Review Article

An Overview on Medicinal Uses of Exiguous Plant *Curcuma caesia* Roxb

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ABSTRACT

Curcuma caesia also known as black turmeric or Kali Haldi is available in many parts of India, especially in north east India. It is a perennial herb of distinguishable bluish-black rhizome with large leaves and a bitter and pungent smell and it is famous for its medicinal properties. Fresh and dried rhizome of *Curcuma caesia* is used in the treatment of leukoderma, asthma, tumours, piles, bronchitis, bruises etc. Several facts and data related to *Curcuma caesia* have been chronicled in the review article in order to institute scientific methods and validate traditional and historic usage and re-establish it as a promising drug source in the coming days.

Keywords: *Curcuma caesia*, phytochemical, bioactivity.

INTRODUCTION

An herbal medicine (also known as phytomedicine) is the foundation for Ayurveda, the ancient Indian medical practice that primarily relies on herbs and plants for maintaining good health.

Although practiced in India since Vedic ages, usage of herbal medicines is gaining immense popularity in the modern world in recent times due to its enormous benefits and lesser known side effects. As the usages of synthetic medicines increases in day to day life, so does the need for greater involvement and expenditure in research and development to identify new medicines and extract new benefits from existing known drugs and plants.

Black turmeric (*Curcuma caesia* Roxb) is a rare perennial herb having medicinal properties. It is mostly found in north east and central India. In India it is found in West Bengal, Madhya Pradesh, Orissa, Chhattisgarh and Uttar Pradesh states. It is also sparsely found in the Papi Hills of east Godavari, west Godavari and Khammam district of Arunachal Pradesh, the root hills of the Himalayas and North Hill Forest of Sikkim.[1] It is a lesser explored herb than the yellow turmeric (*Curcuma longa*) which has been widely studied and its multidimensional benefits have been explored and established.[2] This review is intended to identify and explore the potential of black turmeric and very less studies have been done in India and other part of the world.

The rhizome of *Curcuma caesia* Roxb is bluish black in colour and has pale yellow flower with reddish border. It is aromatic in nature and produces an essential oil and has been traditionally used for medical treatments. It is a member of the ginger family (Zingiberaceae) which consists of 70 species of rhizomatous herbs.[3]

The rhizome of black turmeric has tremendous medicinal properties. Traditionally, it is used in the treatment of smooth muscle relaxation, haemorrhoids, leprosy, asthma, cancer, epilepsy, fever, wound, vomiting, menstrual disorder, anthelmintic, aphrodisiac, inflammation, gonorrhoeal discharge etc.[4,5] In Madhya Pradesh the plant is regarded as very auspicious and is believed that person having this plant will never experience shortage of food and cereals. In West Bengal the plant is used in Kali Puja. Traditionally, the paste of the rhizome is applied on bruises, contusions and rheumatic pains in Manipur.[6] In Arunachal Pradesh Adi tribes use decoction of fresh rhizome as anti-diarrhoetic and to get relief from stomach ache.[7] The Khamti tribe of Lohit district use the paste of fresh rhizome in case of snake bite and scorpion bite.[8] In Assam fresh rhizome juice mixed with mustard oil and is given to cattle during dysentery.[9]

Fresh rhizomes are aromatic with intense camphoraceous odour. It is bitter with an earthy, hot taste.

PLANT DESCRIPTION

Taxonomical Classification:

Kingdom:	Plantae
Subkingdom:	Viridaeplantae
Phylum:	TracheophytaSinnott
Subphylum:	Euphyllophytina
Class:	Magnoliopsida
Order:	Zingiberales
Family:	Zingiberaceae
Subfamily:	Zingiberoideae
Tribe:	Hedychieae
Genus:	Curcuma
Species:	*Curcuma caesia* Roxb

Vernacular Names:

Curcuma caesia is known by different names in different parts of India.

Hindi:	Kali Haldi
Marathi:	Kali halad
Manipuri:	Yaingang Amuba or Yaimu

Telugu:	NallaPasupu
Kannada:	Kariarishina, NaruKachora
Bengali:	Kala Haldi
Mizo:	Aihang, Ailaihang
Assamese:	Kola Halodhi

MORPHOLOGY[9]

Black turmeric is erect and grows up to 0.5-1.0 tall. The plant is divided into two parts, an underground large ovoid tuberous rhizome often called rootstock and an erect aerial shoot along with leaves and reproductive part. The plant grows well in fertile, well drained, sandy or pebbly, loamy soil that is moist.

Rhizome

Rhizome is tuberous, about 2-6 cm in diameter with camphoraceous sweet odour, the shape and size is often variable. It is laterally flattened and covered adventitious roots, root scars and warts. It has nodal and internodal zones due to circular wrinkles on the surface. The surface is dark brown, bluish black or buff in colour (Figure 1).

Figure 1: Rhizome

Roots

During the propagation of the plant with rhizome, the primary roots are not seen. It has yellow brown long fibrous and tapering adventitious roots all over the surface of rhizome (Figure 2).

Figure 2: Roots

Leaf

Leaves of black turmeric plant are elongated oval-shaped with a reddish colour on the edges. They are found of 10-20 grouped. The petiole is ivory colour and unsheathing. The petioles encircle each other forming a pseudo axis. The variation is parallel, typical characteristics of monocots (Figure 3).

Figure 3: Leaf

Flower

Flowers are pale yellow colour with reddish border. Calyx is 10-15 mm long, obtuse and 3 toothed. Corolla is long tubular, pale yellow lip-3 lobe semi- elliptic.

Inflorescence

The inflorescence is 15-20cm long dense spike, which arises much before the opening of leaf, the bracts are green, and the bracts of coma are deep red, when it matures it becomes crimson.

PHYTOCHEMICAL CONSTITUENTS

Phytochemical screening of n-hexane, petroleum ether (60:80), benzene, chloroform, ethyl acetate, methanol and water extract of rhizome of *Curcuma caesia* showed the presence of alkaloid, phenol, resins, phytosterols, terpenoids, carbohydrates, reducing sugars, tannin, glycosides, saponins, quinones, amino acids, oils and flavonoids.[5]

About 30 volatile components were identified by Pandey et al., by GC-MS, representing 97.48% of the oil, with camphor (28.3%), ar-tumerone (12.3%), (Z)-Ocimine (8.2%), 1-ar-curcumene (6.8%), 1,8-cineole(5.3%), element(4.8%), borneol(4.4%), bornyl acetate(3.3%) and curcumene(2.82%) as the major constituents.[2]

Rastogi et al reported linalool as the major component comprising 20.42% followed by ocimine (15.66%), 1-ar-curcumene (14.84%), zingiberol (12.60), 1,8- cineole (9.06%), and borneol (7.4%) as major constituent.[11] Later, Banerjee et al. reported that rhizome oil of *Curcuma caesia* contains 1,8-cineole (9.06%), ocimene (15.66%), 1-ar-curcumene (14.84%), δ-camphor (18.88%), δ-linalool (20.42%), δ borneol (7%) and zingiberol (12.60%).[12] Behura described the chemical composition of essential oil in

rhizome as α- Pinene (0.40 %), α-pinene (0.60%), β-ocimene (E and Z) (2.1%), camphor (7.73%), linalool (0.99%),caryophyllene (3.15%), borneol (4.3%), camphene (1.67%), anethole (1.79%) and cis-b-ocimene (14.54%). [13]

A research on rhizome of *Curcuma caesia* from Thailand was also done and the essential oil was characterized by a high content of 1,8-cineole (30.4%) and camphor (10.8%), curzerene (8.8%) and curzerenone (5.8%). Furthermore, Paliwal*et* et al. reported that the Gas Chromatography-mass spectrometry analysis of rhizome of Madhya Pradesh contains 1, 8 Cineole (27.48%), camphor (14-28.3%) as major constituent as well as ar-turmeone (12.3%).[13]

There may be various reasons for the different components of essential oils as given by different authors such as environmental effects, varieties, maturity variation of the rhizome etc.

BIOLOGICAL ACTIVITIES

Sl No	Activity	Methods	Authors
1.	Antiasthmatic	petroleum ether, ethanol and water extract of *Curcuma caesia* rhizomes at the doses of 25 -100 mg/kg i. p. was evaluated for using milk induced eosinophilia in mice.[1]	Pathan et al.
2.	Analgesic	Methanol extract *Curcuma caesia* was evaluated for analgesic activity against acetic acid-induced writhing and tail flick tests.[15]	Karmakar et.al.
3.	Locomotor depressant	Methanol extract of *Curcuma caesia* was estimated by using actophotometer.[15]	Karmakar et.al
4.	Anticonvulsant	Methanol extract was assessed against pentylenetetrazol-induced convulsion in mice.[15]	Karmakar et.al
5.	Muscle relaxant	Methanol extract *Curcuma caesia* at 50 and 100 mg/kg body weight was evaluated for muscle relaxant effect by using rota-rod apparatus.[15]	Karmakar et.al
6.	Antitumor	Antitumor activity was evaluated on Ehrlich's ascites carcinoma (EAC)-treated mice. *In vivo* antitumor activity was determined after 24 h of EAC cells (2×10^6 cells/mouse) inoculation. MECC (50 and 100 mg/kg i.p.) was administered daily for nine consecutive days. On the 10th day, half of the mice were sacrificed and the rest were kept alive for assessment of increase in lifespan. Antitumor effect of MECC was assessed by the study of tumor weight, tumor volume, viable and non-viable cell count, hematological parameters and biochemical estimations.[15]	Karmakar et.al
7.	Antioxidant	Methanolic extract of *Curcuma caesia* was assessed by using DPPH Free Radical Scavenging Assay. The IC50 (Concentration of sample required to scavenge 50% of DPPH free radical) was calculated by plotting graph between % inhibition vs concentration. The Butylated Hydroxytoluene was used as standard antioxidant.[17]	Mangla et al
8.	Antibacterial	The crude extracts were determined by the agar-well diffusion method against *Bacillus cereus, Bacillus subtilis*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Escherichia coli, Proteus vulgaris*, *Pseudomonas aeruginosa* and *Klebsiella Pneumoniae*.[18]	Pandey et al.
9.	Antifungal	Antifungal activity was screened by agar cup method. The isolated sample was tested against three plant pathogenic fungi like *Fusarium oxysporum*, *Botrytis cinerea*; and *Rhizopus oryzae*to access their antifungal nature.[19]	Banerjee et al.
10.	Anthelmintic	Three extracts (ethanol, chloroform and aqueous) of rhizomes of *Curcuma caesia* at three concentrations (25mg/dl, 50mg/dl, 100mg/dl) of each extract was studied for anthelmintic property. Albendazole (20mg/dl) was taken as standard. Anthelmintic study includes, determination of the time taken for paralysis and death of earthworms in the presence of test samples. Ethanolic extract is the most effective.[20]	Chadalavada et al.
11.	Thrombolytic	An in vitro thrombolytic model was used to evaluate the clot lysis effect of ethanolic extract of *Curcuma caesia* rhizomes along with Streptokinase as a positive control and distilled water as a negative control.[21]	Fathima et al.
12.	Antiulcer	Antiulcer activity of ethanolic extract of *Curcuma caesia* was evaluated on experimental animal model by the method of Goyal RK (2002)[11]. The dissected stomachs of the sacrificed rats were opened along the greater curvature and the ulcer index calculated from the glandular portion of the stomach. The ulcer index was calculated as, Ulcer index = 10/x where x = Total mucosal surface/Total ulcerated area.[22]	Das et al.
13.	Analgesic	Methanolic extract of *Curcuma caesia* (MECC) was evaluated for analgesic activity by using acetic acid induced writhing model and hot plate test in Swiss albino mice. MECC is a peripheral as well as centrally acting analgesic.[23]	Sampada et al.
14.	Hepatoprotective	Ethanolic extract of rhizome of *Curcuma caesia* was evaluated for its hepatoprotective efficacy against paracetamol induced hepatotoxicity in rats. Silymarin was used as standard. The hepatoprotective activity was assessed using various biochemical parameters like SGOT, SGPT, ALP, Total bilirubin, unconjugated bilirubin, and total protein etc.[24]	Satyendra et al.

CONCLUSION

In spite of not being ascertained as a prescribed drug and not known across a wide spectrum, the *Curcuma caesia* is widely administered in some parts of India for its antifungal activity, antibacterial activity, anthelmintic activity, antioxidant activity, analgesic activity, locomotor depressant and anti-ulcer applications. The rhizome of this plant has been explored for bioactive compounds.

Several phytochemical studies have been chronicled and pharmacological studies have substantiated the therapeutic merits of *Curcuma caesia* but the lack of information and knowledge with regards to the clinical, toxicity and phytoanalytical properties of the plant demands a further study of the same for the greater good of society.

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