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Evaluation and pharmacological activities of *Curcuma zedoaria*: A review

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Abstract

Curcuma species are tropical crops used as cut flowers, landscape plants and speciality potted plants. Among these groups, the beautiful inflorescence and luxurious foliage of *C. zedoary* (Christm) Roscoe (a traditional source of Zedoary spice, tonic, and perfume) has potential in floriculture. Zedoary is a valuable medicinal plant; the essential oil obtained from its rhizomes is reported to have antimicrobial activity. It's also used clinically in the treatment of cervical cancer, as the aqueous extract of zedoary has antimutagenic activity. In traditional Asian medicine, zedoary (*Zedoariae rhizoma*) is also used for treatment of stomach diseases, hepato-protection, and to promote menstruation. Furthermore, zedoary has anti-inflammatory potency related to its antioxidant.

Keywords: *Curcuma zedoaria*, rhizome, antimicrobial activity, anti-inflammatory activity, antipyretic activity, white turmeric, Zingiberaceae

Introduction

Curcuma zedoaria belongs to the family (*Zingiberaceae*) it's mainly known as white turmeric. It's used to treatment of many diseases and disorders with phytomedicines and observed as very safe and no minimal side effects [1]. Medicinal plants and their crude parts such as Tulsi, neem, turmeric and ginger are used to cure or treat several common ailments, out of which *Curcuma zedoaria* Rosc commonly known as white turmeric is one of the important crude drugs belonging to Zingiberacea family and genus *Curcuma* [2].

The plant is indigenous to Bangladesh, Sri Lanka and India it is known by its several vernacular names. It is used traditionally for the treatment of menstrual disorders, carminative, expectorant, demulcent, diuretic and stimulant properties while the root is used in the treatment of dyspepsia, cold, cough and fever [3]. *Curcuma zedoaria* rhizomes, which are already used in industry to obtain pharmaceutical product and food coloring it's commercially interesting as starch raw materials [4]. The present study describes the phytochemical analysis and analgesic activity of *Curcuma zedoaria* rhizomes grown in Brazil. The results showed that the hydroalcoholic extract, fractions, specially dichloromethane, and a pure compound [5].

It's used as a folk medicine. The dried rhizome of *Curcuma zedoaria* is selected to make drinks and it's extracted as medicine. *Curcuma zedoary* had a moderate antimutagenic activity against benzo[a]pyrene. Hepatoprotective sesquiterpenes have been isolated from the acetone extracts of *Curcuma zedoaria* rhizome. It will include furanodiene, germacrone, curdione, neocurdione were found to show potent protective effect [6].

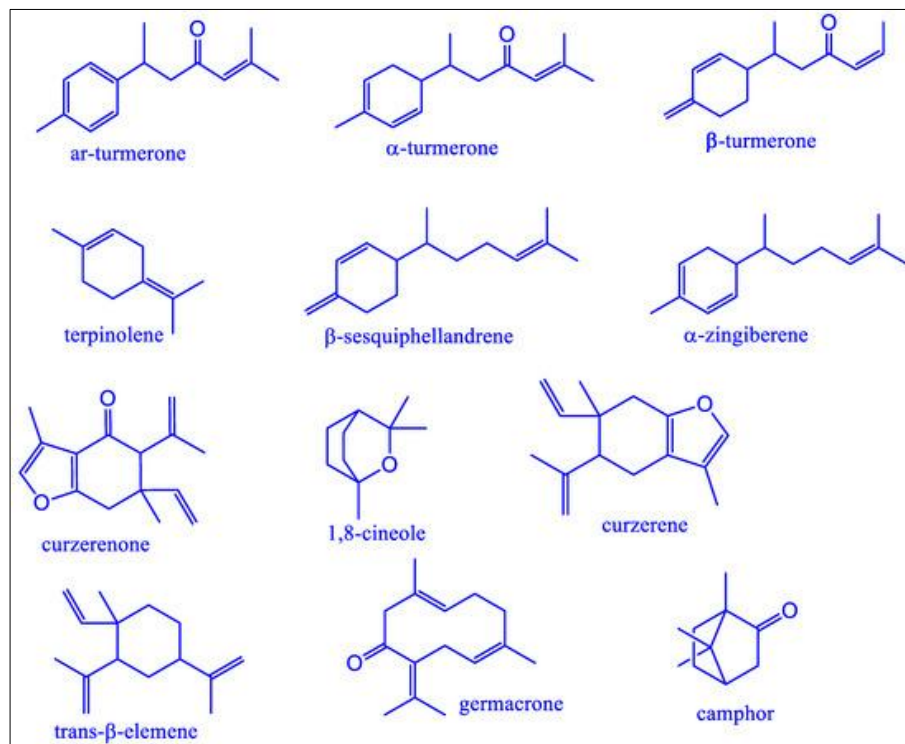
Rhizomes are employed in Asian and many other countries, for the treatment of several ailments, such as cervical cancer, hepatitis, inflammations and dolorous process. *Curcuma zedoaria* is also commonly used in medicine but with high starch content [7].

Pharmacological aspects

We aimed to explore some therapeutic potential of *Curcuma zedoaria* there are some *in vitro* and *in vivo* studies especially in most important metabolite of curcumin. Curcumin has been shown to possess cytotoxic effects against several cancerous cell, such as colorectal cancer cell. There has also been some report about anti-biofilm effects of curcumin. Which is due to interference with the signal molecule-based quorum sensing system [8].

Major chemical constituents

Major compounds present in *Curcuma zedoaria*.



Curcuma zedoaria is also called as white tuemeric and its essential oil is generally composed of camphor, curzerene, germacrone [9].

Microscopic characters of the rhizome

The outermost layer composed of rectangular elongated cells it's called as epidermis. And it's composed of 7 to 10 rows of typical rectangular to tangentially elongate thin-walled cells. The ground tissue is differentiated into two regions, the outer cortex and inner cortex. The ground tissue contains yellowish contents it's called as curcumin. The ground tissue is packed with starch strains. The starch grains are simple, flattened at the end. Endodermis is composed of a raw of thin-walled elongated cells and contain very oblong starch grains [10].

Pharmacological and biological activity

Antimicrobial activity

It's interfered with the synthesis of function of vital components of micro-organisms. Also provide selective toxicity of chemotherapeutic agents against microbes. The anti-microbial activity of the different extracts such as n-hexane, ethyl acetate and methanol of root were investigated by using disc diffusion method. The extracts of *Curcuma zedoaria* were investigated at an initial dose of 500 against gram-positive, gram-negative bacteria [11].

Antimicrobial drugs interfere chemically with the synthesis of function of vital compounds of microorganism. The differences provide us with selective toxicity oh chemotherapeutic agents against microbes. Antibiotics are of our most important weapons in fighting microbial infections and have greatly benefited the health-related quality of human life [12].

Anti-inflammatory activity

Curcuma zedoaria are also used in traditional medicine, and its have the another property that is anti-inflammatory activity. The aqueous extract of *Curcuma zedoaria* rhizome was prepared by decoction method. One portion was freeze-dried and the part was subjected to sequential fractionation using hexane ethyl acetate. This fractions are dried by using a

rotatory vacuum evaporator. And the aqueous extract showed anti-inflammatory activity against heat [13].

Aqueous extract of *Curcuma zedoaria* was made by boiling 450g of fresh rhizome in 1920 ml of water until volume reduced up to 1/8. The anti-inflammatory activity can be higher than the reference drug [14].

The anti-inflammatory effect is thought to be due to the activity of secondary metabolites contained in the ethanol extract of white turmeric, namely, flavonoids, steroids, and tannins. This is supported by the results of phytochemical screening test which indicate the presence of this group of compounds [15].

Antipyretic activity

The ethanol extract of *Curcuma zedoaria* it is significantly reduced yeast-induced elevated body temperature in mice in a dose dependent manner and the antipyretic effect at a dose 750 mg/kg was comparable to that of the antipyretic drug paracetamol. It's showed the phytochemical screening of ethanol extract presence of tannins, saponins, and carbohydrates are major constituents [16].

Cytotoxic activity

The essential oils obtained by hydro distillation of the rhizomes of *Curcuma zedoaria* collected from Malaysia and Indonesia were analysed by capillary GC and GC-MS. Both the oils were principally sesquiterpenes in nature and were characterized by zerumbone. Camphor was also abundant in both oils. The cytotoxic effects of both the oils on human breast, lung and cervical cancer cell lines were examined using the MTT assay. The Malaysian *C. zedoaria* rhizome oil was found to be cytotoxic against the MCF-7, SK-LU-1, HeLa S3 and SiHa cell lines, with IC₅₀ values being less than 10 µg/mL [17].

Anti-cancer activity

The active fraction isolated from *Curcuma zedoaria* was found to possess anti-cancer activity against lung cancer and lymphoma cells together with chemoprotective effects. The therapeutic intervention of the study is that the active fraction

could be used in combination with cyclophosphamide for synergistic effects thus decreasing the dosage of the drug, and decreasing the toxic effects ^[18].

Anti-oxidant activity

Free radicals are responsible for aging and causing various human diseases. The antioxidant substances which scavenge free radicals play an important role in the prevention of free radical-induced diseases. By donating hydrogen radical, the primary radicals are reduced to non-radical chemical compounds and are converted to oxidize antioxidant radicals. This action helps in protecting the body from degenerative disease ^[19]. Widely used artificial antioxidants, such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA), are very effective in their role. However, their use in food products has been falling off due to their instability, as well as due to a suspected action as promoters of carcinogenesis. For this reason, there is a growing interest in the studies of natural additives as potential antioxidants ^[20].

Conclusion

Curcuma zedoaria are also known as white turmeric, exhibits significant anti-microbial, anti-inflammatory, and anti-oxidant activities due to its diver's phytochemical composition. The plant contains compounds like curcumin, ethyl p-methoxycinnamate, and others, which contribute to its various pharmacological effects. These bioactive compounds contribute to its potential as a natural remedy for a range of ailments and as a source for developing new therapeutic agents. These compounds have been shown to inhibit bacterial and fungal growth, reduce inflammation, and scavenge free radicals, making it a promising natural remedy.

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