REVIEW ARTICLE

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Curcuma caesia Almost Untouched Drug: An Updated Ethnopharmacological Review

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Abstract: In ethno medicinal practices, the traditional healers use the genus Curcuma for the treatment of various ailments but *Curcuma caesia* Roxb. is a very less known and almost untouched drug. The present work attempts to establish the necessary ethnomedicinal utilities. *Curcuma caesia* Roxb is a perennial, erect rhizomatous herb with large leaves. Fresh rhizomes are aromatic with intense camphoraceous odour, cultivated for its rhizomes, which are used in traditional medicine. The plant is reported to contain camphor, ar-turmerone, (Z)- ocimene, ar-curcumene, 1, 8-cineole, elemene, borneol, bornyl acetate and curcumene as the major constituents. The plant has been reported to have antifungal activity, anti-asthmatic, smooth muscle relaxant, antimicrobial activity, antioxidant activity, analgesic, locomotor depressant, anticonvulsant and muscle relaxant effects, anti-inflammatory properties. It is now considered as a valuable source of unique natural products for development of medicines against various diseases. This review gives a view mainly on the meditional uses, phytochemistry and pharmacological actions of the plant.

INTRODUCTION

Curcuma caesia Roxb. is a member of the family Zingiberaceae and popularly known as Kali haldi. In India it is found in West Bengal, Madhya Pradesh, Orissa, Chhattisgarh, and Uttar Pradesh states. It nourishes well in moist deciduous forest areas. [1] Rhizomes of the plant are used for sprains and bruises and also employed in the preparation of cosmetics. [2] The effective use of *Curcuma longa* Linn. well known since a long time; it is laxative, anthelmintic, and vulnerary, besides this it is used in blood disorders, leukoderma, scabies, small-pox, and sprains. *Curcuma amada* Roxb. is useful in bronchitis, asthma, sprains, skin diseases, and in ammation caused due to injuries. [3] 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. One of which is *Curcuma caesia* Family: Zingiberaceae. It is also known as "Kali Haldi." It is an erect rhizomatous herb with large leaves. Fresh rhizomes are aromatic with intense camphoraceous odour and are applied externally to sprain and bruises. [4] Black Turmeric (*Curcuma 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. The rhizomes of Black Turmeric have a high economic importance owing to its putative medicinal properties. The rhizomes are used in the treatment of hemorrhoids, leprosy, asthma, cancer, epilepsy, fever, wound, vomiting, menstrual disorder, smooth muscle relaxant activity, anthelmintic, aphrodisiac, inflammation, gonorrheal discharges, etc. [5-6] Almost all species of Curcuma contains antioxidant activity and the pharmacological effects and prospects for future clinical use had been tried so far. [7]

PLANT DESCRIPTION

Taxonomical Classification

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

Vernacular Names

In different parts of India Curcuma caesia is known by different names:
Hindi: Kali Haldi, Nar Kachura Krishna Kedar
Marathi: Kali-halad
Manipuri: Yaingang Amuba or Yaimu
Telugu: Nalla Pasupu
Kannada: Kariarishina, Naru Kachora
Bengali: Kala Haldi
Mizo: Aihang, Ailaihang
Assamese: Kala Haladhi
Nepalese: Kaalo Haledo

Morphology

Rhizome large, 5-6 × 9-10 cm, (Figure 1) blue in the centre, verging towards grey, the blue colour is highly variable, depending upon the nature of the soil and age of the rhizome, strongly aromatic; sessile tubers branched, condensed; roots fleshy; root tubers many, ovate oblong, pale, watery pearl colour. Plants large, 70-100 cm tall, pseudo stem 30-35 cm tall, sheaths green. Leaves distichous, (Figure 2) 79-100 cm; petiole as long as lamina; lamina 30-40 × 10-12 cm, oblong lanceolate, tip acute, base acuminate, glabrous, purple or reddish brown patch along the sides on the distal half of the mid rib on upper side only, fading at maturity, groove of the midrib green. Inflorescence lateral, 25-30 cm long, peduncle 12-18 cm; spike 12-15 × 5 cm; coma bracts large, pink to violet, lower ones streaked green. Fertile bracts 18-20, 4.5-5 × 4.4-5 cm, lower half used, tip rounded, green with pink tip, each bract

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Figure 1: Rhizome of *Curcuma caesia*

Figure 2: Leaves of *Curcuma caesia*

Figure 3: Flower of *Curcuma caesia*

Source of Images: GINGER VILLA, a Botanical Garden at Calicut University, Kerala (India)

Table1: Content of Bioactive Components in *Curcuma caesia*

Parameters	Content in Rhizomes
Total curcuminoid (mg/g dry wt.)	78.4±0.06
Volatile oil content (% v/w)	6.75±1.12
Total phenols (mg/g dry wt.)	60±0.03
Flavonoids (mg/g dry wt.)	30±.0.06
Alkaloids (mg/g dry wt.)	104.25±1.66
Soluble protein (mg/g fresh wt.)	47.5±1.9

subtends a cincinnus of 8-10 flowers. Bracteoles large, 3.5-2.5 cm, white with medium light green patch. Flowers 4.5-5 cm (Figure 3) equal to slightly shorter than bracts. Calyx 1 cm, truncate, 3 lobed at apex, split on one sight. Corolla tube 3-3.3 cm long, pink, lobes eneqaual; dorsal lobes 1.5 × 1.2 cm, concave, hooded; lateral lobes 1.5 × 1 cm, tip rounded, pink. Labellum 1.5-1.7 × 1.8 cm, tip emarginated, yellow with deep yellow median band. Lateral staminodes 1.5 × 1 cm, yellow. Anther 7 mm long, without crest, spurred at base, spurs 3 mm long, divergent. Epigynous gland two, 5 cm long, linear, yellowish green. Ovary 5 mm, trilocular, with many ovules. Style long, filiform; stigma bilipped, slightly exserted above the anther lobes. Fruiting not common. [8]

Distribution

Native to Myanmar. It is also reported from Java and widely cultivated in Malaysia. The Present collection from south India forms the first record from India. It is also wild in south India. [8]

Ecology

It is very common throughout the coastal areas and riverine alluvial soils extending upto midlands in Kerala and south Karnataka. During mansoon it is common undergrowth in coconut and arecanut groves also as a weed in waste lands in association with *Curcuma raktakanta*. [8]

Flowering

April-May (Just after first pre-mansoon showers).

Uses

The rhizomes are widely used in south India for the extraction of East Indian arrowroot or Travancore starch. It is used as a medicine for stomach disorders and as an ingredient in various cuisines. [8]

Phytochemistry

Curcuma caesia contain (Table 1) maximum curcuminoids, oil content, flavonoids, phenolics, different important amino acids, the presence of these bioactive secondary metabolites correlates with the medicinal uses of *Curcuma caesia* fragrances, flavouring and many important useful pharmaceutical Products. [9] The research on the volatile oil of *Curcuma caesia* rhizomes resulted in the identification of 30 components, representing 97.48% of the oil, with camphor (28.3%), ar-turmerone (12.3%), (Z)- ocimene, (8.2%), ar-curcumene (6.8%), 1, 8-cineole (5.3%), elemene (4.8%), borneol (4.4%), bornyl acetate (3.3%) and curcumene (2.82%) as the major constituents. [10]

PHARMACOLOGICAL ACTIVITIES OF *CURCUMA CAESIA*

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, Curcuminoids exhibit free radical scavenging property [11] and anti-oxidant activity. [12] Main bioactive substances in the rhizomes are due to curcumin and two related demethoxy compounds, demethoxycurcumin and bisdemethoxy curcumin. 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. [13]

Antifungal 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. [14]

Antiulcer 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). 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]

Antibacterial 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 *Curcuma zedoaria* and *Curcuma caesia* 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 gram +ve and gram -ve bacteria. [16]

Anthelmintic Activity
Gill Randeep *et al.* (2011) studies two most popular species of genus Curcuma, *Curcuma caesia* and *Curcuma zedoaria* were proved for their Anthelmintic activity. 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 dependant activity. The results indicated that ethanol extract of *Curcuma caesia* was most effective in causing paralysis of earthworms. [17]

Anxiolytic and CNS Depressant Activity
Indrajit Karmakar *et al.* (2011) evaluated the MECC rhizome for Central Nervous System (CNS) depressant activities. MECC was studied for Hypnotic activity, Forced swim test and Tail suspension test. MECC (50 and 100 mg/kg; i.p.) produced significant and dose dependent reduction in the onset and prolongation of sleep duration induced by pentobarbitone. MECC on immobility period in both FST and TST at the doses of 50 and 100 mg/kg, i.p for 7 successive days to mice decreased the immobility periods significantly in a dose dependent manner, indicating significant antidepressant like activity. [5]

Locomotor Depressant, Anti-Convulsant and Muscle Relaxant Effects
Indrajit Karmakar *et al.* (2011) evaluated the MECC for some neuropharmacological activities like analgesic, Locomotor, Anticonvulsant property and muscle relaxant effect in experimental animal models. The results of acetic acid induced writhing showed significant inhibition of writhes, at both test doses as compared with control group in a dose dependent manner. In tail flick test MECC at the both doses exhibited significant increase in reaction time of mice. In locomotor activity study, it was found that MECC significantly depressed the locomotor activity in mice in a dose dependent fashion. In anticonvulsant evaluation MECC pre-treatment exhibited significant and dose dependent protection from PTZ-induced convulsions in mice by delaying the onset of convulsions and recovering the animals leading to survival. In muscle relaxant study, the MECC significantly and dose dependently decreased the fall off time in mice demonstrating its muscle relaxant property. [18]

Analgesic Activity
Satija Saurabha *et al.* (2011) compared the analgesic and antipyretic activity of different extracts obtained from *Curcuma caesia* and *Curcuma 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. [19]

Smooth Muscle Relaxant Activity
Arulmozhi *et al* (2006) evaluated anti-asthmatic property of *Curcuma caesia.* The hydroalcoholic extract of *Curcuma caesia* 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 extracts concentration dependently relaxed the carbachol (1 μM) induced pre-contractions and the presence of an antagonist, such as propranalol, glibenclamide, L-NNA and methylene blue, did not affect the log concentration relaxing response curves of cumulative CC extract to carbachol (1 μM) induced pre-contractions. [6]

Anti-Asthmatic Activity
Pritesh Paliwal *et al* (2011) investigated the bronchodilating activity of extracts of *Curcuma caesia* Bronchodilator activity of the extract was studied on the histamine aerosol induced Bronchospasm and pre-convulsion dyspnoea in guinea pigs. Treatment with methanolic CC extract 500 mg/kg showed significant protection against histamine induced bronchospasm. In this study CC extract significantly prolonged the latent period of convulsions followed by exposure to histamine aerosol at the dose of 500 mg/kg and showed maximum protection as compared to chlorpheniramine maleate (standard) 2 mg/kg, p.o. which indicating its H1 receptor antagonistic activity and supports the anti-asthmatic properties of the plant. [20]

Antioxidant 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 *Curcuma caesia* for their antioxidant properties using sulphur free radical reactivity with curcumin as a reference indicator, *Curcuma caesia* gave good degree of radioprotection. [21]

CONCLUSION

In ethno medicinal practices, the traditional healers use the genus Curcuma for the treatment of various ailments but *Curcuma caesia* Roxb. is a very less known and almost untouched drug. *Curcuma caesia* widely distributed throughout India. The plant appears to have a broad spectrum of activity on several ailments. The pharmacological studies reported in this review confirm the therapeutic value of *Curcuma caesia.* However, less information is available regarding the clinical, toxicity, and phytoanalytical properties of this plant. Several phytochemical studies have been reported but still it needs to progress. The plant is pre-clinically evaluated to some extent; if these claims are scientifically evaluated clinically, then it can provide good remedies and help the mankind in various ailments.

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