Journal of Pharmaceutical and Scientific Innovation
www.jpsionline.com
Review Article

ZANJABIL (*ZINGIBER OFFICINALIS*): A REVIEW

Roohi Azam[1], Azhar Jabeen[1], Tabassum Alam[2], Shafia Mushtaq[2], Sheikh Haneef Mohmad[3]
[1]Asistant Professor, Department of Moalijat (Medicine), Faculty of Unani Medicine, Jamia Hamdard, New Delhi, India
[2]PG Scholar, Department of Moalijat (Medicine), Faculty of Unani Medicine, Jamia Hamdard, New Delhi, India
[3]Lecturer, Department of Moalijat (Medicine), Ayurvedic and Unani Tibbia College, Karol Bagh, New Delhi, India
*Corresponding Author Email: shm8272@gmail.com
DOI: 10.7897/2277-4572.034156
Published by Moksha Publishing House. Website www.mokshaph.com

Received on: 08/06/14 Revised on: 30/07/14 Accepted on: 21/08/14

ABSTRACT
Zanjabil (*Zingiber officinalis*) a genus of rhizomatous herbs belongs to the family Sceitaminaceae or Zingiberacea is a common condiment for various foods and beverages. It has a long history of medicinal use dating back 2,500 years in China and India for conditions such as headaches, nausea, rheumatism, and colds. In Arabic it is known as Zanjabil whereas in Persian it is known as Shangabir, Zanjabil. It was known to the Greeks and Romans as a spice, while being imported during Middle Ages as a "Green ginger" which is the Ginger preserved in syrup. Now it is widely cultivated in tropical Asia and throughout India. It has been in use for centuries in Unani system of medicine and is being described in detail in ethanobotanical and classical Unani literature due to its various mentioned actions such as anti-hyperlipidemia; platelet aggregating inhibitor; diuretic; thrombolytic; anti-inflammatory; expectorant; antitussive; demulcent; digestive; carminative; memory enhancer; liver deobtrunt; desiccant; tonic for digestive system and hepatobiliary system; purgative; cleanser; aphrodisiac; thermogenic; anti-helminthic; antidote; anti-oxidant; rubefacient; anti-histamine; anti-depressant; anti-narcotic; cardiac tonic; eye-tonic. The present review highlights the traditional uses, therapeutic actions and pharmacological properties of this plant.
Keywords: Zanjabil (*Zingiber officinalis*), Unani medicine, Traditional uses, Pharmacological properties

INTRODUCTION

Zanjabil (*Zingiber officinalis*) a genus of rhizomatous herbs belongs to the family sceitaminaceae or zingiberacea. In Hindi it is known as Ada or Adrak or sonth while in English it is named as Ginger. In Arabic it is known as Zanjabil whereas in Persian it is known as Shangabir, Zanjabil [2, 4, 22, 27, 28, 38, 39]. Zanjabil (*Zingiber officinalis*) or commonly called ginger, is a slender, perennial erect herb with thick underground stem (rhizome) from which the aerial stems grow upto about 1m high which is entirely covered by the leaf-sheaths. The leaves are 8-12 inches in length and they are alternate, sessile, linear, standing away from the stem, terminating in 2 small rounded auricles, tapering at both ends. Its roots are numerous, large, cylindrical, fleshy thick, brittle, semi-transparent, and yellow in colour. Ginger has been used in traditional medicine to aid digestion and treat stomach upset, diarrhea, nausea, and arthritis for centuries. In addition to these medicinal uses, it continues to be valued around the world as an important cooking spice and is believed to help the common cold, flulike symptoms, headaches, and even painful menstrual periods. Today, ginger root is widely used as a digestive aid for mild stomach upset and is commonly recommended by health care professionals to help prevent or treat nausea and vomiting associated with motion sickness, pregnancy and cancer chemotherapy. Ginger is used as support in inflammatory conditions such as arthritis and may even be used in heart disease or cancer and androgenic property[25]. Ginger is native to Southern Asia, but it is now extensively cultivated in Jamaica, Nigeria, Chin, Fiji, Sierra Leone and Australia. It is also widely cultivated in tropical Asia and throughout India[22,27,28,38] due to its anti-inflammatory properties which have been known and valued for centuries. The original discovery of ginger's inhibitory effects on prostaglandin biosynthesis in the early 1970s has been repeatedly confirmed. This discovery identified ginger as an herbal medicinal product that shares pharmacological properties with non-steroidal anti-inflammatory drugs[33].

Zanjabil (*Zingiber officinalis*) was known in china as early as 400BC and has a long history of medicinal use dating back 2,500 years in China and India for conditions such as headaches, nausea, rheumatism, and colds[33]. It was introduced into Jamaica and other islands of the West Indies by the Spaniards and was exported from the West Indies to Spain in considerable quantity even during the year 1547AD. It was known to the Greeks and Romans as a spice, which appears to have received it by the way of red sea and considered it to be the product of southern Arabia. It was probably, therefore that they may have adopted the Arabic name which they received along with the plant, which is turn was derived from the Sanskrit. In 2nd century AD; ginger is mentioned as liable to duty (veltigal) at Alexandria along with other Indian spices. During the Middle Ages it is frequently mentioned is similar lists and evidently constitutes an important item in European commerce with the east. The merchants of Italy, about the 14th century knew 3 kinds of ginger called respectively as "Belledi" or "Baladi" which is an Arabic word applied to ginger and signify "Country or wild" i.e. "Common Ginger". Colombian- refers to columb ium kolam or Quilon, a part in Travancore frequently mentioned in middle ages. "Micchino" denotes that spice has been brought from, or by way of Mecca. Ginger preserved in syrup, was called "Green ginger" and was imported during middle ages. John of Monti-Carvino, who visited India about 1292, described ginger as plant like a flag, the roots of which could be dug up and transported[22,27,28,38,39]. There are several commercial varieties are recognized in cultivation type. They are generally named after the localities where they are grown. Prominent type includes: Khuruppampadi- Kerala; Jhodopuzha- Kerala; Maran-Assam; Chiranad-Malabar; Dolka-Gujrat; Burdwan-Bengal and Nadia- Bengal. Ginger is marketed both in peeled and in unpeeled condition, the former as scraped ginger and latter as unscraped ginger. The following commercial typed gingers are recognized: Jamaican ginger is the most esteemed variety of ginger in the

market and commands the maximum price. The ginger is extremely pale-yellow brown to yellowish orange in color with pleasantly pungent and aromatic in smell and very fibrous and resinous. An inferior grade of Jamaican ginger is known as "Ratoon" ginger. Indian ginger is considered only second to the Jamaican ginger in quality and has two main types: a). Cochine ginger- which comes from Kerala, India and peeled typed light brown to yellowish grey externally b). Calicut ginger- which comes from Malabar, India, is orange to reddish brown in color. African ginger is mostly unpeeled darker than Cochin ginger in bulk, odor strongly aromatic and taste pungent. Chinese ginger is whitish and free from fiber. It is inferior in aroma to Jamaican ginger and consists of the rhizomes which are not fully ripe. The absence of fiber in rhizomes makes this type very suitable for pickling[4,6,22,38].

Chemical Composition

The chemical composition of ginger varies according to the type and agro-climatic conditions under which it is grown. However the important active chemical constituents of fresh ginger are: volatile oils (2.5-3.0 %) and pungent phenol compounds such as Gingerols-Chief components in gingerol series are: [6]-gingerol (pungent substance) [8]-gingerol, [10]-gingerol and Shagaols-Chief components in shagaols series are: [6]- shagaols [8]- shagaols, [10]- shagaols[25]. The powdered rhizome contains 3-6 % fatty oil, 9 % protein, 60-70 % carbohydrates, 3-8 % crude fiber, about 8 % ash, 9-12 % water and 2-3 % volatile oil. The volatile oil consists of mainly mono and sesquiter– penes; camphene, beta-phellandrene, curcumene, cineole, geranyl acetate, terphineol, terpenes, borneol, geraniol, limonene, linalool, alpha-zingiberene (30-70 %), beta-sesquiphellandrene (15-20 %), beta-bisabolene (10- 15 %) and alpha-farmesene and oleoresin. The oleoresin has also been found to contain zingiberol, the principal aroma contributing component as well as zingiberene, gingediol, diarylheptanoids, vitamins and phytosterols (Jalal Bayati Zadeh *et al*-2014). Including among others gingereone A and B starch 50 %, crude protein 12.4 %, crude fiber 7.2 %, total ash 6.6 %, vitamins- thiamine 0.06, riboflavin 0.03, niacin 0.60, vitamin C 6.0 mg/100 g. Glucose, fructose, sucrose, free amino acids like glutamine, aspartic acid, serine, glucine, aspargine, cystine, isolysine, Histidine, cystine, proline, penecolic acid, iron, calcium and phosphorous[4,10,18].

Zanjabil (*Zingiber officinalis*) in Unani Classical Literature

Mizaj (Temperament) of Zanjabil (*Zingiber officinalis*)

$Hot^3\ Dry^1$ (Fresh)[8,9,12,19-21]
$Hot^3\ Dry^2$ (Dried)[12,19-21]
$Hot^2\ Dry$[1,32]
$Hot^3\ Wet$[1,15]

Actions of Zanjabil (*Zingiber officinalis*)

Zanjabil (*Zingiber officinalis*) is described in detail in ethanobotanical and classical Unani literature and various actions of the drug have been reported such as anti-hyperlipidemia; platelet aggregating inhibitor; diuretic; thrombolytic; anti-inflammatory; expectorant; antitussive; demulcent; digestive; carminative; memory enhancer; liver deobtrunt; desiccant; tonic for digestive system and hepatobiliary system; purgative; cleanser; aphrodisiac; thermogenic; anti-helminthic; antidote; anti-oxidant; rubefacient; anti-histamine; anti-depressant; anti-narcotic; cardiac tonic; eye-tonic.[5,7-14,16,19-22,27,28,30,31,34,36,37,41]

Therapeutic uses of Zanjabil (*Zingiber officinalis*)

It is therapeutically used in various diseases such as hyperlipidemia; dribbling of urine; Bright's disease; Cirrhosis of liver; arthritis; Cardiopathy (CHD); headache; paralysis; parasthesia; jaundice; indigestion and flatulence; colic; vomiting; piles; dropsy; ascites; intestinal worms; gout; sciatica; tetanus; chronic cough; common cold; dyspnea; bronchial asthma; thrombosis; corneal opacity and cataract; fever; leucoderma; depression; anemia; dysmenorrhea[4,5,7-14,16,19-21,23,26-28,30,31,34,37-39,41].

Badal (Substitute) of Zanjabil (*Zingiber officinalis*)

Dar filfil; Mirch siyah-wa-safed; Aakar-karha[8,9,12,14,19-21]

Muzir-wa-Musleh (Correctives) of Zanjabil (*Zingiber officinalis*)

It may be Muzir for throat, which may be corrective by the use of Rogan Badam, Asl-E-Khalis; Kurs Kafor and Bahi-ka- Ras[8,9,19-21]. Whereas ginger on the U. S. Food and Drug Administration's GRAS (generally recognized as safe) list and The British Herbal Compendium documents had also mentioned no adverse effects of ginger[24].

Mikdar-e-Khurak (Dose of administration) of Zanjabil (*Zingiber officinalis*)

2-7 Masha[8,9,12]
$1\text{-}1^{1/2}$ Masha[19]

Pharmacological Studies

Antioxidant and androgenic effect on male reproductive system

Morakinyo A. O *et al*-2008 had designed a study to investigate the effects of *Zingiber officinalis* on male reproductive functions. In order to understand the mechanisms underlying these effects, the aqueous extract of *Zingiber officinalis* were administered orally to two groups of male rats at 500 mg/kg b.w. and 1000 mg/kg b.w along with the third group which served as control and received the distilled water as a treatment vehicle only. Treatment lasted for 14 and 28 days before sacrifice. Organ weight, epididymal sperm counts, motility, viability and morphology, seminal fructose, testicular malonhydialdehyde and serum testosterone were determined. The treatment caused a significant increase ($P < 0.05$) in the weight of the testis and epididymis. There were dose and duration dependent increases in sperm count and motility ($P < 0.05$). There was also a significant increase ($P < 0.05$) in serum testosterone level. Malonhydialdehyde levels were significantly reduced ($P < 0.05$). The results of this study indicated that extract of *Zingiber officinalis* possesses the pro-fertility properties in male rats which might be due to its potent antioxidant properties and androgenic activities[25].

Pain relieving effect on primary dysmenorrhea

Parvin Rahnama *et al*-2012 has planned a study with a primary aim to evaluate the effects of ginger on pain relief in primary dysmenorrhea. The was designed as a randomized, controlled trial based on a sample of one hundred and twenty students with moderate or severe primary dysmenorrhea. The students were all residents of the dormitories of Shahed University. They were randomly assigned into two equal

groups, one for ginger and the other for placebo in two different treatment protocols with monthly intervals. The ginger and placebo groups in both protocols received 500 mg capsules of ginger root powder or placebo three times a day. In the first protocol ginger and placebo were given two days before the onset of the menstrual period and continued through the first three days of the menstrual period. In the second protocol ginger and placebo were given only for the first three days of the menstrual period. Severity of pain was determined by a verbal multidimensional scoring system and a visual analogue scale. There was no difference in the baseline characteristics of the two groups (placebo n = 46, ginger n = 56). The results of this study showed that there were significant differences in the severity of pain between ginger and placebo groups for protocol one (P = 0.015) and protocol two (P = 0.029). There was also significant difference in duration of pain between the two groups for protocol one (P = 0.017) but not for protocol two (P = 0.210). From this study it may be concluded that ginger is an effective and safe therapy for relieving pain in women with primary dysmenorrhea if it is administered at the onset or during the 3 days prior to menstruation due to statistically significant effect on relieving intensity and duration of pain[29].

Antibacterial and anti cough forming effects

For the Evaluation of antibacterial and anti cough forming effects of *Zingiber officinale* Extract Wasim Raja *et al*-2012 had planned an experimental study on the antibacterial property of different concentration of plant extract which was monitored using 'disc diffusion assay'. In this study the antibacterial activity was screened for three microorganisms: *Proteus mirabilis, Klebsiella pneumoniae* and *Streptococcus aureus*. The data was compared to that of standard antibiotics. To antibacterial activity of *Zingiber officinale* data revealed the sensitizing quality of extract against *Proteus mirabilis, Klebsiella pneumoniae* and *Streptococcus aureus* 250 and 500 mg/kg concentration of extract were having good activity, showing zone of inhibition after 12 hour time interval. In the another set of experiment anti cough forming activity of *Zingiber officinale* extract shows the expiratory effort due to an end tracheal mechanical stimulus was reduced by *Z. officinale* extract shows the dose response in SGOT and SGPT enzyme as compared to SO_2 treated group. The mortality rate was observed to be nil in all experimental groups. A significant reduction in body weight gain was observed. Serum SGOT and SGPT concentration showed a significant increase as compared to control. We were also found the anti cough forming activity of *Zingiber officinale* extract as compared to standard (Benadryl) and control liver enzymes was also significant using SGOT and SGPT enzymes. These results obtained in the current study also indicated an increase in activity of the liver enzymes following liver damage. Thus the extract would be a good alternative for broad spectrum antibiotic in addition to the anti cough forming effect[40].

Anti-inflammatory and Analgesic effects

The aim of the present study was to evaluate the anti-inflammatory and analgesic effects of ginger essential oil (GEO) administered orally in rodents. GEO was obtained from 250 g of Fresh rhizomes of *Z. officinale* by conventional steam distillation using Clevenger apparatus during 3 h. The oil obtained was kept refrigerated and protected from direct light. Pleurisy was induced in anesthetized mice by intra peritoneal (i.p.) injection of carrageenan (200 μg/cavity). Four hours later, the rats were sacrificed and the exudates were collected to determine the total volume and leukocyte number. In the pleurisy test, indomethacin and GEO 200 and 500 mg/kg reduced significantly the exudates volume ($P < 0.05$ and $P < 0.001$) without promoting alteration of total leukocyte migration. In the present experiments, GEO (50, 100, and 200 mg/kg, p.o.) and indomethacin significantly suppressed the acetic acid-induced writhing response in a dose-dependent manner. Maximum inhibition of GEO was observed at the dose of 200 mg/kg. The Data suggest that GEO does not have influence on cells' recruitment, different to that observed for others essential oils. The anti-inflammatory activities of compounds obtained from GEO have been reported by other investigations using ginger extract. These anti-inflammatory actions could be owing to the inhibition of prostaglandin release and hence ginger may act in a way similar to other non steroidal anti-inflammatory drugs which interfere with prostaglandin biosynthesis. GEO was found to contain monoterpenes and sesquiterpenes as principal compounds, suggesting that the anti-inflammatory and analgesic effects could be correlated to these essential oil constituents[1].

Anti-Osteoarthritic effect

Ginger extract has been studied as an alternative to NSAID therapy for arthritic conditions. A randomized, placebo-controlled, crossover study comparing ginger extracts and ibuprofen was performed on 75 individuals with osteoarthritis of the hip or knee. 41 Patients received 170 mg ginger extract, 400 mg ibuprofen, or placebo three times per day and were followed for three weeks. The study revealed significant improvement in symptoms for both the ginger and ibuprofen groups before crossover; however, at the study's end there was no difference between ginger and placebo. No side effects were noted in the ginger group; however, side effects prompting removal from the study occurred in the ibuprofen group. However, more studies are recommended using different doses and duration of treatment to assess the efficacy of ginger extract for this condition[24].

Cytoprotective and Gastric anti-ulcer effect of ginger

To evaluate the cytoprotective and gastric anti-ulcer effect of ginger M. A. Al-Yahya *et al* had carried out an experimental study in albino rats. Cyto-destruction was produced by 80 % ethanol, 0.6M HCL, 0.2M NaOH and 25 % NaCl, whereas the gastric ulcers were produced by ulcerogenic agents including indomethacin, aspirin and reserpine, beside hypothermic restraint stress and by pylorus ligated Shay rat technique. The results of this study demonstrate that the extract in the dose of 500 mg/kg orally exert highly significant cytoprotection against 80 % ethanol, 0.6M HCL, 0.2M NaOH and 25 % NaCl induced gastric lesions. The extract also prevented the occurrence of gastric ulcers induced by non steroidal anti-inflammatory drugs (NSAIDs) and hypothermic restraint stress. These observations suggest cytoprotective and anti-ulcerogenic effect of the ginger which may be due to the presence of terpenoidal compounds of ginger[23].

Effects on cardiovascular system and blood pressure

Jalal Bayati Zadeh *et al* in 2014 had presented a review on ginger and its constituents of the last 10 years. Under the review of pharmacological action of ginger they mentioned

the Effect of ginger on cardiovascular system and blood pressure. They review that in the traditional system of Chinese medicine ginger is used to improve the flow of body fluids, to stimulate blood circulation throughout the body by powerful stimulatory effect on the heart muscle and by diluting blood. The improved circulation is believed to increase the cellular metabolic activity, thus contributing to the relief of cramps and tension. A Japanese study showed that active constituents in ginger reduced the blood pressure and decreased cardiac workload. Ginger reduced the formation of pro inflammatory prostaglandins and thromboxanes thus lowering the clotting ability of the blood. The inhibition of platelet aggregation by ginger more than the similar effects observed with garlic and onion. Ginger can prevent the increase in cholesterol levels following intake of cholesterol-rich diet. Ginger is also known to possess antioxidant properties. In the same above mentioned review paper the author also mentioned the more recently, Ghayur and Gilani study report and discussed that the crude extract of ginger induced a dose-dependent (0.3–3 mg/kg) fall in the arterial blood pressure of anesthetized rats. In Guinea pig paired atria, the crude extract exhibited a cardio depressant activity on the rate and force of spontaneous contractions. In rabbit thoracic aorta preparation, the crude extract relaxed the phenylephrine induced vascular contraction at a dose 10 times higher than that required against K-induced contraction. Ca^{2+} channel- blocking activity was confirmed when the crude extract shifted the Ca^{2+} dose–response curves to the right, similar to the effect of verapamil. It also inhibited the phenylephrine control peaks in normal Ca^{2+}-plus and Ca^{2+}-free solutions, indicating that it acts at both the membrane-bound and the intracellular Ca^{2+} channels. When tested in endothelium contraction at a dose 14 times less than that required for relaxing the PE-induced contraction. The vasodilator effect of the crude extract was endothelium-independent because it was not blocked by either L-NAME (a non-selective inhibitor of nitric oxide synthase used experimentally to induce hypertension) or atropine and also was reproduced in the endothelium-denuded preparations in the same dose range. These data indicate that the blood pressure lowering effect of ginger is mediated through blockade of voltage dependent calcium channels. In another paper, the same group concluded that the blood pressure lowering action of aqueous ginger extract was through a dual inhibitory effect mediated via stimulation of both muscarinic receptors and blockade of Ca^{2+} channels. Interestingly, they also noted that the different constituents of ginger might have opposing actions on the reactivity of blood vessels[18].

Acute and Subacute cardiovascular toxicity of ginger

Iman A. Elkhishin *et al*-2009 had planned a study with the aim of the work, is to study the acute and sub acute cardiovascular toxicity of ginger in adult male albino rats and its possible mechanisms of action. The *in- vivo* studies included eighty four adult male albino rats for the acute and sub acute toxicity experiments. The rats were divided into 7 groups each one consisted of 12 rats. All rats received ginger orally in saline. Each of the *in- vivo* studies included 2 control groups, the negative and positive control rats. In the acute toxicity study, rats received ginger in a single dose of 2500 mg/ kg. In the sub acute toxicity study group VI and VII received ginger in a daily dose of 50 mg/ kg and 500 mg/ kg respectively for 28 days. After 24 hours of the acute toxicity and 28 days of the sub acute experiments six rats of each group were used for blood pressure and heart rate recording. The other 6 rats were used for histopathological study of the cardiac tissue. The *in- vitro* experiments included 6 rabbits each weighing 1.5- 2 kg. Ginger (5 mg/ml) was incubated with the aortic spiral strip of each rabbit to investigate the possible mechanisms of action of Ginger. It was concluded that; single dose of 2500 mg/ kg ginger can be a toxic by causing severe hypotension and bradycardia with induction of pre necrotic changes in cardiac tissue. The administration of ginger in a dose of 50 mg/ kg for 28 days produced bradycardia with waviness in cardiac muscle fibers. Ginger in a dose of 500 mg/ kg produced both hypotension and bradycardia with degenerative changes in cardiac myocyte tissue. The hypotensive and bradycardic effects of ginger may be partially due to induction of vasodilatation by increasing nitric oxide release or synthesis and partially due to a calcium channel blocking effect. Also, a cholino-mimetic effect could be contributed in the cardiovascular effects of ginger. While the *In-vitro* results revealed that ginger is a partial vaso-relaxant as it produced a relaxant effect on rabbit's aortic strip pro contracted with phenylephrine, while pre-incubation with L-nitroarginine methyl ester (L-NAME) significantly attenuated the ginger-induced relaxation indicating that the vasodilator effect of ginger is partially mediated through nitric oxide synthesis or release from L-NAME[17].

CONCLUSION

Zanjabil (*Zingiber officinalis*) has been subjected to quite extensive physiochemical, experimental and clinical investigations. Experimental studies have demonstrated its antioxidant, antibacterial, anti-cough, anti-inflammatory, analgesic, androgenic, cytoprotective along with gastric anti-ulcers effect etc. Since several metabolic diseases and age-related degenerative disorders are closely associated with oxidative processes in the body, hence the use of either ginger or one or more of its constituents as a source of anti-oxidants to combat oxidation warrants further attention. At present the scientific studies on ginger have proved the claims of traditional system of medicine. Still, further detailed clinical research appears worthwhile to explore the full therapeutic potential of this drug in order to establish it as a standard drug.

REFERENCES

1. Vendruscolo A, Takaki I *et al*. Anti inflammatory and anti nociceptive activities of *Zingiber officinale* Roscoe essential oil in experimental animal models. Indian J Pharmacol 2006; 38(1): 8-9.
2. Affaque SH, Siddiqui MMH. Pharmacogonosy, phytochemistry, pharmacology and clinical studies of Unani medicinal plants vol 1; 1984. p. 146-72.
3. Aggarwal MSS, Parkash J. International seminar on recent trends in pharmaceutical sciences. Ootacamunds Abstr NOD-21; 1995. p. 18-20.
4. Publication and information directorate C.S.I.R. Wealth of India vol 11. New Delhi; 1976. p. 89-106.
5. Bhandari U, Zafar JN, Sharma JN. The proteolytic action of ethamolic ginger (*Z. officinalis*) extract in cholesterol fed rabbits. Medicinal and Aromatic Plants Abstracts (MAPA) 1998; 61(2): 167-171.
6. Chopra RN, Nayar SL, Chopra I. Supplement to glossary of Indian medicinal plants. New Delhi: Publications and information directorate, The Council of Scientific & Industrial Research (CSIR); 1969. p. 11, 19, 103.
7. Farnsworth NR, Bunyapraphatsara N. Thai medicinal plants. Bangkok: Medicinal Plants Information Center; 1992. p. 180A-2.
8. Ghani N. Khazainul Advia, vol 6. Lucknow: Nawal Kishore publication; 1930. p. 865-867.
9. Ghani N. Khazainul Advia, vol 2. Lucknow: Nawal Kishore publication; 1930. p. 371-374, 533-537.

10. Graunwald T, Thomas B *et al*. PDR for herbal medicine 2nd ed. Medicinal economic company; 2000. p. 339.
11. Gujral S, Bhurma H *et al*. Effect of ginger oleoresin on serum and hepatic cholesterol levels in cholesterol fed rats. Nutr. Rep. Inter 1978; 183: 17.
12. Hakeem A. Bastanul-Mufradat. Lucknow: Idarah traqqui Urdu publication; 1311. p. 56, 261.
13. Haleem A. Mufradat-e-Azizi. Lucknow: Sahitya Mandir press; 1948. p. 51, 44, 33.
14. Ibn Baitar. Aljamiul Mufradat Al Advia Wa Aghzia. New Delhi: CCRUM; 1985. p. 349.
15. Ibn Rusd. Kitabul Kulliyat. New Delhi: Central Council for Research in Unani Medicine (CCRUM); 1980. p. 292, 267, 278.
16. Ibn Sena. Al Qanoon fit tib vol 2. Lahore: Naval Kishore publication reprinted by Shiekh Bashir and sons; 1930. p. 115-137, 118, 143, 188.
17. Iman A, Elkhishin, Ibrahim A, Awwad. A study of the cardiovascular toxic effects of *Zingiber officinale* (ginger) in adult male albino rats and its possible mechanisms of action. J. Forensic Med Clin. Toxicol 2009; XVII(2): 109-117.
18. Jalal Bayati Zadeh and Nasroallah Moradi Kor. Physiological and pharmaceutical effects of Ginger (*Zingiber officinale* Roscoe) as a valuable medicinal plant. European Journal of Experimental Biology 2014; 4(1): 87-90.
19. Kabiruddin M. Makhzanul mufradat-kitabul- Advia. Lucknow: Shiekh Bashir and sons; 1937. p. 463, 547, 366.
20. Khan A. Muheet-e-Azam part 2, vol 4. Kanpur: Nizami Press; 1313. p. 129-132, 96-98.
21. Khan A. Muheet-e-Azam vol 3. Kanpur: Nizami Press; 1313. p. 108-109.
22. Kirtikar KR, Basu BD. Indian medicinal plants vol 4, 2nd ed. Dehradun: International book distributors; 1995. p. 2435-2437.
23. Al Yahya MA, Rafatullah S *et al*. Gastroprotective Activity of Ginger *Zingiber officinale* Rose in Albino Rats. American J of Chin Med XVII(1-2): 5 1-56
24. A monograph on *Zingiber officinalis*. Alt Med Rev 2003; 8(3): 331-335.
25. Morakinyo AO, Adeniyi OS. Effects of *Zingiber officinale* on reproductive functions in the male rat. African J Biomed Res 2008; 1: 329-334.
26. Moscolo NJ, Jain R *et al*. J. Ethno pharmacology 1989; 27: 129-40. http://dx.doi.org/10.1016/0378-8741(89)90085-8
27. Nadkarni KM. Indian Matrica Medica vol 1. Bombay: Popular prakashan; 1976. p. 1308-1314.
28. Nadkarni KM. Indian Matrica Medica vol 2. Bombay: Popular prakashan; 1976. p. 167, 211-212.
29. Rahnama P, Montazeri A. Effect of *Zingiber officinale* R. rhizomes (ginger) on pain relief in primary dysmenorrhea: a placebo randomized trial. BMC Compl Alt Med 2012; 12: 92. http://dx.doi.org/10.1186/1472-6882-12-92
30. Razi AZ. Alhawi fil istafgharat wa tasmeem wa Huzal vol 6. Hyderabad: Mataba Daeratul Moarif Usmani; 1908. p. 215.
31. Sharma SB *et al*. Medicinal plants with hypolipidemic activities. Indian Drugs 1997; 34(5): 242-251.
32. Sheerazi MH. Makhzanul Advia Mae Toofatul Moomineen. Kanpur: Nizami Press; 1896. p. 670, 743, 409.
33. Bhargava S, Dhabhai K *et al*. *Zingiber officinale*: Chemical and phytochemical screening and evaluation of its antimicrobial activities. J of Chem and Pharma Res 2012; 4(1): 360-364.
34. Shrinivasan K, Sambiah K. The effect of spices on cholesterol 7α-Hydroxylase activity and on serum and hepatic cholesterol level in rats. Intr. J. Vitamin Nutrition 1991; 61(4): 364-369.
35. Srivastava KC. Prostaglandic and leukotrienes and medicine 1986; 25(2-3): 187-98.
36. Srivastava KC, Mustafa T. Medicinal hypothesis 1989; 29: 25-58.
37. Tanabe M, Chen YD *et al*. Pharmaceutical Bull 1993; 41(4): 710-13. http://dx.doi.org/10.1248/cpb.41.710
38. Warrier PK, Nambia K *et al*. Indian medicinal plants- a compendium of 500 species vol 2. Madras: Orient Longman publisher; 1996. p. 164-172, 297-300 vol 3; p. 431-438.
39. Warrier PK, Nambia K *et al*. Indian medicinal plants- a compendium of 500 species vol 3. Madras: Orient Longman publisher; 1996. p. 431-438.
40. Raja W, Pandey S. Evaluation of antibacterial and anti cough forming effects of *Zingiber officinale* Extract. Intl J Chem Pharm Res 2012; 1(6): 141-147.
41. Weiner M. Weiner's Herbal. 4thed. New York: Stein and Day Publisher; 1990. p. 244.

Source of support: Nil, Conflict of interest: None Declared

QUICK RESPONSE CODE	ISSN (Online) : 2277 –4572
	Website http://www.jpsionline.com

How to cite this article:

Roohi Azam, Azhar Jabeen, Tabassum Alam, Shafia Mushtaq, Sheikh Haneef Mohmad. Zanjabil (*Zingiber officinalis*): A review. J Pharm Sci Innov. 2014;3(4):278-282 http://dx.doi.org/10.7897/2277-4572.034156