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Zanjabeel (*Zingiber offcinale*) Transformation of Culinary Spice to a multi-functional Medicine

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ABSTRACT

The various traditional 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. 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. Zanjabeel (*Zingiber officinale*) 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, its Pharmacological actions and therapeutic uses and to discuss scientific studies.

Keywords: Zanjabeel, Unani, Pharmacological actions, therapeutic uses.

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INTRODUCTION

Zanjabeel (*Zingiber officinale*) is an important drug in Unani system of medicine and a culinary spice widely used all over the world. It consists of whole or cut, dried scrapped or unscrapped rhizomes of *Zingiber officinale* Rosc.of Zingiberaceae family [Kokate. 2009; Anonymous, 2007]. Rhizomes are aromatic, thick lobed, pale-yellowish, differing in size and shape in different cultivated types. India is the largest producer of *Zanjabeel*, accounting for 50% of the total world production [Anonymous, 2003]. Cochin ginger in the world market is considered next best to Jamaica [Purohit, 2008].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 *Zanjabeel* [Anonymous, 2006].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.

SCIENTIFIC CLASSIFICATION [Khare, 2007; Joy, 1980]

Kingdom	:	Plantae
Subkingdom	:	Tracheobionata
Division	:	Magnoliophyta
Class	:	Liopsida
Sub Class	:	Zingiberidae
Order	:	Zingiberales
Family	:	Zingibraceae
Genus	:	Zingiber
Species	:	officinale

VERNACULAR NAMES [Baitar, 2000; Kirtikar, 2003].

English	:	Ginger
Hindi	:	Sonth, Adrak
Urdu	:	Sonth, Zanjabeel
Arabic	:	Qafeer,Zanjabeel
Persian	:	Sahangrez,Zanjabil
Sanskrit	:	Naara, Visva, Adraka, Anupama, Ardrashaka
Bengali	:	Ada
Kannad	:	Hasisunti, Shunth
Tamil	:	Allam, Inji
Telugu	:	Allamu, Sonthi

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 [Cupp, 2001]. 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 was also described by dioscorides as hot, digestive, gently laxative; it was an ingredient in collyria and antidotes to poison. [Dymock, 2005]

DESCRIPTION

As per Unani Literature, it is a root of a plant and a famous drug, which remains inside the ground. According to *Dioscorides*, this root resembles the roots of *Saad*, which is white in colour, tastes like *Filfil Siyah* and odour is strong [Ibn e Hubal, 2005; Kabeeruddin, 2007]. According to some physicians, it is a root of a famous grass which resemble to *Shaqaqul*. It does not bear flowers and fruits [Hakim, YNM; Momin, 1272 H]. According to *Ghani*, fresh root is called *Adrak* and dry root is called *Sonth* [Ghani, YNM].

Macroscopic:

The plant is a slender, perennial rhizomatous herb; leaves linear, sessile and glabrous; flowers yellowish green in oblong, cylindric spikes, ensheated in a few scarious, glabrous bracts; fruits oblong capsules. The rhizomes are white to yellowish brown in colour, irregularly branched, somewhat annulated and laterally flattened. The growing tips are covered over by a few scales. The surface of the rhizomes is smooth and if broken a few fibrous elements of the vascular bundles project out from the cut ends [Sala, 2003; Bhattacharjee, 2005; Kumar, 2002]. Stems are leafy and 1.8 m tall. Leaves are 30 cm long and 7.5 cm broad. Flowers are white or yellowish in colour, with pale yellow lip [Sharma, 2003]. Fresh rhizomes jointed, 1-2 inches in diameter and compressed.

Microscopic:

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. [Prajapati, 2009]

DISTRIBUTION

Ginger is cultivated in many parts of India; on a large scale in the warm, moist regions, chiefly in Madras, Cochin and Travancore, and to a somewhat less extent in Bengal and Punjab [Nadkarni, 1982; Kumar, 2002]. It is cultivated throughout India, [Sala, 2003; Sharma, 2003; Khori, 1985]. It's also found at some places in the Western Ghats [Sala, 2003]. 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.

PART USED:

Root (Rhizome) [Kabeeruddin, YNM; Ghani, YNM; Rafiquddin, 1985; Kabeeruddin, 2007]

MIZAJ (Temperament):

Fresh: Har 2^{o} Yabis 1^{o},

Dried: Har 3 ^{o} Yabis 2 ^{o} [Kabeeruddin, YNM; Ghani, YNM; Rafiquddin, 1985; Baitar, 2000; Ibn Sina, YNM; Mohammad, YNM]

AFAAL (Actions)

- *Mohallil e Riyah* (Carminative) [Chopra, 2002; Nadkarni, 2005; Waring, 2010; Prajapati, 2009]
- *Hazim* (Digestive) [Khan, 1313 H]
- *Mushtahi Tu'am* (Appetizer)
- *Muqawwi e Meda wa Kabid* (Tonic for liver and stomach)
- *Mulayyin* (Laxative)
- *Muharrik* (Stimulant) [Said, 1997]
- *Aromatic* [Bentley, 2002]
- *Mudirr e Luab e Dehn* (Sialagogue)
- *Muhammir* (Rubefacient)
- *Musleh Advia* (Corrective)
- *Daaf e Zakhm* (Antiulcer) [Evans, 2008]
- *Mufatteh Sudda e Jigar* (Deobstruent of liver)
- *Circulatory Stimulant* [Khare, 2007]
- *Muqawwi e Bah* (Aphrodisiac)
- *Muqawwi e Basar* (Eye Tonic)
- *Muqawwi e Aasab* (Nervine Tonic)
- *Mohallil e Warm* (Anti-inflammatory)
- *Muqawwi e Hafiza* (Memory Enhancer)
- *Mujaffif e Ratoobat* (Dessicant)
- *Mulattif* (Demulscent) [Nooruddin, 1239]
- *Munaffis e Balgham* (Expectorant)
- *Mushil e Balgham* (Phlegmagogue)
- *Daaf e Qai* (Anti-emetic) [Kareem, 1880; Anonymous, 1996]
- *Aasir* (Squeezing) [Khan, 1280 H]
- *Moarriq* (Diaphoretic)

- *Qatil e Deedaan* (Anthelminthic)
- *Muwallid e Mani* (Spermatogenic)
- *Muqawwi e Dimagh* (Brain Tonic)
- Antiplatelet [Khan, 1280 H]
- Anti-bacterial [Ross, 2005]
- Anti-fungal [Majoosi, 2010]

THERAPEUTIC USES

- *Fasād al-Haḍm* (Dyspepsia)
- *Nafakh* (Flatulence)
- *Dard e Shikam* (Pain in abdomen)
- *Zauf e Ishtiha* (Anorexia)
- *Amraaz e Ain* (Diseases of eyes)
- *Amraaz e Uzn* (Diseases of Ear)
- *Waja ul Uzn* (Otalgia)
- *Niqris* (Gout)
- *Hudar* (Rheumatism)
- *Istisqa* (Dropsy)
- *Dīq al-Nafas* (Asthma)
- *Suda* (Headache)
- *Shaqiqa* (Migraine)
- *Amraaz e Sadar* (Chest Disorders)
- *Iltihab al-Shu'ab* (Bronchitis)
- *Nisyan* (Dementia)
- *Riyahi Bawaseer* (Piles)
- *Surfa* (Dry Cough)
- *Bah't ul Sawt* (Hoarseness of voice)
- *Nazla* (Colds or Catarrhal Attacks)
- *Taqteer e Bawl* (Incontinence of Urine)
- *Falij* (Paralysis)
- *Waja ul Qutn* (Lumbago)
- *Da' al-Fīl* (Elephantiasis)
- *Da'us Salab* (Alopecia)
- *Yaraqān* (jaundice)
- *Sailan ur Reham* (Leucorrhoea)
- *Ehtebas e Tamth*(Amenorrhea)
- *Ziabetus* (Diabetes)
- *Laqwa* (Facial palsy)
- *Ishaal* (Diarrhoea) [Majoosi, 2010]
- *Ghathayān* (Nausea) [Attar, 1888]

MIQDAR E KHOORAK (Dose):

1 to 1 ½ gm, can be given up to 7 gm. [Kabeeruddin, YNM; Anonymous, 2007; Ghani, YNM]

MUZIR (Adverse effect):

Amraz e Halaq (Diseases of throat).

Person having hot temperament. [Kabeeruddin, YNM; Ghani, YNM; Mohammad, YNM]

MUSLEH (Corrective)

Roghan e Badam and Shahed (Honey), *Qurs e Kafoor*, Juice of *Behi* (Quince) fruit. [Kabeeruddin, YNM; Ghani, YNM]

BADAL (Substitute)

Dar filfil, Filfil Safed, Filfil Siyah, Aqarqarha. [Kabeeruddin, YNM; Ghani, YNM; Baitar, 2000; Mohammad, YNM]

MURAKKABAT (Compound formulations)

Safoof e Kharkhasak , Habbe Hindi Zeeqi, Habbe Kabid Naushadri, Jawarish Kamooni, Jawarish zanjabeel, Laboob Kabeer, Laboob Sagheer, Majoon Supari pak, Majoon Jograj Gugal, Jawarish Zarooni ambari ba Nushka Kalan. [Kabeeruddin, 2006; Anonymous, 2007]

CHEMICAL CONSTITUENTS

Chemical constituent of *Zingiber officinale* varies according to agro climatic condition green/fresh ginger gives water 80.9 %, protein, fat, fibre, carbohydrate (starch, pentosans), minerals (Ca, P, Fe), trace of Iodine and fluorine Vitamin (thiamine, riboflavin, niacin, Vitamin C, carotene), fructose, sucrose, raffinose in trace. [Khare, 2004]

PHARMACOLOGICAL STUDIES

Aphrodisiac/Androgenic and Spermatogenic Activity:

- A study was conducted to evaluate the effect of alcoholic extract of Ginger on the testes in rats in busulfan induced infertility in rat model. It showed that *Zingiber offiicinale* increased the semen volume of seminiferous tubules in test group treated with 100mg/kg of the extract of ginger compared to control group. Sperm count and level of testosterone were also increased in test group treated with alcoholic extract of Ginger in dose of 100 mg/kg and 150 mg/kg body weight of rat, in comparision to control group. [Bordbar, 2013]
- Study conducted on 30 male Sparague Dawley rats allotted in 3 groups 10 in each, for evaluation of androgenic activity of Ginger Showed Significant increase in testicular weight and body weight gain, serum testosterone in test group treated with 200mg/kg of aqueous extract of *Zingiber officinale* for 28 and 56 days as compared to control group without any toxic effect on spermatogenesis in the testes. [Memudu, 2012]
- A study reported in which aqueous extract of *Zingiber officinale* was administered orally in the Broiler breeder male in dose of 5 % and 10 % has demonstrated that aqueous extract of Ginger have an antioxidant and androgenic activity and have good effects on spermatogenesis and sperm parameters as well as increase in ejaculatory volume, sperm concentration, count, movement, decrease in motility and abnormality. There was also significant increase in semen plasma cholesterol, glucose, and significant decrease in protein. Increase in testosterone, LH, FSH hormone level ($P<0.05\%$). [Saeid, 2011]
- In an experiment *aqueous extract* of *Zingiber officinale* was given orally to 2 groups of rats in dose of 500 mg / kg b.w. and 1000 mg / kg b.w. for 14 and 28 days then

test groups were investigated for effect of Ginger on reproductive functions in the male rats in comparison to control group. In was revealed by the study that there was significant increase (P<0.05%) in the weight of the testis and epididymis, and dose and duration dependent increase in sperm count and motility (P<0.05%). There was significant increase (P<0.05%) in serum testosterone level noted. [Morakinyo, 2008]

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 [Jian *et.al*, 2004; Rastogi, 1999].

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 acidin mice. The results show that rhizome extract of *Z. officinale* possesses anti-inflammatory and analgesic agent(s) [Raji *et.al*, 2002].

Cytoprotective and Anti-Ulcer Activity:

- Highly significant cytoprotective activity against Cytodestruction produced by 80% ethanol, 0.6M HCl, 0.2M NaOH and 25% NaCl in albino rats is reported when 96% ethanolic extract (Obtained by Soxhlet hot extraction method) of Zingiber officinale Rosc was administered orally in dose of 500 mg/kg body weight after passing the starvation period of 36 hrs. Beside this extract of Ginger was reported to have protective effect against gastric ulcers induced by Non-steroidal anti-inflammatory drugs (NSAIDs) and hypoythermic restraint stress. [Alyahya *et.al*,]
- In another study conducted, ginger-free phenolic (GRFP) and ginger hydrolysed phenolic (GRHP) fractions of ginger (*Zingiber officinale*) worked as potent inhibitors of proton potassium ATPase activity (PPA) and H. pylori growth. GRFP (Constituted by syringic 38%, gallic 18% and cinnamic14% acids as major phenolic acids) and GRHP (Constituted by cinnamic 48%, p-coumaric 34% and caffeic 6% acids as major phenolic acids) inhibited PPA at an IC 50 of 2.9 l 0.18 and 1.5 l 0.12 lg/ mL, exhibiting six- to eight-fold better potency over lansoprazole. It exhibited free radical scavenging (IC50 1.7 l 0.07 and 2.5 l 0.16), inhibition of lipid peroxidation (IC 50 3.6 l 0.21 and 5.2 l 0.46), DNA protection (80% at 4 lg) and reducing power abilities (80 – 338 U/g) indicating strong anti-oxidative properties. [Siddaraju et al, 2007]

Anxiolytic and Antiemetic activity:

- Powdered ginger root was compared with metoclopramide and placebo in a prospective, randomised, double-blind trial for the incidence of postoperative nausea and vomiting. Incidence of nausea and vomiting was similar in patients given metoclopramide and ginger, *Zingiber officinale* showed effective and promising prophylactic antiemetic, which may be especially useful for day case surgery. [Philips, 1993]
- Ginger can be an effective adjuvant in controlling nausea during cancer chemotherapy. In Patients receiving chemotherapy addition of ginger to conventional antiemetic medication causes further reduction in the severity of post chemotherapy nausea. [Hickok, 2007]
- 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 [Vishwakarma, 2002].

Antimicrobial activity:

Antimicrobial activity of *ethanolic extract* of *Zingiber officinale* in concentration of 20 mg/ml was reported in study performed against *Pseudomanas areuginosa* and *Escherichia coli*. Although the extract had negligible inhibitory activity against *E.coli* most likely due to non-liberation of active constituent of raw extract. [Auta, 2011].

Antifungal activity:

- Study of antifungal and anti-biofilm properties of ginger extract against Candida species indicate that ginger extract has good antifungal and anti-biofilm formation by fungi against *C. albicans* and *C. Krusei*. [Aghazadeh, 2016]
- Activity of extracts of *Zingiber officinale* (ginger) and *Curcuma longa* (curcumin) against Giardia lamblia in vitro and in vivo was studied. Fecal cyst and intestinal trophozoite counts reduction was seen and *in vivo* ginger was found more effective. [Dyab, 2016]

CONCLUSION

The paper revealed therapeutic importance of Zanjabeel as evident by the recent research performed on it. Several Unani formulations containing dry ginger are indicated in liver, kidney, stomach, joint diseases and as an aphrodisiac etc. Recent researches also validated the indications of Zanjabeel (*Zingiber officinale*) in Unani Medicine such as in liver debility, arthritis, rheumatism, as an liver tonic, anti-inflammatory, aphrodisiac etc. Beside traditional therapeutic utilization in Unani medicine its new indications such as anti-emetic, antioxidant, antimicrobial activity etc, make it more important easily available household drug. Further scope of research can also be explored with the help of traditional knowledge exist in Unani medicine.

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