

The Role of Curcuma Species as Functional Food Ingredients

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ABSTRACT

An important aspect of indigenous medicine is the ability of traditional societies to manipulate the environment for their own benefit, for example for their health care. In Indonesia, this indigenous medicine is called jamu.

Jamu mostly consists of a mixture of herbals of the genus *Curcuma*, Zingiberaceae. There are 19 species of curcuma grown in Indonesia. Eleven of them are popular in the jamu preparations. Ethnopharmacological surveys have shown that 50% of these species are used for post partum protection, dismenorrhea, 30% are used for the treatment of stomache and as cosmetics, 20% for the treatment of various diseases such as fever, worms, asthma, etc. Chemical studies show that they contain curcuminoids, volatile oils, flavonoids, starch, and resinous substance.

Pharmacological studies of extracts and isolated bioactive compounds have shown that they have a broad pharmacological activity such as antibacterial, antifungal, anti-inflammatory, choloretic, antihepatotoxic, antitumor, antioxidant, and antihyperlipidemic activity.

INTRODUCTION

Traditional healing practice using indigenous medicines of plant origin is an important part of health care system in Indonesia. It may essentially be considered to be a medical science and art constituting a part of the Indonesian culture handed down from generation to generation orally as well as in written form.

The majority of the Indonesian community particularly in the rural areas is still having confidence and knowledges of the usefulness of traditional healing treatment. Traditional medicine is now used not only by the rural community but also by people of modern society as alternative medicine. The indigenous medicine widely used in Indonesia is commonly named *Jamu*. It is usually prepared from herbal materials and most of the materials are of the genus *Curcuma*, Zingiberaceae. Many species of the genus *Curcuma* have a wide variety of medicinal uses for the treatment of different diseases or ailments in different countries. In Indonesia, at least 11 species have been identified as being used as traditional medicine (Sidik and Hadi, 1999).

An ethnopharmacological survey shows that 50% of these species are used for post partum protection and dismenorhae, 20% as tonic to care stomach ailments, liver disorders and rheumatism, and 30% for the treatment of various diseases such as coughs, asthma, and fever (Sidik and Hadi, 1999). Among the *Curcuma* species, *Curcuma xanthorrhiza* and *Curcuma domestica* are the most widely used in traditional medicine. In addition, certain species are used as food dyes and flavouring agents while turmeric, for example, is employed in traditional rites (Prana, 1997).

Botany

These are some curcuma species growing in Indonesia. Well know species are *C. domestica* (kunyit), *C.*

xanthorrhiza (temulawak), *C. aeruginosa* (temu hitam), *C. aurantiaca* (koneng halamasu/temu blobo), *C. euchroma* (kunir kebo), *C. heyneana* (temu giring), *C. mangga* (temu mangga), *C. petiolata* (temu badur), *C. soloensis* (temu blenyeh), *C. zedoaria* (temu putih)

Curcuma is indigenous to the forests of Indonesia and Malaysia peninsula. It is cultivated mainly in Java, Malaysia, Thailand, and Philippines. The plant of curcuma is perennial, the leaves are in long their sheaths in the rhizome. Plant parts used for medicinal purposes are the dried, tuberous rhizomes cut into slices.

Chemistry

Plants belonging to Zingiberaceae generally contain volatile oils. Like common volatile oil, the oil of curcuma rhizome consist of monoterpenoids and sesquiterpenoids. Cinnamic acid and its esters are also obtained in the volatile oils of curcuma. These cinnamic derivatives are presumably as intermediate precursors of non volatile compounds in Curcuma. In addition, some species of Curcuma contain a mixture of yellow pigments, curcuminoids, polyphenolic compounds, flavonoids, and starch which is as an important reserved substance.

Curcuma species seem to produce certain volatiles constituents which differ in quantity as well as in quality to each other. Monoterpenoids in some Curcuma species include linalool, camphor, ocimene, pinene, 1-8-cineol, camphene, buracol, and cineal, while sesquiterpenoids consist of zingiberene, β -curcumene, α -curcumene, atlantone, turmerone, α -turmerone, and isofuranogermacron. Three curcuminoid compounds identified from Curcuma are curcumin, demethoxycurcumin, and bisdemethoxycurcumin.

Pharmacology

Curcuma species have been used in traditional medicine for a long time, and its broad spectrum of biological activity is ascribed to volatile oils and curcuminoids. They have been proved to have a variety of activity such as antibacterial, antifungal, anti-inflammatory, choleric, antihepatotoxic, antitumor, antioxidant, and antihyperlipidemic activity.

C. xanthorrhiza and *C. domestica* were most widely used in traditional medicines in Indonesia. Efficacy of curcuminoids and volatile oils of these two species on acute and chronic hepatitis have been extensively investigated (Sidik and Hadi, 1999). This investigation was done on 51 patients consisting of 24 patients with acute hepatitis and 27 patients chronic hepatitis. The materials used were a combination of curcuminoids (20 mg) isolated from *C. domestica* and volatile oils (5 mg) of *C. xanthorrhiza*. All patients were given a uniform dose of one capsule three times daily for six weeks. The liver function tests (bilirubin, SGOT, SGPT, γ GT and CHE) were done before and every week or every two weeks after treatment. The results showed, among the acute hepatitis patients, that the liver function test returned to within normal limits after 16.7 days of treatment with Curcuma complex. Among the chronic hepatitis patients treated with the Curcuma complex, there was a marked improvement in SGOT, SGPT, and CHE at the second week mark, and an improvement in the γ GT at the fourth week mark.

The interesting findings of the mechanism of anti-inflammatory action and radical scavenging activity of curcuminoids were reported by Tennesen (1989) and Tennesen and Greenhill (1992). This activity might be responsible for the effect of curcuminoids on hepatitis.

Volatile oils of *C. xanthorrhiza* has triglyceride-lowering activity in rats, and α -curcumene is identified as the active principle (Yasni et al., 1991). The volatile oils of *C. xanthorrhiza* give cholagogic effect and this effect is attributable to d-camphor contained in it (Ozaki and Liang, 1988).

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