TANG HUMANITAS MEDICINE

Review

Zingiber officinale Rosc.: A traditional herb with medicinal properties

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ABSTRACT

Ginger (*Zingiber officinale*) belonging to the family Zingiberaceae is a perennial herb. It is widely distributed in tropical Asia. In India, it is cultivated mainly in Kerala, Andhra Pradesh, Uttar Pradesh, West Bengal and Maharashtra. It is one of the most common spices, which is in use since centuries for its versatile medicinal actions like antiemetic, stomachic, expectorant, anti-inflammatory, aphrodisiac etc in traditional system of medicine (Unani, Ayurveda, and Chinese medicine). It is useful for the treatment of various gastrointestinal, pulmonary, cardiovascular and sexual disorders. The phytochemical study of ginger showed the presence of many volatile oils and oleo-resins like gingerol, zingerone, zingiberol etc. Numerous experimental and clinical trials have proven ginger for its range of therapeutic activities such as antibacterial, antidiabetic, antiemetic, hypolipidaemic, hepatoprotective etc properties. The present article aims to explore traditional Unani and pharmacological activities of this herb reported till date.

Keywords ginger, hypolipidaemic, Unani, *Zingiber officinale*

INTRODUCTION

Ginger is scientifically known as *Zingiber officinale*. The name was given by the English botanist, William Roscoe (1753 - 1831) in an 1807 publication. A number of medicinal plants are included in the family Zingiberaceae and ginger is one of them. The ginger family is a tropical group especially abundant in Indo-Malaysia, consisting of more than 1200 plant species in 53 genera. The genus Zingiber includes about 85 species of aromatic plants from East Asia and tropical Australia. The word Zingiber is derived from a Sanskrit word denoting "horn-shaped," in reference to the protrusions on the rhizome (Amiril, 2006). It has been used for medicinal purposes since antiquity. In particular, it has been an important plant for the traditional medicine especially Unani, Ayurveda and Chinese medicine. Ginger has been used to treat a wide range of ailments including dyspepsia, diarrhoea, nausea, asthma, respiratory disorders, toothache, gingivitis and arthritis (Duke, 2003; Ebadi, 2007; Pulliah, 2006). Historically, ginger has been used both as a food and a medicine since ancient times. Confucius wrote about it in his Analects, the Greek physician, Dioscorides, listed ginger as an antidote to poisoning, as a digestive, and as being warming to the stomach in his treatise "De Materia Medica". The Al Qur'an, the Talmud and the Bible all mention ginger. Records suggest that ginger was highly valued as an article of trade and in 13th and 14th century England, one pound of ginger was worth the same as a sheep (Braun and Cohen, 2007). Ginger is accounted for its value as an aphrodisiac. The references of ginger's sexual tonic activity are remarkable; it includes citation by Dioscorides, John Gerard's prescriptive herbal. The University of Salerno medical school approved a rule for happy life in old age i.e. to "eat ginger; and love and be loved as in your youth." Ginger's value as an effective aphrodisiac is indisputably connected to its extensive use as an energy enhancer, systemic tonic, hormone balancer and agent for improving the blood circulation (http://www.herballegacy.com/Whitney_History.html). Some other important historical events regarding ginger are, in 5000 B.C. Ancient historians equate the ownership of ginger or its trade routes with prosperity (Duke et al., 2002). In 2165 B.C., Death of Chinese Princess Tai, buried with cinnamon, galangal, ginger, and pepper. In 47 A.D. Pedanios Dioscorides (first century A. D.) "Materia Medica", suggested ginger as an aphrodisiac. In 200 A.D. Ginger taxed in Rome, first listed as medicinal in China. In 1280 A.D. Marco Polo observed ginger cultivated in China and India. In 1915 A.D. 25,000 physicians, the Eclectics, embrace ginger and other natural medicines.

Ginger is an aromatic rhizome (underground root like stems) which is warty and branched. It has upright stems and narrow medium green leaves arranged in two on each stem. The stem is surrounded by the sheathing bases of two rank leaves. The flower either white or yellowish-green and is rarely seen. It grows well in humid climate where it can absorb more sunlight (Amiril, 2006). The fresh and dried rhizome is used for medicinal purpose as well as a spice. The phytochemical analysis of ginger reveals that it contains important nutrients like carbohydrate, lipids, amino acids and vitamins like niacin, retinol etc; apart from this it has essential oils and oleo-resins. It has pungent smell and slight bitter taste (Barnes et al., 2007).

Several experimental and clinical trials have been carried out on *Zingiber officinale* those have proved its traditional claims as well researched many new indications of the plant (Fig. 1).

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Fig. 1. *Zingiber officinale* plant

Fig. 2. Fresh rhizome

TAXONOMY

Kingdom: Plantae
Subkingdom: Tracheobionta
Division: Magnoliophyta
Class: Liliopsida
Subclass: Zingiberidae
Order: Zingiberales
Family: Zingiberaceae
Genus: Zingiber
Species: officinale (Amiril, 2006; http://www.itis.gov.)

VERNACULAR NAMES

English: Ginger (Khare, 2007; Joy et al., 1998); Sanskrit: Ardrakam (Joy et al., 1998); Hindi: Adarak (Joy et al., 1998); Japanese: Shokyo (Braun and Cohen, 2007); Bengali: Ada (Joy et al., 1998); Malayalam: Inji (Joy et al., 1998); Tamil: Inci (Joy et al., 1998); Kannada: Adraka; Ayurvedic: Fresh rhizome (Fig. 2) - Aardraka, Aadrikaa, Shrngibera, shrngavera, Katubhadra. Dried rhizome (Fig. 3)- Shunthi, Naagara, Naagaraa, Naagaraka, Aushadha, Mahaushadha, Vishvaa, Vishvabheshaja, Vishvaaushadha (Khare, 2007); Unani: Fresh rhizome-Zanjabeele Ratab, Al-Zanjabeel, Dried rhizome-Zanjabeel, Zanjabeele yabis (Khare, 2007); Siddha: Fresh rhizome- Inji, Allam, Lokottai, Dried rhizome- Chukku, Sunthi (Khare, 2007); Urdu: Adrak; Arabic: Zanjabeel; Punjabi: Dried rhizome- Sonth, Fresh rhizome- Adrakh (Nadkarni, 2005); Telugu: Dried rhizome- Sonti, Fresh rhizome- Allam (Nadkarni, 2005); Assamese: Ada (Kritikar and Basu, 2007); Chinese: Chiang P'i, Kan Chiang, Kiang, Sheng Chiang (Kritikar and Basu, 2007); Marathi: Ardrak, Ale (Department of Indian Systems of Medicine & Homoeopathy, 2007); Gujarati: Adu (Department of Indian Systems of Medicine & Homoeopathy, 2007).

Binomial name: *Zingiber officinale* Rosc. (Joy et al., 1998; Khare, 2007; Pulliah T, 2006)

Habitat: *Zingiber officinale* is widely distributed to tropical Asia (Kritikar and Basu, 2007); In India, it is cultivated mainly in Kerala, Andhra Pradesh, Uttar Pradesh, West Bengal and Maharashtra (Khare, 2007). In India, different types of Indian ginger are available like Cochin ginger (light brown or yellowish grey); Calicut ginger from Malabar (orange or reddish brown, resembling African ginger) and Kolkata ginger (greyish brown to greyish blue) (Khare, 2007).

MORPHOLOGICAL DESCRIPTION

Zingiber officinale is a perennial herb. Stem is leafy, thick, about 60 cm high. Leaves are pointed, narrowly or linear-lanceolate, approx 20 cm long and 1.5 - 2cm wide, clasping the stem by long sheaths. The inflorescences rarely produced by cultivated plants are separate, approx 20 cm high, consisting of threefold flowers subtending with bracts and bracteoles. Bracts are ovate approx 2.5 cm long, closely pressed against each other, pale green. Calyx is short, three lobed. Corolla has two green-yellow pointed segments and shorter, an oblong ovate, dark purple lip spotted and striped with yellow. Each flower has only one short stalked, fertile stamen and solitary stigma. The fruit, which is rarely formed, is a dehiscent capsule containing relatively large seeds. It requires hot, moist climate and rich, well-drained soil (Ross, 2005). The rhizome is stout, tuberous, horizontal, branched, fleshy, aromatic, white or yellowish to brown (Kritikar and Basu, 2007; Ross, 2005). PART(S) USED: Rhizome (Barnes et al., 2007; Ghani N, 2002; Kabeeruddin M, 2010; Waring, 2010)

ACTIONS MENTIONED IN UNANI MEDICINE

- Muqawwie bah (aphrodisiac) (Hakeem, 2002; Ghani, 2002; Kabeeruddin, 2010)
- Mudirre baul (diuretic) (Hakeem, 2002)
- Muhallile auram (anti-inflammatory) (Hakeem, 2002)
- Muhallile riyah (carminative) (Hakeem, 2002; Kabeeruddin, 2010)
- Mulaiyine shikam (laxative) (Ghani, 2002; Kabeeruddin, 2007)
- Hazim (digestive) (Ghani, 2002; Kabeeruddin, 2007; Kabeeruddin, 2010)
- Mushtahi (appetizer) (Ghani, 2002)
- Muqawwie meda (stomachic) (Ghani, 2002)
- Muqawwie jigar (liver tonic) (Ghani, 2002)
- Muqawwie hafeza (memory enhancing) (Kabeeruddin, 2007; Kabeeruddin, 2010)
- Muqawwie asab (nervine tonic) (Department of Indian Systems of Medicine & Homoeopathy, 2007)
- Dafae sual (antitussive) (Ghani, 2002)
- Muharrik (stimulant) (Department of Indian Systems of Medicine & Homoeopathy, 2007)

THERAPEUTIC USES MENTIONED IN UNANI MEDICINE

Decoction: The decoction of ginger is beneficial in Zukam (coryza), Sua'al (cough), Suda (headache) and Zeequnnafas (asthma) (Hakeem, 2002).

Paste: The paste of fresh ginger rhizome is useful in the conditions like Niqras (gout), Irqunnasa (sciatica), Wajaul Mafasil (rheumatoid arthritis) and Auram (inflammations) (Hakeem, 2002).

Oil: It is mixed in Roghane kunjad (sesame oil) and applied externally in Suda (headache) (Kabeeruddin, 2010), Wajaul mafasil (Arthritis) and Tahajjure mafasil (Ghani, 2002).

Juice: Juice of fresh ginger is mixed with honey and used in Sua'ale balghami (productive cough). Extract of fresh ginger mixed with sugar and boiled, and used in Zukam wa sua'al

Fig. 3. Dried rhizomes

(common cold and cough) (Ghani, 2002).

Others: Dried rhizome 10 gram mixed with jiggery 17 grams is used before breakfast for the treatment of Bahtus saut (Hoarseness of voice) (Ghani, 2002).

Ginger along with salt is advised just before the meals for the treatment of Zoafe ishteha (lack of appetite) and Nafakhe shikam (Flatulence) (Ghani, 2002).

Ginger is also commonly used in Bawaseer (haemorrhoids), Istisqua (ascites), Khuruje miqad (rectal prolapse), Sue hazm (dyspepsia), Suqoote ishteha (anorexia), Daus salab (alopecia areata) (Ghani, 2002), Falij (hemiplegia), Laqwa (facial palsy) (Department of Indian Systems of Medicine & Homoeopathy, 2007) and ENT disorders (Ghani, 2002).

Compound formulations: Murabbae Zanjabeel, Majoone Zanjabeel and Jawarishe Zanjabeel are important formulations which are used in the conditions such as Nisyan (Amnesia), Zoafe Bah (Sexual debility), Sailanurraham (Leucorrhoea), Wajaul zahar (Low backache) (Kabeeruddin, 2010), Maghas (Abdominal cramps), Ganda duhni (Bad breath) and the diseases of urinary system (Hakeem, 2002).

ETHNOBOTANICAL ACTIONS

•Antiemetic (Duke et al., 2002; Khare, 2007)
•Antiflatulent (carminative) (Khare, 2007; Kritikar and Basu, 2007; Nadkarni, 2005; Waring, 2010)
•Hypocholesterolaemic (Khare, 2007)
•Anti-inflammatory (Duke et al., 2002; Khare, 2007)
•Antispasmodic (Barnes et al., 2007; Khare, 2007)
•Expectorant (Khare, 2007)
•Circulatory stimulant (Khare, 2007)
•Diaphoretic (Barnes et al., 2007; Khare, 2007)
•Stomachic (Duke et al., 2002; Kritikar and Basu, 2007; Nadkarni, 2005; Pulliah, 2006; Waring, 2010)
•Analgesic (Duke et al., 2002)
•Antioxidant (Duke et al., 2002)
•Aphrodisiac (Duke et al., 2002; Kritikar and Basu, 2007)
•Cardiac tonic (Duke et al., 2002)
•Digestive (Duke et al., 2002)
•Stimulant (Nadkarni, 2005)
•Appetiser (Kritikar and Basu, 2007)
•Laxative (Kritikar and Basu, 2007)

ETHNOBOTANICAL USES

•Flatulence (Nadkarni, 2005; Pulliah, 2006; Waring, 2010)
•Rheumatism (Nadkarni, 2005; Pulliah, 2006; Waring, 2010)
•Throat infections (Pulliah, 2006; Waring, 2010)
•Dyspepsia (Kritikar and Basu, 2007; Nadkarni, 2005; Pulliah, 2006)
•Cold (Duke et al., 2002; Nadkarni, 2005; Pulliah, 2006)
•Cough (Khare, 2007; Nadkarni, 2005; Pulliah, 2006)
•Gout (Pulliah, 2006)
•Gastritis (Pulliah, 2006)
•Irritable bowel syndrome (Khare, 2007)
•Nausea, vomiting (Ebadi, 2007; Kritikar and Basu, 2007; Nadkarni, 2005)
•Diarrhoea (Duke et al., 2002; Khare, 2007)
•Influenza (Khare, 2007)
•Migraine (Duke et al., 2002; Khare, 2007)
•Intestinal colic (Barnes et al., 2007; Nadkarni, 2005)
•Toothache (Duke et al., 2002; Nadkarni, 2005)
•Impotence (Duke et al., 2002)
•Motion sickness (Ebadi, 2007)
•Arthritis (Ebadi, 2007)
•Asthma (Ebadi, 2007; Kritikar and Basu, 2007)
•Bronchitis (Kritikar and Basu, 2007)

ADVERSE REACTIONS

European scientific cooperative on Phytotherapy (ESCOP) lists heartburn as a possible adverse reaction, while the Commission E states that ginger has no known adverse reactions. The USP-DI also lists minor heartburn as the only reported adverse reaction to ginger (Barrett, 2004).

PHYTO-CHEMISTRY

The ginger rhizome contains an essential oil and resin known collectively as oleo-resin. The composition of the essential oil varies according to the geographical origin, but the chief constituents, sesquiterpene hydrocarbons, which are responsible for the characteristic aroma, are fairly constant (Braun and Cohen, 2007). A summary of chemical constituents of ginger is given below.

Carbohydrates: Starch (major constituent, up to 50%) (Barnes et al., 2007).

Lipids: 6 - 8%. Free fatty acids (e.g. palmitic acid, oleic acid, linoleic acid, caprylic acid, capric acid, lauric acid, myristic acid, pentadecanoic acid, heptadecanoic acid, stearic acid, linolenic acid, arachidic acid); triglycerides, phosphatidic acid, lecithins; gingerglycolipids A, B and C (Barnes et al., 2007).

Oleo-resin: Gingerol homologues (major, about 33%) including derivatives with a methyl side-chain, shogaol homologues (dehydration products of gingerols), zingerone (degradation product of gingerols), 1-dehydrogingerdione, 6-gingesulfonic acid and volatile oils (Barnes et al., 2007).

Volatile oils: 1 - 3%. Complex predominately hydrocarbons. β- Bisabolene and zingiberene (major); other sesquiterpenes include zingiberol, zingiberenol, ar-curcumene, β-sesquiphellandrene, β-sesquiphellandrol (cis and trans); numerous monoterpene hydrocarbons, alcohols and aldehydes (e.g. phellandrene, camphene, geraniol, neral, linalool, δ-nerol) (Barnes et al., 2007).

Other constituents: Amino acids (e.g. arginine, aspartic acid, cysteine, glycine, isoleucine, leucine, serine, threonine and valine), protein (about 9%), resins, diterpenes (galanolactone), Vitamins (especially nicotinic acid (niacin) and vitamin A), minerals. The material contains not less than 4.5% of alcohol (90%) soluble extractive and not less than 10% of water-soluble extractive (Barnes et al., 2007).

Some active constituents: The reported pharmacological actions of zinger are due presence of active chemical constituents which are summarised below.

10-Gingerdione–Anti-inflammatory; 6-Gingerdione–Anti-inflammatory; Gingerenone-A-Anticoccidioid 10 ppm; Fungicide 10 ppm; Gingerenone-B- Fungicide; Gingerenone-C-Fungicide; Gingerol-Analgesic; Zingiberone- Antimutagenic; Antiulcer (Duke, 2003).

6-Gingerol, 6- and 10-dehydrogingerdione, 6- and 10-gingerdione have been reported to be potent inhibitors of prostaglandin biosynthesis (PG synthetase) in vitro, with the latter four compounds stated to be more potent than indomethacin. Concentration-dependent inhibition of platelet aggregation, in vitro, induced by ADP, adrenaline, collagen and arachidonic acid has been described for an aqueous ginger extract. Ginger was also found to reduce platelet synthesis of prostaglandin-endoperoxides, thromboxane and prostaglandins (Barnes et al., 2007).

MODERN SCIENTIFIC REPORTS

Anti-diarrhoeal activity

In an experimental trial *Zingiber officinale* was studied for its antimicrobial profile and effect on virulent features of diarrhoeal pathogens, viz. colonization of epithelial cells and production of enterotoxins. It inhibited the production of cholera toxin, it had no effect on the action of this toxin. It also had no effect on the production and action of E. coli heat labile and heat stable toxins. However, the bacterial colonization of HEp2 cells was reduced. The results indicate that in the absence of antimicrobial action, Z. officinale exhibits its antidiarrhoeal activity by affecting bacterial and host cell metabolism. This study reports a novel mechanism of action by Z. officinale in infectious diarrhoea (Daswani et al., 2010).

Anti-diabetic and hypolipidaemic activity

Al-Amin et al. (2006) in a study found that at a dose of 500 mg/kg, raw ginger was significantly effective in lowering serum glucose, cholesterol and triacylglycerol levels in the ginger-treated diabetic rats. The ginger treatment also resulted in a significant reduction in urine protein levels. Moreover, ginger decreased both water intake and urine output in the STZ-induced diabetic rats. These results indicate that raw ginger possesses hypoglycaemic, hypocholesterolaemic and hypolipidaemic potential. Additionally, raw ginger is effective in reversing the diabetic proteinuria observed in the diabetic rats. Thus, ginger may be of great value in managing the effects of diabetic complications in human subjects. Jafri et al. (2011) carried out an experimental study to evaluate the hypoglycaemic effect of *Zingiber officinale* aqueous extract at a dose of 500 mg/kg body weight once a day for six weeks in alloxan induced diabetic rats. The results of the study showed significant ($p < 0.05$) reduction in serum glucose level after day 21 and 42 post treatment.

Anti-inflammatory and antinociceptive activities

Vendruscolo et al. (2006) conducted an experimental trial on male Swiss mice and male Wistar rats for the evaluation of antinociceptive and anti-inflammatory effects respectively. In this study they found that ginger essential oil (GEO) showed significant antinociceptive and anti-inflammatory activities.

Antioxidant activity

Al-Katib et al. (2009) studied the extraction of flavonoids and non-flavonoids parts (oils and defatted) of dried *Zingiber officinale* against H_2O_2 induced oxidative stress in the serum of male rats. The results of the study showed the protective effects of the ginger extract by increasing antioxidant defense and suppression free radicals production in the serum.

Antibacterial activity

Karteek et al. (2012) conducted a study to evaluate the antibacterial activities of three medicinal plants namely Punica granatum, Ricinus communis and *Zingiber officinale* against five important bacterial strains viz., E. coli, Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa and Proteus vulgaris. The researchers showed that the extract of these herbs has great potential against different microorganisms tested and has inhibitory effect. In another study conducted by Auta et al. (2011) the antimicrobial property of various extract of *Zingiber officinale* was investigated against Escherichia coli and Pseudomonas aeruginosa using the Agar and tube diffusion method. The result obtained revealed that ethanolic extract of ginger gave the widest zone of inhibition against one out of the two test organisms at the concentration of 20 mg/ml. However, Pseudomonas aeruginosa was more sensitive to the extract. It was also observed that the solvent of extraction and its varying concentrations affected the sensitivity of the two test organisms to the plant extract, showing that ginger has antimicrobial activities on the test organisms due to its inhibitory effect.

Anti-parasitic activity

In an experimental study, anti-parasitic effect of *Zingiber officinale* on Limnatis nilotica leech population was evaluated. After treating the leeches with *Zingiber officinale* (32×10^4 ppm) and the positive controls; Chlorine (4×10^6 ppm), Formalin 37% (4×10^3 ppm) and Savlon (4×10^3 ppm) for 30 min, the mean death time of L. nilotica was measured by disinfectant assay. The mean death time (M ± SD) for *Zingiber officinale* was 24 ± 4.07 min and for Chlorine, Savlon and Formalin were 1.62 ± 0.51, 3.37 ± 1.9, 5.12 ± 1.9 min, respectively. The results offer an opportunity for using ginger plant as antiparasitic and disinfectant (Forouzan et al., 2012).

Hepatoprotective activity

The effect of ginger (*Zingiber officinale*) upon hepatotoxicity induced in albino rats by the anticancer drug, adriamycin (ADR) was studied by Sakr et al. (2011) Adriamycin caused significant elevation in serum ALT (Alanine aminotransferase) and AST (Aspartate aminotransferase) enzymes after 4 and 6 weeks of treatment. It also caused an increase in malondialdehyde (lipid peroxidation marker) and depletion of the antioxidant enzyme, superoxide dismutase. Treating animals with water extract of ginger and adriamycin led to an improvement in the histological changes induced by adriamycin together with significant decrease in ALT and AST activity. Moreover, ginger reduced the level of malondialdehyde and increased the activity of superoxide dismutase. The results this work indicated that ginger had protective effect against liver damage induced by adriamycin and this is due to its antioxidant activities.

Antidepressant activity

Pratap R et al. (2012) in their study reported that the extract of *Zingiber officinale* showed the significant antidepressant activity comparable to the standard drug. The Antidepressant effects of *Zingiber officinale* extract seems to be mainly associated with the activation of dopaminergic system and possess potential anxiolytic and antidepressant activities.

Effect on male reproductive functions

Saeid et al. (2011) conducted a study on male broilers breeder to investigate the effects of *Zingiber officinale* on male reproductive functions and study the mechanisms underlying these effects. The investigators found that the treatment caused a significant increase in the weight of the testis and there were dose and duration dependent increases in ejaculate volume, sperm concentration, counts, movements and a significant decrease in motility and abnormality. There was also a significant increase in semen plasma cholesterol, glucose and a significant decrease in protein. Antioxidant malonhydialdehyde

were significantly reduced, glutathione and blood serum LH, FSH and testosterone serum level were significantly increase. These results indicated that extract of *Zingiber officinale* possesses pro-fertility properties in male broiler which might be a product of both its potent antioxidant properties and androgenic activities. In another study Ghlissi et al. (2013) investigated the androgenic activity of Ginger on testicular histology of adult Sparague Dawley rats. The results of the study showed significant androgenic activity.

Larvicidal activity
Khandagle et al. (2011) in their study extracted essential oils by steam distillation from rhizome of Zingiber officinalis and leaf and stem of Achyranthes aspera to evaluated the larvicidal, attractant/repellent, and oviposition attractant/deterrent activity against two mosquito species viz. Aedes aegypti and Culex quinquefasciatus. In this study they found that the highest larvicidal activity for A. aegypti and C. quinquefasciatus was shown by Z. officinalis. This oil also offers 5-h protection at the concentration of 0.5 mg/cm² from both mosquito species. The highest oviposition deterrence activity was exhibited by A. aspera stem oil in case of A. aegypti and C. quinquefasciatus at the concentration of 0.1%. These results reveal that both these oils have control potential against A. aegypti and C. quinquefasciatus.

Gastroprotective effect
Nanjundaiah et al. (2011) in their study reported that the aqueous extract of ginger was able to protect the gastric mucosa from stress- induced mucosal lesions and inhibits gastric acid secretion probably by blocking H+, K+-ATPase action, inhibiting growth of H. pylori and offering anti-oxidant protection against oxidative stress-induced gastric damage.

Cardioprotective activity
Ansari et al. (2006) in their study showed that the ethanolic extract of *Zingiber officinale* enhances the antioxidant defense against isoproterenol (ISO) induced oxidative myocardial injury in rats and exhibit cardioprotective property.

Anti-atherosclerotic activity
An ethanolic ginger extract, standardised to contain 40 mg/g gingerols, shogaols and zingerone, and 90 mg/g total polyphenols, was reported to inhibit low-density lipoprotein oxidation and to reduce the development of atherosclerosis in atherosclerotic mice, when compared with control. In rats fed a high-fat diet for 10 weeks, an aqueous preparation of ginger powder administered orally at doses of 35 and 70 mg/kg demonstrated antioxidant activity, as measured by raised tissue concentrations of thiobarbituric acid reactive substances and hydroperoxides, and reduced activities of superoxide dismutase and catalase (Barnes et al., 2007).

CLINICAL TRIALS

Hypolipidaemic activity
Navaei et al. (2008) conducted a double blind placebo control clinical trial in hyperlipidaemic patients. The Patients were divided into two unequal groups, treatment group was given ginger capsule 3 g/day in divided doses while the placebo group received lactose capsule of the same dose. The results of the study showed that ginger has a significant lipid lowering effect compared to placebo.

Musculoskeletal disorders
A randomised, double-blind, placebo-controlled, multicentre, parallel-group 6- week study of 261 patients found that a highly purified and standardised ginger extract (EV.EXT 77) moderately reduced the symptoms of OA of the knee. Similarly, 250 mg of the ginger extract (Zintona EC) four times daily for 6 months was shown to be significantly more effective than placebo in reducing pain and disability in 29 OA patients in a double-blind, placebo-controlled, crossover study (Braun and Cohen, 2007).

Migraine
In an open-label study of 30 migraine sufferers that reported that treatment with a sublingual ginger and fever few preparation (GelStat Migraine O) in the initial phase of a migraine resulted in most patients being satisfied with the therapy and being pain-free or only having mild headache post-treatment (Braun and Cohen, 2007).

Chemotherapy-induced nausea
In an open study, 1.5 g ginger was found to decrease psoralen-induced nausea in 11 patients treated with photopheresis for cutaneous T-cell lymphoma. Powdered ginger root effectively reduced cyclophosphamide-induced nausea and vomiting in a randomised, prospective, crossover double-blind study, with the anti-emetic effect of ginger being equal to metoclopramide. Ginger was found to have similar efficacy to metoclopramide in reducing cisplatin-induced emesis in a randomised, double-blinded, crossover study of 48 gynaecologic cancer patients receiving chemotherapy (Braun and Cohen, 2007).

Gastrointestinal motility
A crossover trial measured the effect of 200 mg ginger extract WS 1540 (corresponding to 2 g ginger root) on gastrointestinal motility in 12 healthy volunteers. Ginger or placebo was given in the morning after fasting and at noon before lunch. Gastro-duodenal motility was tested in the morning and for an hour after lunch. In comparison to placebo, ginger increased the number, frequency, and amplitude of gastric contractions in the fasting state and to a lesser degree following a meal (Barrett, 2004).

Motion sickness
A study explored the effects of ginger on motion sickness experienced by Navy cadets. Seventy-nine men were given either ginger (1 g powered root) or placebo (lactose) on their first trip on the high seas. Ginger significantly reduced the tendency to vomit and experience cold sweats. The symptoms of nausea and vertigo were also reduced (Barrett, 2004).

CONCLUSION

Zingiber officinale is a common spice, which is in use for the treatment of various gastrointestinal, pulmonary, cardiovascular and sexual disorders since antiquity in Unani and Ayurvedic medicines. The versatile biological activities of this plant have been proven on scientific parameters, which are attributed to its phytochemical constituents like 10-Gingerdione, 6-Gingerdione, Gingerenone-A, Gingerenone-B, Gingerenone-C, Gingerol, Zingiberone, etc. It mainly possesses anti-diarrhoeal, anti-diabetic, hypolipidaemic activity, anti-inflammatory and antinociceptive, antioxidant, antibacterial, anti-parasitic, hepatoprotective, antidepressant, gastroprotective, anti-atherosclerotic, cardioprotective activities etc. The traditional uses of this plant mentioned in the classical text are proven pharmacologically and clinically on scientific parameters that show that ginger is a universal spice having various medicinal

properties.

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none

CONFLICT OF INTEREST

None to declare.

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