extraction method. About 200 g of powdered plant material was uniformly packed into a thimble and extracted with various solvents like chloroform, ethanol and aqueous. The dried extracts was packed and labeled in air tight container for the further studies such as a Pharmacognostic, Phytochemical and physiochemical screening [7].

2.3 Pharmacognostic Study

Pharmacognostic study was carried on the basis of Morphological characters such as color, odor, taste, size, fracture, texture etc.

2.4 Phytochemical Analysis

Phytochemical analysis was done for all the following extracts chloroform, ethanol and aqueous to investigate the Phytoconstituents present in it.

2.4.1 Preliminary Phytochemical Screening [8, 9]

Phytochemical examinations were carried out for all the extracts as per the standard methods.

2.4.1.1 Test for Alkaloids

- **Dragendorff's Test:** In 3 ml. of filtrate, few drops of Dragendorff's reagent (potassium bismuth iodide solution) were added and formation of Orange brown colored precipitate shows presence of alkaloids.
- **Mayer's Test:** Few drops of Mayer's reagent (potassium mercuric iodide solution) were added in 3 ml of filtrate and formation of cream colored precipitate indicates presence of alkaloids.

2.4.1.2 Test for Flavonoids

- **Shinoda Test:** 5 ml of (95%v/v) ethanol was added in the extract and then few drops of concentrated Hydrochloric acid and 0.5g magnesium turnings were added. Pink color shows the presence of flavonoids.
- **Lead acetate test:** To small quantity of extract, lead acetate solution was added. Yellow colored precipitate formation shows the presence of flavonoids.

2.4.1.3 Test for Glycosides

- **Borntrager's test:** To about 3 ml extract, dilute sulphuric acid was added. It was boiled and filtered. To cold extract equal volume of benzene or chloroform was added. After shaking, organic solvents were well separated. Add ammonium, ammonical layer turned pink.

2.4.1.4 Test for Tannins

- **Gelatin test:** To 2 ml test solution, 1% Gelatin solution containing 10% sodium chloride was added to obtain a white precipitate.
- **Ferric chloride test**: To 1ml of the extract, ferric chloride solution was added and formation of a dark blue or greenish black color shows the presence of tannins.

2.4.1.5 Test for Amino Acid

- **Ninhydrin test**: 3 ml of test solution was heated and 3 drops of 5% Ninhydrin Solution was added in boiling water and was boiled for 10 minutes. Purple or bluish color appeared.

2.4.1.6 Test for Gum and Mucilage

- About 10 ml of the extract was slowly added to 25ml of absolute alcohol under constant stirring. Precipitation indicates the presence of gum and mucilage.

2.5 Physiochemical Parameters

2.5.1 Determination of Ash Value [10, 11]

2.5.1.1 Total Ash Value

Weighed accurately 2 g of the air-dried drug (rhizome) in a silica dish and incinerated at a temperature not exceeding 450º until free from carbon. Then cool and weighed.

Percentage of ash value was calculated on the the basis of air-dried drug.

2.5.1.2 Acid Insoluble Ash

Boiled the ash with 25 ml of 2M hydrochloric acid for 5 minutes, collected the insoluble matter in a Gooch crucible, washed with hot water, ignited, cooled in a desiccator and weighed. Calculated the percentage of acid-insoluble ash on the air dried drug basis.

2.5.1.3 Water Soluble Ash

Boiled the ash for 5 minutes with 25 ml of water, collected the insoluble matter in a Gooch crucible, washed with hot water, and ignited for 15 minutes at a temperature not exceeding 450º. Subtracted the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. Percentage of water soluble ash was calculated with reference to the air dried drug.

2.5.2 Extractive Values [12, 13]

Extractive values of crude drugs are useful for their evaluation. These values indicate the amount and nature of the constituents present in the crude drugs.

2.5.2.1 Water Soluble Extractive Value
5 gm of the air-dried, coarsely powdered drug was macerated with 100 ml of water in a closed flask for 24 hours, shaken frequently during the first 6 hours and allowed to stand for 18 hours. Thereafter, it was filtered taking precautions against loss of water; 25 ml of the filtrate was evaporated to dryness in a tarred flat-bottomed shallow dish, dried at 105 ˚C and weighed. The percentage of water-soluble extractive with reference to the air dried drug was calculated.

2.5.2.2 Alcohol Soluble Extractive Value
5gm of the air dried, coarsely powdered drug was macerated with 100 ml of alcohol (95%v/v) and refluxed for 2 hrs. Then it was filtered and 25 ml of filtrate was transferred in a porcelain dish and evaporated to dryness on a water bath and dried completely in an oven at 105 ˚C and finally weighed. The percentage of alcohol-soluble extractive with reference to the air dried drug was calculated.

2.5.3 Loss on Drying
It was performed with the help of IR moisture balance.

3. Result and Discussion
3.1 Pharmacognostic Study
Pharmacognostic study was carried on the basis of Morphological characters such as color, odor, taste, size, fracture, texture etc. were considered. The results of the Pharmacognostic study were expressed in Table no.1

Table 1: Pharmacognostic study of *C. aromatica* Salisb.

Characters	Observation
Organoleptic characters	
Colour	Deep orange
Odor	Aromatic
Taste	Pungent
Quantitative Macro morphology	
Size	3-5 cm in diameter
Length	1-1.5 cm long
Macroscopically feature	
Shape	Finger shaped
Surface	Smooth or slightly rough
Texture	Hard and Heavy
Fracture	Short

3.2 Physicochemical Parameters
In this study ash values (total ash, acid insoluble ash and water soluble ash), extractive value (alcohol soluble extractive value and water soluble extractive value) and moisture content were determined. The total ash value was found to be 16.6% indicating the considerable presence of inorganic radicals. The acid insoluble and water soluble ash value was found to be 2.8% and 3.93% respectively where as the alcohol soluble extractive value and Water soluble extractive value was found to be 0.4% and 0.8% respectively and 3.14% of Moisture Content was present. The results of the Physicochemical Parameters are shown in Table no.2

Table 2: Physicochemical parameters of *C. aromatica* Salisb.

Parameters	Value
Ash Value	
Total Ash	16.6%
Acid Insoluble Ash	2.8%
Water Soluble Ash	3.93%
Extractive Value	
Alcohol Soluble Extractive Value	0.4%
Water Soluble Extractive Value	0.8%
Moisture Content	
LOD	3.14%

3.3 Phytochemical Analysis
The Preliminary Phytochemical Investigations of Chloroform, Ethanolic and Aqueous extract of rhizome *Curcuma aromatica* Salisb were preformed which reveals the presence of Alkaloid, Flavonoids, Glycoside, Tannins, Amino acid and Gum & Mucilage type of major secondary metabolites which revealed their potent therapeutic activity. The results of the screening were expressed in Table no.3

Table 3: Phytochemical analysis of *C. aromatica* Salisb.

Compounds	Chloroform	Ethanol	Aqueous
Alkaloids	-	+	+
Flavonoids	-	-	+
Glycosides	+	-	-
Tannins	-	+	-
Amino acid	-	-	-
Gum & Mucilage	-	-	-

Indication: + Presence, - Absence

4. Conclusion
The Phytochemical screening confirmed the presence of various phytochemical constituents such as alkaloids, flavonoids, glycosides, tannins, amino acids and gum & mucilage. Phytochemical constituents confirmed utilization of rhizome for treating diabetes, abdominal pains, menstrual disorder, wounds, eczema, Jaundice, inflammations and as a blood purifying activity. Different Physicochemical parameters such as Total Ash, Acid Insoluble Ash, Water Soluble Ash, Water soluble extract, Alcohol Soluble extract and Loss on drying value was observed. These values can be useful to detect adulteration. All studied standardization parameters like Pharmacognostic study, Phytochemical screening and Physicochemical parameters provide the knowledge in the identification authentication of rhizome of *Curcuma aromatica* Salisb.

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