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A Review on Pharmacological Properties of *Curcuma caesia* Roxb.

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ABSTRACT

Curcuma caesia Roxb (family Zingiberaceae) commonly known as kali haldi is a perennial herb with bluish black rhizome belonging to Genus *Curcuma*. Black Turmeric (*C. caesia*) is native to North-East and Central India. It is also sparsely found in Papi hills of East Godavari, the root hills of the Himalayas and North Hill forest of Sikkim. Fresh rhizomes are aromatic with intense camphoraceous odour, cultivated for its rhizomes, which are used in traditional medicine. In the traditional system of medicine, fresh and dried rhizomes of *Curcuma caesia* Roxb are used in treating leucoderma, asthma, tumors, piles, bronchitis, bruises *etc.* The rhizomes of Black Turmeric have a high economic importance owing to its putative medicinal properties. In this review article mainly a view to validate its traditional uses and pharmacological properties and open the door for a source of potential drugs in near future.

INTRODUCTION

Plants are the most important sources of medicine. The term Medicinal Plants include various types of plants used in Herbalism and some of these plants have medicinal activities. These plants have rich resources of ingredients which can be used in drug development and synthesis due to their therapeutic use. The plant parts are valued for its medicinal, aromatic or savory qualities. Medicinal Plants are of great importance to the health of individuals and community. The use of herbs as medicine is the oldest form of healthcare known to humanity. The widespread use of herbal materials for the maintenance of health and treatment of diseases can be traced back to prehistoric times throughout many cultures and regions. Even today, 80% of the world's population uses traditional medicine for healthcare and therapeutic purposes. Herbal medicines have become a popular form of therapy. They are often perceived as being natural and therefore harmless. Herbal medicines are also in great demand in the developed world for primary health care because of their efficacy, safety and lesser side effects. India has long history of using plants for medicinal purposes as mention in Ayurveda. The significance of medicinal plants for prevention, mitigation and cure of diseases are always recognized. History revealed that plants have been a valuable source of natural products for maintaining human health at all the times. Their importance is continuously growing nowadays. Indian Medicinal plants are considered a vast source of several pharmacologically active principles and compounds, which are commonly used in home remedies against multiple ailments^[1].

The genus *Curcuma* is a well-known spice of India. It is also called Haldi and more than 200 species and subspecies of it is found all across the world. *Curcuma* Linn. is a large genus belonging to the family Zingiberaceae. It comprises about 70 species of rhizomatous herbs distributed mostly in Southeast Asia as wild and cultivated plants. *Curcuma* species have a great importance for its medicinal value and *Curcuma caesia* has been using by various tribal communities from long before. Kali haldi (*Curcuma caesia*) is a perennial herb with bluish-black rhizome native to North- East and Central India. Black Turmeric is also sparsely found in Papi Hills of East Godavari, West Godavari, and Khammam Districts of Andhra Pradesh. The rhizomes of kali haldi have a high economical importance because of its putative medicinal properties. The rhizomes are used in the treatment of smooth muscle relaxant activity, hemorrhoids, leprosy, asthma, cancer, epilepsy, fever, wound, vomiting, menstrual disorder, anthelmintic, aphrodisiac, inflammation, gonorrhoeal discharges, etc^[2]. In Madhya

Pradesh, the plant is regarded as very auspicious and is stated that a person who possess it will never experience shortage of cereals and food. The rhizomes of the plant are aromatic in nature. The inner part of the rhizome is bluish-black in colour and emits a characteristic sweet smell, due to presence of essential oil. Almost all species of *Curcuma* contains antioxidant activity and the pharmacological effects and prospects for future clinical use had been tried so far^[3].

TAXONOMICAL CLASSIFICATION

Kingdom: Plantae

Division: Angiosperms

Class: Monocotyledons

Order: Zingiberales

Family: Zingiberaceae

Subfamily: Zingiberoideae

Genus: *Curcuma*

Species: *C. caesia* Roxb



VERNACULAR NAMES

In different parts of India, *Curcuma caesia* is known by different names-

Hindi: Kali Haldi

Manipuri: Yaingang Amuba or Yaimu

Marathi: Kala-haldi

Telugu: Nalla Pasupu

Kannada: Kariarishina, Naru Kachora

Bengali: Kala Haldi

Mizo: Aihang, Ailaihng

Assamese: Kala Haladhi

Nepalese: Kaalo Haledo

DISTRIBUTION

Mostly found in Bengal and north-eastern part of the country including Arunachal Pradesh, Assam, Meghalaya, Mizoram. It is also found in some parts of central India like Raipur, Mandla, Amarkantak, Panchamarhi *etc.*^[4]

BOTANICAL DESCRIPTION

Morphology

The plant is normally erect with height ranging from 0.5 to 1.0 m. It is divided into underground large ovoid tuberous rhizome often called root- stock and an erect aerial shoot along with leaves and reproductive part.^{[5][6]}

Root

As the plant propagates with rhizome, the primary roots are not seen; however, yellow brown long fibrous and tapering adventitious roots are present all over the surface of rhizome.^{[5][6]}

Rhizome

The rhizome is tuberous with camphoraceous sweet odour, about 2–6 cm in diameter, the shape and size is often variable. It is sessile, laterally flattened and covered with adventitious roots, root scars and warts. It shows longitudinal circular wrinkles on the surface giving the look of nodal and intermodal zones to the rhizomes. The surface (cork) of rhizome is dark brown, bluish black, or buff in colour. The branching is more or less sympodial.^{[5][6]}

Leaves

The leaves are in the groups of 10-20, each leaf is broad oblong lanceolate and glabrous. In the middle region, the lamina shows deep farruginous purple coloured clouds. The petiole is ivory colour and unsheathing the petioles encircles each other forming a pseudo axis. The variation is parallel, typical characteristic of monocots.^{[5][6]}

Inflorescence

It is 15-20 cm long dense spike, which arises much before the opening of leaf, the bracts are green, and the bracts of coma are deep red, which becomes crimson when old.^{[5][6]}

Flowers

Smaller than bracts, pale yellow with reddish border. Calyx: 10-15 mm long, obtuse, 3 toothed, and Corolla: Long tubular, pale yellow lip-3 lobed semi-elliptic.^{[5][6]}



Fig 1: *Curcuma caesia* Roxb. Plant



Fig 2: Tuberous Rhizome (cut surface) of *Curcuma caesia* Roxb.

PHARMACOLOGICAL ACTIVITY

Medicinal uses of the rhizome arise from the bioactive components. Bioactive components such as curcuminoids are responsible for anti-oxidative and anti-inflammatory properties, wound healing, hypoglycemia, anti-coagulant, anti-microbial activities. Curcuminoids exhibit free radical scavenging property and anti-oxidant activity. Main bioactive substances in the rhizomes are due to curcumin and two related demethoxy compounds, demethoxycurcumin and bisdemethoxycurcumin. Flavonoids and phenolic compounds which are widely distributed in plants have been reported to exert multiple biological effects including antioxidant, free radical scavenging abilities, anti-inflammatory, anti-carcinogenic *etc.*^[7]

Anti-fungal Activity

Banerjee and Nigam, 1976 reported antifungal activity in *C. caesia* rhizomes. Essential oil of rhizomes of *C. caesia* Roxb has been known for its antifungal activity.^[8]

Smooth Muscle Relaxant activity

Arulmozhi *et al.* (2006) evaluated anti-asthmatic property of *C. caesia*. The hydroalcoholic extract of *Curcuma caesia* (CC extract) was tested for its relaxant effect in guinea pig trachea and also in the presence of various receptor antagonists and enzyme inhibitors. Furthermore, the possible role of hydroalcoholic extract in calcium channel modulation was investigated in depolarized rabbit aorta. The CC extract concentration dependently relaxed the carbachol (1 μ M)-induced pre-contractions and the presence of an antagonist, such as propranolol, glibenclamide, 2', 5'-dideoxyadenosine, α -chymotrypsin, L-NNA and methylene blue, did not affect the log concentration relaxing response curves of cumulative CC extract to carbachol (1 μ M)-induced pre-contraction.^[9]

Anti-oxidant Activity

Chirangini *et al.*, (2004), Rhizome extracts of some members of the medicinal Zingiberales are widely used in dietary intake as well as in the traditional system of medicine. Curcumin, the chrome orange-yellow colouring compound present in turmeric rhizomes, has long been known to possess antioxidant property. Chirangini evaluated Crude methanol extracts of the rhizomes of 11 species, including *C. caesia* for their antioxidant properties using sulphur free

radical reactivity with curcumin as a reference indicator, *C. caesia* gave good degree of radioprotection.^{[10][11]}

Analgesic Activity

Satija Saurabha *et al.*, (2011) compared the analgesic and antipyretic activity of different extracts obtained from *C. caesia* and *C. amada* rhizomes. Analgesic and antipyretic activities of the plant extracts was evaluated using chemical model of acute pain and brewer's yeast induced hyperthermia in rats. The writhing and pyrexia were observed at the doses of 250 and 500 mg/kg body weight of rats. Both the plants exerted analgesic and antipyretic activity. Where by *C. amada* showed better response in comparison to *C. caesia*.^[12]

Anthelmintic Activity

Gill Randeep *et al.* (2011) studies two most popular species of genus *Curcuma*, *C. amada* and *C. caesia* were proved for their anthelmintic activity. In this study, four extracts viz. Petroleum ether, Dichloromethane, ethanol and aqueous extract of rhizomes of *C. amada* and *C. caesia* were investigated for anthelmintic activity at three different concentrations. Three concentrations (50 mg/ml, 100 mg/ml and 150 mg/ml) of each extract were studied which included the determination of paralysis time and time of death of earthworms. All the extracts of both the plants exhibited dose dependent activity. The results indicated that ethanol extract (150 mg/ml) of *C. caesia* was most effective in causing paralysis of earthworms, while the ethanol extract (150 mg/ml) and Dichloromethane extract (150 mg/ml) of both *Curcuma* species were very effective in causing death of earthworms.^[13]

Anti-bacterial Activity

Angel Gabriel Rajamma *et al.* (2012) investigated antioxidant and antibacterial activities of oleoresins isolated from nine *Curcuma* species. Oleoresins were extracted from rhizomes of nine starchy *Curcuma* species (*Curcuma aeruginosa*, *C. amada*, *Curcuma aromatica*, *Curcuma brog*, *C. caesia*, *Curcuma malabarica*, *Curcuma rakthakanta*, *Curcuma sylvatica* and *Curcuma zedoaria*) using dichloromethane and evaluated for antioxidant and antibacterial activity. Oleoresins from all the species exhibited high DPPH radical scavenging activity and ferric reducing power, which had good correlation with phenolic content. The oleoresins inhibited both g +ve (*Staphylococcus aureus* and *Bacillus subtilis*) and g -ve (*Escherichia coli*) bacteria. Maximum sensitivity was observed in the case of *B. subtilis*. The

results indicated that the oleoresins from these species (most of which are unutilized) would have good potential as additives for food and medicinal applications.^[14]

Anti-ulcer Activity

Pranab KR Bordoloi *et al.* (2012) studied the anti-ulcer activity of the ethanolic extract of the rhizome of *C. caesia* on experimental animal models. Four groups of albino rats weighing 150-200 g were taken for the study (n = 5). Group A: Control (3% gum acacia 5 ml/kg/day orally for 7 days). Group B: Experimental control (Aspirin 400 mg/kg orally as single dose on 7th day). Group C: Test (*C. caesia* extract 500 mg/kg/day orally for 7 days plus Aspirin 400 mg/kg orally on 7th day) and Group D: Standard (Ranitidine 150 mg/kg orally for 7 days and Aspirin 400 mg/kg orally on 7th day). The stomachs of the sacrificed rats were removed. The ulcer index, pepsin activity, free and total acidity and volume of gastric juice in group III and IV showed significant decrease in comparison to group II whereas there was increase in gastric mucus secretion.^[15]

CONCLUSION

The present study emphasizes the knowledge on the plant *Curcuma caesia* Roxb. The rhizomes of the plant have enough bioactive properties. The plant appears to have a broad spectrum of activity on several ailments. Rhizomes of the plant have been explored for antifungal activity, smooth muscle relaxant activity, antioxidant activity, analgesic activity, antibacterial activity, anti-ulcer activity and many other miscellaneous activities. The pharmacological studies reported in this review confirm the therapeutic value of *Curcuma caesia*. The significance of primary information from the data, further studies can be carried out like clinical evaluation, psychoanalytical studies and toxicity evaluation and the requisite level of activity (pharmacological & toxicological) would be considered for further scrutiny to develop the potential drug molecule that can provide good remedies and help the mankind in various ailments.

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