



ZANJABEEL (GINGER): A CULINARY SPICE WITH ITS POTENTIAL THERAPEUTIC APPLICATIONS

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ABSTRACT

Interest in medicine has been almost universal and constant since the beginning of man. The various indigenous systems such as Unani, Ayurveda and Siddha use several plant species to treat different ailments. The Unani (Greco-Arab) system of medicine has been practiced since ancient times for the treatment of range of diseases. Traditional medicine usually takes a “holistic” approach where the physical, spiritual (which includes mental), and most often social well-being of an individual are treated. Thus, the medicinal value of an herbal product may be intimately related to its nutritional and psychological aspects. Modern medicines, on the other hand, are relatively more focused on particular diseases based on specific etio-pathological entities. It is estimated that between 70% and 95% of citizens in a majority of developing countries use traditional medicine for the management of health and as primary health care to address their health-care needs and concerns. Medicinal plants play an important role in the development of potent therapeutic agents. It is estimated that at least 25% of all modern medicines are derived, either directly or indirectly, from medicinal plants, primarily through the application of modern technology to traditional knowledge. Zanjabeel (Ginger) is a very famous herbal drug which is widely used in world as spice as well as drug in traditional medicine. This article aims at reviewing the Zanjabeel on the basis of description in Unani system of medicine as well as ethnomedicine, its Pharmacological actions, therapeutic uses and to discuss scientific studies aimed at isolation and identification of phytochemical constituents, scientific validation of its pharmacological actions in various diseases.

KEY WORDS: Zanjabeel, Unani, Pharmacological actions, therapeutic uses.

INTRODUCTION

Zanjabeel (Ginger) is an important drug and a culinary spice widely used in Unani system of medicine. It consists of whole or cut, dried scrapped or unscrapped rhizomes of *Zingiberofficinale* Rosc. of *Zingiberaceae* family [1,2]. Rhizomes are aromatic, thick lobed, pale-yellowish, differing in size and shape in different cultivated types. India is the largest producer of ginger, accounting for 50% of the total world production [3].

Cochin ginger in the world market is considered next best to Jamaica [4]. Rhizome is highly esteemed as a spice for its characteristic odour and pungent taste and widely used for flavouring foods, for extraction of oleoresins, preparation of extracts and distillation of an essential oil of ginger [5]. It is well known drug and spice which is widely used in Unani system of medicine as a single drug and as an ingredient in various Unani formulations to treat a number of diverse pathological conditions.

Vernacular Names

Zingiberofficinale Rosc. is known by different names in different parts of the world including Indian subcontinent especially because India is a multilingual country. Hence vernacular names [6,7] of the drug are given below for the convenience of the persons living in different states or speaking different languages.

| | | |
|-----------------|---|---|
| English | : | Ginger |
| Hindi | : | Sonth, Adrak |
| Urdu | : | Sonth, Zanjabeel |
| Arabic | : | Qafeer, Zanjabeel |
| Persian | : | Sahangrez, Zanjabil |
| Sanskrit | : | Naara, Visva, Adraka, Anupama, Ardrashaka, |
| Bengali | : | Ada |
| Kannad | : | Hasisunti, Shunthi |

| | | |
|---------------|---|----------------|
| Tamil | : | Allam, Inji |
| Telugu | : | Allamu, Sonthi |
| Deccan | : | Ala |
| Unani | : | Hotyoon |

Historical Background

Ginger is used as an ingredient in more than half of all traditional Chinese medicines and has been used since 4th century BC [8]. Ginger has been cultivated in India from prehistoric times. Ginger is mentioned by many names in Sanskrit literature as Mahaushadha “great remedy”, Visva “Pervader”, Katubadra “the good acrid” etc. Ginger is one of the three acrids (trikatu) of the hindu physicians, the other two being black peppers. According to Persians, shingabir and adrak are applied to ginger and it was probably through the Persians that the ginger first became acquainted with it. Ginger was also described by dioscorides as hot, digestive, gently laxative; it was an ingredient in collyria and antidotes to poison. In the second century of our era ginger is mentioned as liable to duty (vectigal) at alexandria along with other Indian spices [9].

Description of Zanjabeel as Per Unani Literature

It is a famous Unani drug. It is a root of a plant, which remain inside the ground. According to Dioscorides, a famous Unani physician and pharmacognosist this root resembles the roots of *Saad*, which is white in colour, taste is like filfilsiyah and odour is strong [10,11]. According to some physicians, it is a root of a famous grass which resemble to *Shaaqul*. It does not bear flowers and fruits [12,13]. According to Ghani, fresh root is called Adrak and dry root is called Sonth [14]. ALLAH Karim has mentioned it in Holy Quran [15]. Roots of Zanjabeel are used for medicinal purposes and its *Mizaji* (Temperament) is Hot 3° and Dry 2° [16]. Its therapeutic dose is 1 - 1.5 masha (1 - 1.5 gram) or 1 - 2 gram. According to Unani physicians it is harmful for people having hot temperament [17] and its *Musleh* (Correctives) are Honey and Roghan Badam and its *Badal* (Substitute) are Dare Filfil (*Piper longum*); FilfilSiyah (*Piper nigrum*) and Aaqarqarha (*Anacyclus pyrethrum*).

Habit & Habitat

An herbaceous, rhizomatous perennial, reaching upto 90 cm in height, thick lobed, pale yellowish, differing in shape and size in the different cultivated types. India is the largest producer of ginger, accounting for 50% of total world production. Kerala is the major ginger producing state in India particularly the Wynad area. Indian ginger is regarded as Cochin ginger in the world market and considered next to Jamaica. Ginger requires a warm and humid climate. The plant thrives well from the sea level upto an altitude of 1500 m in the Himalayas, the optimum elevation being between 300- 900 m. The crop needs good rainfall and high temperature during the growing period. High relative humidity is required throughout the crop

period. Ginger is an exhausting crop and requires heavy manuring.

Botanical Description

Morphological Features

Rhizome is laterally compressed bearing short, flat, ovate, oblique branches on upper side each having at its apex a depressed scar, pieces about 5-15cm thick, externally buff colored showing longitudinal fracture short, smooth, transverse surface exhibiting narrow cortex, a well-marked endodermis and a wide stele showing numerous scattered fibro-vascular bundles and yellow secreting cells.

Microscopic Structure

Transverse section of rhizome shows cork consists of irregularly arranged cells, followed by cortex. Cortex is made up of thin walled parenchymatous tissue. Well marked endodermis distinguishes the stele and the cortex. Cortical tissue encloses several closed collateral fibro-vascular bundles. Vascular bundles just inside the endodermis are free of fibres. Oleo-resinous cells and starch grains are found throughout the ground tissue. Endodermis is free of starch.

Unaniand Ethno-botanical Actions

MohallileRiyah (Carminative) [18-21]; *Hazim* (Digestive)[22]; *MushtahiTu'am* (Apetiser); *MuqawwieMedawaKabid* (Tonic for liver and stomach); *Mulayyan* (Laxative); Improves taste; *Muharrik* (Stimulant)[23]; Aromatic [24]; *MudirreluabeDehn* (Sialagogue); *Muhammir* (Rubefacient); *MuslehAdvia* (Corrective); *DaafeZakhm* (Anti-ulcer) [25]; *MufattehSuddaeJigar* (Deobstruent of liver); Circulatory Stimulant[26]; *Muqawwie Bah* (Aphrodisiac); *MuqawwieBasar* (Eye Tonic); *MuqawwieAasab* (Nervine Tonic); Molluscicidal; Hypocholesterolaemic; *Mohallile Warm* (Anti-inflammatory); *MuqawwieHafiza* (Memory Enhancer); *MujaffifeRatoobar* (Dessicant); Anti-oxidant; Thermogenic; *Mulattif* (Demulscient) [27]; *MunaffiseBalgham* (Expectorant); *MushileBalgham* (Phlegmagogue); *DaafeQai* (Anti-emetic) [28,29]; *Aasir* (Squeezing) [30]; *Moarriq* (Diaphoretic); *QatileDeedaan* (Anthelminthic); *MunaqqieSina* (Drugs Clearing bad humour from the lungs); *Muwallide Mani* (Spermatogenic); Removes the *RatoobateGhaliza* around head and neck; *MuqawwieDimagh* (Brain Tonic); Anti-platelet [30]; Anti-bacterial [31]; Anti-fungal [32].

Unaniand Ethno-botanical Therapeutic Uses

FasadeHazam (Dyspepsia); *Nafakh* (Flatulence); *DardeShikam* (Pain in abdomen); *ZaufeIshtiha* (Anorexia); *AmraazeAin* (Diseases of eyes); *AmraazeUzn* (Diseases of Ear); *WajaulUzn* (Otagia); *Niqras* (Gout); *Hudar* (Rheumatism); *Istisqa* (Dropsy); *Dama* (Asthma); *Suda* (Cephalgia); *Shaqiqa* (Migrain)

e); *Amraaze Halaq* (Diseases of Throat); *Pharyngopathy*; *Amraaze Sadar* (Chest Disorders); *Warme Shobaturriya* (Bronchitis); Cold temperament people; *Cardiopathy*; Improves the local circulation; *Nisyan* (Dementia); *Riyahi Bawaseer* (Piles); *Auja* (Pain due to cold); *Bayaz Wa Sabal* (Opacity and Vascular Keratitis); *Tareekie Chashm*; Externally *Ghisha Chashm* (conjunctivitis); Post-Operative Anti-emetic; Enhanced Gastric Motility; *Surfa* (Dry Cough); Hoarseness of voice; *Nazla* (Colds or Catarrhal Attacks); *Taqteere Baul* (Incontinence of Urine); Cold Stage of Intermittent Fever; *Balghami Auram* (Phlegmatic Swellings); *Falij* (Paralysis); *Baroodate Aasab*; *Wajaul Qutn* (Lumbago); *Feelpa* (Elephantiasis); *Daus Salab* (Alopecia); *Yarqan* (jaundice); *Sailanur Reham* (Leucorrhoea); *Ehtebase Tams* (Amenorrhoea); To stimulate menstrual flow; Morning sickness; *Ziabetus* (Diabetes); *Laqwa* (Facial palsy); *Tashannuje Ratab*; Relieve the agonizing cramps of the terrible diseases; *Ishaal* (Diarrhoea) [32]; Toxicity caused by insect bite; Snake Bite and Scorpion Sting; *Matli* (Nausea) [33]; Carrier Function [34].

Note: It should not be used in Leucoderma; Anaemia; strangury; Leprosy; Ulcers; fevers; burning sensation; diseases of blood. It should use minimally during pregnancy.

Phytochemical Studies

The principal constituents of ginger are starch, volatile oil. The odour of ginger is due to volatile oil, and its pungent taste is due to resin. Dry ginger contains protein, fat, fibre, carbohydrate, minerals, vitamin A, B & C. On steam distillation it yields 1 to 3% aromatic oil [35] Ginger contains small quantities of glucose, fructose and sucrose; raffinose is probably present in traces. The predominant sequiterpene hydrocarbon is zingiberene (20-30%). The principal carbohydrate of the rhizome is starch. The essential oil derived from the dried ginger is known as oil of ginger. The oil is sparingly soluble in 95% alcohol, but is generally soluble in 90% alcohol. The essential oil contains monoterpenes, mainly geranial and neral; and sequiterpenes, mainly beta-sesquiphellandrene, beta-bisabolene, ar-curcumene and alpha-zingiberene; pungent principles, consisting of gingerols, shagols and related phenolics ketone derivatives. Other constituents include diarylheptones, diterpenes, gingesulphonic acid and monoacyldigalactosylglycerols.

Four new inhibitors of prostaglandin biosynthesis: (6) - dehydrogingerdione, (10) - dehydrogingerdione, (6) - gingerdione and (10) - gingerdione isolated with (6)-gingerol from roots and their structures were also determined. The composition of ginger varies according to the type and the agro-climatic conditions under which it is grown. The range of values and average values in brackets are reported in percentage as: Moisture:- 8.5-16.5 (10.9);

Crude protein:- 10.3-15.0 (12.4); Crude fibre:- 45.8- 9.8 (7.2); Starch:- 40.4- 59.0 (53.0); Total ash:- 5.1-9.3 (6.6); Water soluble ash:- 4.0-8.8 (5.5); Water extract:- 14.4-25.8(19.6); Cold alcohol extract:- 3.6-9.3 (6.0); acetone extract:- 3.9-9.3 (6.5) and volatile oil:- 1.0-2.7 (1.8).

S.D. Joladet *al.* have carried out Gas chromatography in conjunction with mass spectrometry, a technique previously employed to analyze non-volatile pungent components of ginger extracts modified to trimethylsilyl derivatives, was applied successfully for the first time to analyze unmodified partially purified fractions from the dichloromethane extracts of organically grown samples of fresh Chinese white and Japanese yellow varieties of ginger, *Zingiber officinale* Roscoe. (Zingiberaceae). This analysis resulted in the detection of 20 hitherto unknown natural products and 31 compounds previously reported as ginger constituents. These include paradols, dihydroparadols, gingerols, acetyl derivatives of gingerols, shogaols, 3-dihydroshogaols, gingerdiols, mono- and diacetyl derivatives of gingerdiols, 1-dehydrogingerdiones, diarylheptanoids, and methyl ether derivatives of some of these compounds. The thermal degradation of gingerols to gingerone, shogaols, and related compounds was demonstrated. The major constituent in the two varieties was [6]-gingerol, a chemical marker for *Z. officinale*. Mass spectral fragmentation patterns for all the compounds are described and interpreted [36,37].

A study has carried out in which Two new diaryheptanoids, (5S)-5-acetoxy-1,7-bis(4-hydroxy-3-methoxyphenyl)-3-heptanone (1) and (3S,5S)-3,5-diacetoxy-1,7-bis(4-hydroxy-3-methoxyphenyl)heptane (2) were isolated from the rhizomes of *Zingiber officinale*. Their structures were elucidated by spectral methods.

Pharmacological Studies

Serum and Hepatic Cholesterol Lowering Activity

A study has carried out in which ginger oleoresin when administered orally significantly lowered serum and hepatic cholesterol and increased faecal cholesterol excretion [38,39].

Nutraceutical Agent against Liver Fibrosis

Ginger rhizomes successive extracts (petroleum ether, chloroform and ethanol) were examined against liver fibrosis induced by carbon tetrachloride in rats. The evaluation was done through measuring antioxidant parameters; glutathione (GSH), total superoxide dismutase (SOD) and malondialdehyde (MDA). Liver marker enzymes; succinate and lactate dehydrogenases (SDH and LDH), glucose-6-phosphatase (G-6-Pase), acid phosphatase (AP), 5'-nucleotidase (5'NT) and liver function enzymes; aspartate and alanine aminotransferases (AST and ALT) as well as cholestatic markers; alkaline phosphatase (ALP), gamma glutamyltransferase (GGT), total bilirubin were estimated. Liver histopathological analysis and collagen content were also evaluated. Treatments with the selected

extracts significantly increased GSH, SOD, SDH, LDH, G-6-Pase, AP and 5thNT. However, MDA, AST, ALT ALP, GGT and total bilirubin were significantly decreased. Extracts of ginger, particularly the ethanol one resulted in an attractive candidate for the treatment of liver fibrosis induced by CCl₄ [40].

10.3 Anti-Inflammatory and Analgesic Activity

The rhizome extract of *Zingiber officinale* was investigated for anti-inflammatory and analgesic properties in albino rats and Swiss mice respectively. The extract (50 and 100 mg/kg b.w) produced significantly ($P < 0.05$) inhibition of the carrageenan – induced rat paw oedema and a reduction in the number of writhing induced by acetic acid in mice. The results show that rhizome extract of *Z. officinale* possesses anti-inflammatory and analgesic agent(s) [41].

Spermatogenic Activity

As an antioxidant's ginger has a useful effect on spermatogenesis and sperm parameters. Khaki et al reported that ginger may be promising in enhancing sperm healthy parameters. In the study two groups of rats received ginger rhizome powder (50 and 100mg/kg/day) for 20 consecutive days. Animals were kept in standard conditions. In twentieth day the testes tissue of Rats in whole groups were removed and sperm was collected from epididymis and prepared for analysis. Results revealed that administration of 100 mg/kg/day of ginger significantly increased sperm percentage, viability, motility and serum total testosterone [42].

Antimicrobial and Cytotoxic Activity

In a study, the edible plant *Zingiberofficinialis* ethanol and chloroform extracts were prepared and their cytotoxic effects versus human cervical cancer (HeLa) and mouse fibroblast (L929) cell-lines were investigated. HeLa and L929 cell lines in 96 well microplates were cultivated for 24 h with initial concentrations of 8×10^4 cells/mL and 7.4×10^4 cells/mL, respectively. After that the cultures were treated with different dilutions of the extracts and incubated for 48 h. The growth inhibition was determined to the 50% inhibition concentration (IC₅₀). IC₅₀ values were reported as ± 95 % confidence intervals (± 95 % CI) by using Graph Pad Prism (San Diego, CA). The antibacterial activity of the ginger extracts was tested by the paper disc diffusion technique. The results of the morphological observation and MTT test indicated that the cytotoxic activity of the extracts were dose dependent. IC₅₀ values versus L929 and HeLa cells were found to be 87.28 μ g/mL and 74.32 μ g/mL, respectively, for the chloroform extract, while the ethanol extract showed IC₅₀ values at 101 μ g/mL and 33.78 μ g/mL, respectively. Moreover, the extracts were evaluated for their antimicrobial activities against *Klebsiellapneumoniae*, *Salmonella typhimurium*, *Bacillus cereus*, *Enterococcus*

fecalis and *Staphylococcus aureus*. The antimicrobial activity results showed that the ginger extracts inhibited the growth of five out of eight microorganisms but had no effect on the growth of *Escherichia coli* ATCC11230, *Pseudomonas aeruginosa* ATCC 27853, and *Staphylococcus epidermidis* ATCC 12228 [43].

Anxiolytic and Antiemetic Activity

The benzene fraction (BF) of a petroleum ether extract of dried rhizomes of ginger was screened for anxiolytic and antiemetic activity. Motor coordination was not affected by BF *per se*, but diazepam-induced motor incoordination was potentiated. Animals treated with BF showed decreased occupancy in the closed arm of the elevated plus maze suggesting the presence of anxiolytic principles in the BF. BF also blocked lithium sulphate - induced conditioned place aversion indicating antiemetic activity. These findings suggest that the fraction (BF) possesses anticonvulsant, anxiolytic and antiemetic activity [44].

CONCLUSION

The present review describes the information about Zanjabeel (*Zingiberofficinale*) which includes its introduction, nomenclature, vernacular names, historical background, habit & habitat, Unani description, botanical description, therapeutic dose, Unaniand Ethno-Pharmacological actions, Unaniand Ethno-therapeutic uses, recent phytochemical studies, and pharmacological studies of *Zingiber officinale*. Zanjabeel (Ginger) is a very famous spice which is widely used as drug in traditional medicine. The vast range of its pharmacological effects such as serum and hepatic cholesterol lowering activity, nutraceutical agent against liver fibrosis, anti-inflammatory and analgesic activity, spermatogenic activity, antimicrobial and cytotoxic activity and anxiolytic and antiemetic activity and its phytochemicals present in extract has been of immense importance in phytotherapeutics. Ginger has been used in curing different types of diseases. In view of the enormous potential of *Zingiber officinale* to treat many diseases as indicated in pharmacological investigations, detailed scientific studies are suggested to investigate and validate the other medicinal properties of *Zingiberofficinale* mentioned in Unani classical literature and ethno-botanical literature. The outcome of this review work may facilitate the enrichment of concept and the possible outcome from the use and consumption of *Zingiber officinale*.

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