



PHARMACOLOGICAL ACTIVITY OF ZINGIBER

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ABSTRACT

Ginger is a medicinal plant that has been widely used in Chinese, Ayurvedic and Tibb-Unani herbal medicines all over the world and has a long history of use in traditional systems of medicine. The primary pungent agents are due to the presence of phenylalkylketones or vanillyl ketones. Gingerol and shogaol are two most active constituents of ginger based preparations. In traditional medicine, this plant has been employed for treating several diseases like asthma, arthritis, stroke, toothaches, paralysis, and diabetes.

KEYWORDS: Zingiber officinale, pharmacology, Zingerone.

INTRODUCTION

Ginger (*Zingiber officinale*), a genus of rhizomatous herbs belonging to the family Zingiberaceae, is a spice commonly used as a condiment and preservative for a variety of foods. It is a slender, perennial erect herb with thick underground stem (rhizome) from which the aerial stems grow up to about 1m high which is entirely covered by the leaf-sheaths. Chinese and Ayurvedic system of medicine uses ginger as an antiemetic, antipyretic, and antiinflammatory agent. In traditional medicine, this plant has been employed for treating several diseases like asthma, arthritis, stroke, toothache, paralysis, diabetes and gastrointestinal problems. Phytochemical studies showed that the plant is rich in a large number of substances, including α -Zingiberene, β bisabolene, gingerols and shagaols. The aroma and flavor of ginger are determined by the composition of its steam volatile oil, which is comprised mainly of sesquiterpene, hydrocarbons, monoterpene hydrocarbons and oxygenated monoterpenes.

PHARMACOLOGY

Gastroprotective activity

Some active components of ginger are reported to stimulate digestion, absorption, relieve constipation and flatulence by increasing muscular activity in the digestive tract. In the present study by SU Zaman et al-2014 the gastroprotective activity and the underlying mechanism of the 95% ethanolic extract of *Z.officinale* was investigated. The extract was evaluated against gastric ulceration induced by hydrochloric acid (HCL) or water immersion restraint stress (WIR) or aspirin (ASP).

Ginger extract reduced gastric lesions in three different models of gastric ulcers, by 81% (HCL), 44.1% (WIR) and 68.2% (ASP).

Anticancer activity

An ethanolic ginger extract applied topically to mouse skin provided a highly significant protective effect against the development of skin tumors, and this was associated with the inhibition of 12-Otetradecanoylphorbol-13-acetate (TPA)- caused induction of epidermal ornithine decarboxylase, cyclooxygenase and lipoxygenase activities. Another important study has shown that 6-shogaol show anticancer activities against breast cancer via inhibition of cell invasion reduction of matrix metalloproteinase-9 expression.

Antiemetic effect

The components in ginger that are responsible for antiemetic effect are thought to be gingerols, shogaols, and galanolactone, a diterpenoid of ginger. Studies based on animal model revealed that ginger extract possesses anti-serotonergic and 5-HT₃ receptor antagonism effects which play an important role in the etiology of postoperative nausea and vomiting. The study verifies the antiemetic activity of ginger by the serotonergic and dopaminergic component in the mediation of its antiemetic effect.

Anti-inflammatory activity

A study was conducted for the anti-inflammatory activity of ginger alone and in combination with Indomethacin using carrageenan-induced rat paw edema. Aqueous

extract of *Zingiber officinale* (200mg/kg or 400mg/kg) was administered alone and in combination with Indomethacin (25mg/kg) to separate group of rats. Indomethacin, ginger 200mg/kg and ginger 400mg/kg displayed the value of 95%, 89.5%, and 92.6% inhibition of paw edema respectively thus showing a similarity in the anti-inflammatory profile of ginger and Indomethacin.

Antimicrobial Activities

Ingenol and^[6] shogaol, isolated from ginger rhizome, demonstrated antiviral activity.³²^[10] gingerol has been reported as active inhibitor of *M. avium* and *M. tuberculosis* in vitro. Gingerol and related compounds have been investigated for antimicrobial activities.^[6] gingerol and^[12] gingerol, isolated from ginger rhizome, demonstrated antibacterial activity against periodontal bacteria.

Cardiovascular Effects

In vitro research indicates that gingerols and the related shogaols exhibit cardio depressant activity at low doses and cardiostimulant properties at higher doses.⁷ Both (6)-shogaol and (6)-gingerol, and the gingerdiones, are reportedly potent enzymatic inhibitors of prostaglandin, thromboxane, and leukotriene biosynthesis.

Neuroprotective activity

Ginger and their constituents play a vital role as a neuroprotector. The exact mechanism of action of ginger in this vista is not known fully. But it is thought ginger shows neuroprotector effect due to the phenolic and flavonoids compounds. An important study has shown that 6-shogaol has neuroprotective effects in transient global ischemia via the inhibition of microglia.

Analgesic activity

Shogaol has also been shown to inhibit acetic acid-induced writhing in mice and to elevate the nociceptive threshold of the yeast-inflamed paw. In an experiment by Chyad AH et al-2016 ginger was shown to have peripheral and central analgesic effect in mice which may be attributed to the various phytochemicals present in rhizomes of *Z. officinale*.

Lipid Effects

Oral ingestion of ginger extract has been shown to have hypocholesterolemic, hypolipidemic and antiatherosclerotic effects in cholesterol-fed rabbits¹⁴ and in rats ¹⁶. Inhibition of LDL oxidation and attenuated development of atherosclerosis has also been observed in apolipoprotein E-deficient mice.

Antigenotoxic Activity

Norethandrolone and oxandrolone were investigated for their genotoxic effect on human lymphocyte chromosomes using chromosomal aberrations and sister chromatid exchanges as parameters and subsequently Genistein and^[6] gingerol were used as antigenotoxic

agents to ameliorate the genotoxicity induced by the steroids.

CONCLUSION

Zingiber officinale has been subjected to many extensive clinical investigations. Experimental studies have demonstrated its anti-inflammatory, analgesic, antiemetic properties. So further many kinds of research can be done for finding out the more medicinal use of ginger and it can be an alternative to modern medicine for the treatment of any underlying disease. We hope this review will facilitate all about the past scientific research and the necessary information about the enormous pharmacological activities of ginger and more detailed clinical research appears worthwhile to establish it as a standard drug.

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