



Zingiber Officinale (Ginger): A Review On Medicinal Uses

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Abstract

Ginger (*Zingiber officinale*) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. Ginger is loaded with antioxidants, compounds that prevent stress and damage to your body's DNA. They may help your body fight off chronic diseases like high blood pressure, heart disease, and diseases of the lungs, plus promote healthy aging. Doctors recommend consuming a maximum of 3–4 grams of ginger extract per day. If you're pregnant, don't consume more than 1 gram of ginger extract per day. Ginger is not recommended for children under the age of 2. The first written record of ginger comes from the Analects of Confucius, written in China during the Warring States period (475–221 BC). Though it is grown in many areas across the globe, ginger is "among the earliest recorded spices to be cultivated and exported from southwest India".

Key Words- *Zingiber officinale*, Rhizome, Ginger, Anti-inflammatory, Resins.

Introduction

Ginger (*Zingiber officinale*) could be a blossoming plant whose rhizome, ginger root or ginger, is broadly Utilized as a spice and a people pharmaceutical. It could be a herbaceous lasting which develops yearly Pseudo stems (wrong stems made of the rolled bases of clears out) almost one meter tall bearing Contract leaf edges.[1]



Fig: Ginger

Scientific classification

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Monocots

Clade: Commelinids

Order: Zingiberales

Family: Zingiberaceae

Genus: Zingiber

Species: *Z. officinale*.

Binomial name: *Zingiber officinale*

The inflorescences bear flowers with pale yellow petals with purple leaf blades, which arise directly from the rhizomes of individual shoots. Ginger belongs to the Zingiberaceae family, which also includes turmeric (*Curcuma longa*), cardamom (*Elettaria cardamomum*), and galangal.

Ginger is native to coastal Southeast Asia and was probably first domesticated by Austronesians. During the Austronesian expansion (c.5000 BC), it was transported with them through the Indo-Pacific, reaching as far as Hawaii. Ginger is one of the primary flavors to have been sent out from Asia, arriving in Europe with the zest exchange, and was utilized by old Greeks and Romans. The distantly related dicots within the class Asarum are commonly called wild ginger since of their comparable taste.[2]

In spite of the fact that utilized in traditional pharmaceutical and as a dietary supplement, there's no great prove that devouring ginger or its extricates has any impact on human wellbeing or as a treatment for Infections. In 2019, world generation of ginger was 4.1 million tons, driven by India with 44% of the world add up to.[3]

Origin and Distribution

Ginger begun from Sea Southeast Asia. It could be a genuine cultigen and does not exist in its wild state. The foremost antiquated prove of its taming is among the Austronesian people groups where it was among a few species of ginger developed and misused since old times. They developed other gingers counting turmeric (*Curcuma longa*), white turmeric (*Curcuma zedoaria*), and biting ginger (*Zingiber zerumbet*). The rhizomes and the clears out were utilized to enhance nourishment or eaten straightforwardly. The clears out were moreover utilized to weave mats. Aside from these employments, ginger had devout importance among Austronesians, being utilized in ceremonies for healing and for inquiring assurance from spirits. It was too utilized within the favoring of Austronesian ships.[4]

History

The primary composed record of ginger comes from the Analects of Confucius, composed in China amid the Warring States period (475-221 BC). In it, Confucius was said to eat ginger with each Supper. In 406 Advertisement, the minister Faxian composed that ginger was developed in pots and carried on Chinese Ships to anticipate scurvy. Amid the Melody Line (960-1279), ginger was being imported into China from southern nations. Ginger was presented to the Mediterranean by the Middle easterners, and depicted by journalists like Dissensions (40-90 Advertisement) and Pliny the Senior (24-79 Advertisement).[5] In 150 Advertisement, Ptolemy famous that ginger Was created in Ceylon (Sri Lanka). Crude and protected ginger

was imported into Europe Amid the Center Ages where it was depicted within the official pharmacopeia of a few Nations. In 14th century Britain, a pound of ginger fetched as much as a sheep.[6]

Ginger farming

The fragrant Perisperm of the Zingiberaceae is utilized as sweetmeats by Bantu, conjointly as a condiment and Sialagogue. The estimate of the seed ginger, called rhizome, is fundamental to the generation of ginger. The bigger the Rhizome piece, the quicker ginger will be delivered and so the quicker it'll be sold onto the Advertise. Earlier to planting the seed rhizomes, ranchers are required to treat the seeds to avoid Seed-borne pathogens and bothers, rhizome decay and other seed-borne infections. There are different Ways ranchers do seed treatment in India. These incorporate plunging the seeds in bovine compost emulsion, Smoking the seeds some time recently capacity, or hot water treatment. Once the seeds are legitimately treated, the farmland in which they are to be planted must be completely burrowed or furrowed by the rancher to break up the soil. After the soil is adequately Furrowed (at slightest 3-5 times), water channels are made 60-80 ft separated to water the edit.[7]

The following step is planting the rhizome seed. In India, planting the flooded ginger edit is as a rule Drained the months between Walk and June as those months account for the starting of the Storm, or blustery season. Once the planting arrange is done, agriculturists go on to mulch the trim to Conserve dampness and check weed development, as well as check surface run-off to preserve soil. Mulching is done by applying mulch (green takes off for illustration) to the plant beds specifically after Planting and again 45 and 90 days into development.[8]

Tabel 1: Top ten Ginger Producing country in world

S. No.	Country	Production (Tonnes)
1.	India	683000
2.	China	425000
3.	Nepal	235033
4.	Indonesia	232669
5.	Nigeria	160000
6.	Thailand	140000
7.	Bangladesh	69000
8.	Japan	57835
9.	Cameron	46350
10.	Philippines	28216

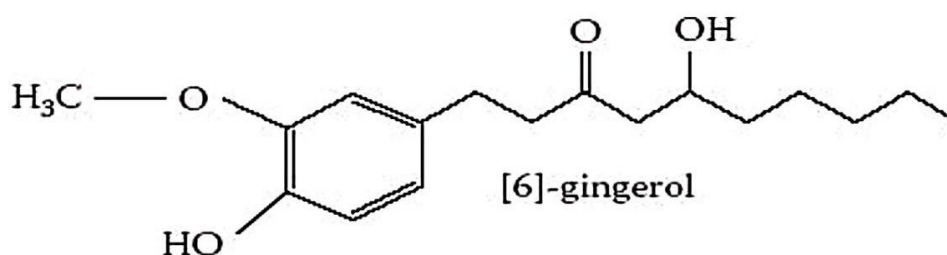
Tabel 2: Top ten Ginger producing states in India

S. No.	State	Production (Tonnes)
1.	Assam	122307
2.	Gujarat	70646
3.	Karnataka	50054.3
4.	Arunachal Predesh	57000
5.	Meghalaya	62994
6.	Sikkim	52110
7.	Orrisa	35000
8.	Mizoram	28390
9.	West Bengal	25000
10.	Uttarakhand	23440
11.	Kerala	21249
12.	Andhra Predesh	1369
13.	Telangana	12729

Chemical Composition

At least 115 ingredients in fresh and dried ginger kinds have been linked by a variety of logical processes. Gingerols are the major ingredients of fresh ginger and are set up slightly reduced in dry ginger, whereas the attention of shogaols, which are the major gingerol dehumidification products, are more abundant in dry ginger than in fresh ginger. (9)

At least 31 gingerol-related compounds have been linked from the methanolic crude extracts of fresh ginger rhizome. Ginger has been fractionated into at least 14 bioactive compounds, including [4]-gingerol, [6]-gingerol, [8]-gingerol, [10]-gingerol, [6]-paradol, [14]-shogaol, [6]-shogaol, 1-dehydro-[10]-ginger Dione, [10]-ginger Dione, hexahydro curcumin, tetrahydro curcumin, gingerone A, 1,7-bis-(4-hydroxy-3-methoxyphenyl)-5-methoxyheptan-3-one, and methoxy-[10]-gingerol.[10]



Nutrient Composition [11]

Table 3: Nutrient composition of Ginger (per 100g 3.5oz)

Constituents	Ginger root (ground)	Ginger root (Raw)
Energy	1404KJ (336Kcal)	333KJ (80Kcal)
Carbohydrates	71.6g	17.7g
Sugar	3.39g	1.7g
Dietary Fibre	14.1g	2.0g
Fat	4.24g	0.75g
Protein	8.98g	1.82g

Table 4: Vitamin content of Ginger (per100g)

Vitamins	Ginger root (Ground)	Ginger root (Raw)
Thiamine(B1)	0.046mg	0.025mg
Riboflavin(B2)	0.17mg	0.034mg
Niacin(B3)	9.62mg	0.75mg
Panathenaic acid (B5)	0.477mg	0.203mg
Vitamin B6	0.626mg	0.16mg
Folate (B9)	13µg	11 µg
Vitamin C	0.7mg	5mg
Vitamin E	0.0	0.26mg

Table 5: Mineral content of ginger (per 100g)

Minerals	Ginger root (Ground)	Ginger root (Raw)
Calcium	114mg	16mg
Iron	19.8mg	0.6mg
Magnesium	214mg	43mg
Manganese	33.3mg	0.229mg
Phosphorus	168mg	34mg
Potassium	1320mg	415mg
Sodium	27mg	13mg
Zinc	3.64mg	0.34mg

Medicinal Use of Ginger [12]

1. Antioxidant activity of Ginger

The nearness of oxidative push is related with various infections and a common component regularly put forward to clarify the activities and wellbeing benefits of ginger is related with its antioxidant properties. Ginger was detailed to diminish age-related oxidative stretch markers and was proposed to protect against ethanol-induced hepatotoxicity by stifling oxidative results in rats treated with ethanol.

Ginger root contains an awfully tall level (3.85 mmol/100 g) of add up to cancer prevention agents, outperformed as it were by pomegranate and a few sorts of berries. The phorbol ester, 12-O-tetradecanoylphorbol-13-acetate (TPA), advances oxidative push by actuating the nicotinamide adenine dinucleotide phosphate (NADPH) oxidase framework or the xanthine oxidase framework or both. Ginger was detailed to smother TPA-induced oxidative stretch in human promyelocytic leukaemia (HL)-60 cells. Others have appeared that ginger compounds successfully hinder superoxide generation.

2. Anti-Inflammatory Activity of Ginger

One of the numerous wellbeing claims credited to ginger is its implied capacity to diminish irritation, swelling, and torment. [6]-gingerol, a dried ginger extricates, and a dried gingerol-enriched extricate were each detailed to show pain relieving and powerful anti-inflammatory impacts. Prior creature considers propose that rodent rear appendages perfused with [6]-gingerol appeared expanded warm generation that was related with expanded oxygen utilization and lactate efflux.

The thermogenesis was at slightest somewhat related with vasoconstriction autonomous of adrenergic receptors or auxiliary catecholamine discharge. In differentiate, bigger dosages of ginger components restrained oxygen utilization, which was ascribed to disturbance of mitochondrial work. These comes about were bolstered in a afterward ponder in which rats that were given a single intraperitoneal infusion of [6]-gingerol (2.5 or 25 mg/kg) displayed a quick, stamped drop in body temperature and a critical diminish in metabolic rate.[13]

3. Antinausea Activity of Ginger

The foremost common and well-established utilize of ginger all through history is likely its utilization in reducing indications of queasiness and spewing. The benefits and threats of home-grown treatment of liver and gastrointestinal trouble have been looked into, and a few controlled thinks about have detailed that ginger is for the most part rally compelling as an antiemetic. The adequacy of ginger as an antiemetic has been ascribed to its carminative impact, which makes a difference to break up and oust intestinal gas. This thought was backed by the comes about of a randomized, double-blind trial in which sound volunteers detailed that ginger successfully quickened gastric purging and fortified antral withdrawals.

4. Anti-cancer activity of Ginger

A proceeded increment within the rate of cancer has alarmed customers to the utilize of useful nourishments that secure against, and diminish the speeding up of the infection. The useful impacts of ginger and its metabolites against a assortment of carcinomas and cell lines of the lung, colon, skin, pancreas, prostate, liver, ovary, colon, breast, kidney, etc. have been perceived by numerous analysts over the past 20 a long time. An ethanolic ginger extricate connected topically to mouse skin given a profoundly critical defensive impact against the improvement of skin tumours, and this was related with the restraint of 12-O-

tetradecanoylphorbol-13-acetate (TPA)- caused acceptance of epidermal ornithine decarboxylase, cyclooxygenase and lipoxygenase exercises. A consequent think about appeared [6]-gingerol to have comparable movement. A more later ponder appeared that topical application of [6]- gingerol repressed COX-2 expression in mouse skin fortified with the tumour promoter TPA. Comes about from this consider proposed that the hindrance of COX-2 expression was the result of the blocking of the p38 Outline kinase-NFκB flagging pathway. A cytotoxic or cytostatic impact interceded by apoptosis was found for [6]-gingerol and [6]- paradol in human promyelocytic leukaemia HL-60 cells, conjointly for four diarylheptanoids and two shogaols. Later considers have appeared that zingerone contains anticancer potential.

5. Anti-diabetic activity of Ginger

Diabetes may be a metabolic clutter and major worldwide wellbeing issue around the world. It is caused by variation from the norm of carbohydrate digestion system which is related to moo blood affront level or cold-heartedness of target organs to affront. Untreated cases appear extreme tissue and vascular harm driving to genuine complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications and ulceration. An vital finding based on in STZ treated-type 1 diabetic rodent demonstrate detailed that, verbal organization of ethanolic extricate of ginger altogether diminish fasting blood glucose level. Prior ponder detailed that noteworthy blood glucose bringing down impact of ginger juice in diabetic and non-diabetic creatures. The growth of osteoblastic MC3T3-E1 cells was expanded within the nearness of 0.1 IM 6-GN and 30 mM 2-deoxy-D-ribose, as a result of raising the soluble phosphatase movement, collagen substance and osteocalcin emission of the cells. At concentrations of 1 and 100 nM, 6- GN expanded the osteo protegrin emission in osteoblastic cells and diminished the protein carbonyl substance of osteoblastic cells, which is of significance in bone illnesses related to diabetes.[14]

6. Analgesic activity of Ginger

[6]-shogaol has too been appeared to hinder acidic acid-induced writhing in mice and to raise the nociceptive edge of the yeast-inflamed paw. Tests carried out by Onogi and co-workers recommended that [6]-shogaol represses the discharge of Substance P by incitement of the essential afferents from their central terminal and consequently offers this location of activity with capsaicin. [15]

7. Antipyretic activity of Ginger

A Soxhlet extricate of ginger in 80% ethanol decreased yeast-induced fever in rats by 38% when managed orally (100 mg/kg). This was comparable to the antipyretic impact of acetylsalicylic corrosive at the same measurements. The ginger extricates did not influence the temperature of normothermic rats. This antipyretic action may be intervened by COX hindrance.[16]

8. Immunomodulatory activity of Ginger

The advantageous impacts of ginger in treating hacks, colds and flu is likely connected to immune-boosting properties of the plant. Few ponders have inspected the potential immunomodulatory action of ginger. Non-specific resistance was expanded in rainbow trout eating a count calorie containing 1% of a dried watery ginger extricate for three weeks. Mice nourished a 50% ethanolic ginger extricate (25 mg/kg) for seven days had higher haemagglutinating counter acting agent titre and plaque-forming cell checks, reliable with progressed humoral resistance. One in vitro ponders found that ginger smothered lymphocyte expansion; this was interceded by diminishes in IL-2 and IL-10 generation.[17]

9. Anti-atherosclerotic activity of Ginger

In a more later consider, air-dried ginger powder (100 mg/kg orally every day) encouraged to rabbits with tentatively actuated atherosclerosis for 75 days repressed atherosclerotic changes within the aorta and coronary supply routes by approximately 50%. In this ponder the ginger treatment did not cause any noteworthy bringing down of serum lipids, but lipid peroxidation was diminished and fibrinolytic movement expanded.[17]

10. Anti-obesity activity of Ginger

Okamoto et al., 2011 detailed that 6-GN neutralizes body weight pick up and fat amassing in mice. A think about conducted by Tzeng and Liu (2013) uncovered that 6-GN hinders rosiglitazone-induced adipogenesis by stifling oil bead aggregation and by diminishing the bead measure in 3T3-L1 cells. Histochemical recolouring too allowed the discovery of oil beads in adipocytes at concentrations extending from 5 to 15 lg/mL. A diminishment within the levels of greasy corrosive synthase and adipocyte-specific greasy corrosive authoritative protein was too detailed.

11. Anti-angiogenic activity of Ginger

Kim et al., 2005a has performed that [6]-Gingerol has anti-tumour-promoting exercises. They detailed its novel anti-angiogenic action in vitro and in vivo. In vitro, [6]-gingerol restrained both the VEGF- and finicked expansion of human endothelial cells and caused cell cycle capture within the G1 stage. It moreover blocked capillary like tube arrangement by endothelial cells in reaction to VEGF, and emphatically restrained sprouting of endothelial cells within the rat aorta and arrangement of unused blood vessel within the mouse cornea in reaction to VEGF. The results illustrate that [6]- gingerol hinders angiogenesis and may be valuable within the treatment of tumours and other angiogenesis-dependent. [18]

Conclusion

Ayurveda suggests *Zingiber officinale* (ginger) to oversee different infection conditions in show disdain toward of saying cutting edge viewpoints on antiviral, radioprotective, anti-inflammatory, and anticancer and antioxidant impacts. Indeed, in spite of the fact that, conventional Ayurveda classics give solid writing base to manage ginger in different maladies saying complication or related side effects of numerous clutters. Later progresses in phytochemistry and ethnomedicinal ponders expand employments of ginger in viral contaminations, carcinogenic conditions and physiological needs. Comparing proposals of ginger in therapeutic reason concurring to the Ayurveda literary works might be connected in cutting edge scenarios in illness anticipation and wellbeing advancement.

Reference

1. "Zingiber officinale. Germplasm Resources Information Network (GRIN). Agricultural Research Service (ARS), United States Department of Agriculture (USDA). Retrieved 10 December 2017.
2. "Ginger, NCCIH Herbs at a Glance. US NCCIH. 1 September 2016.Retrieved 2 February 2019.Sutarno H, Hadad EA, Brink M (1999). "Zingiber officinale Roscoe".
3. DeGuzman CC, Siemonsma JS(eds.). Plant resources of South-East Asia: no.13: Spices. Leiden (Netherlands): Backhuys Publishers.pp. 238- 244.
4. "Curcuma longa L." Plants of the World Online, Kew Science, Kew Gardens, Royal Botanic Gardens, Kew, England. 2018. Retrieved 26 March 2018.
5. "Zingiber officinale Roscoe".Kew Science, Plants of the World Online. Royal Botanic Gardens, Kew. 2017. Retrieved 25 November2017. "Ginger" Drugs.com. 20 December 2020. Retrieved 25 November 2021.
6. Caldwell R (1 January 1998). A Comparative Grammar of the Dravidian Or South-Indian Family of (3rd ed.). New Delhi: Asian Educational Services.
7. "Ginger" Online Etymology Dictionary. Douglas Harper. Retrieved 22 January 2011.
8. Ravindran P, Nirmal Babu K (2016). Ginger: The Genus Zingiber. Boca Raton: CRC Press. P. 7.
9. Singh RJ (2011). Genetic Resources, Chromosome Engineering, and Crop Improvement. Medicinal Plants.6. Boca Raton: CRC Press. P. 398.
10. Omoya FO, Akharaiyi FC, Mixture of honey and ginger extract for antibacterial assessment on some clinical isolates, International Journal on Pharmaceutical and Biomedical Research, 2011, 2(1), 39-47.
11. Ayse N, Duygu AT, Hakký AI, Tansel OY, Ýsmet DG, Ismail K, Antimicrobial and cytotoxic activities of *Zingiber officinalis* extracts,FABAD J Pharm Sci, 2008, 33(2), 77-86.

12. Al-Tahtawy RHM, El-Bastawesy AM, Monem MGA, Zekry ZK, Al-Mehdar HA, El-Merzabani MM, Antioxidant activity of the volatile oils of *Zingiber officinale* (ginger), *Spatula DD*, 2011, 1(1), 1-8.
13. Akhane SP, Vishwakarma SL, Goyal RK, Anti-diabetic activity of *Zingiber officinale* in streptozotocin-induced type I diabetic rats, *J Pharm Pharmacol*, 2004, 56(1), 101- 105.
14. Ajith TA, Nivitha V, Usha S, *Zingiber officinale* Roscoe alone and in combination with α -tocopherol protect the kidney against cisplatin-induced acute renal failure, *Food and Chemical Toxicology*, 2007, 45(6), 921- 927.
15. Abdullah N, Saat NZM, Hasan HA, Budin SB, Kamaralzaman S, Protective effect of the ethanol extract of *Zingiber officinale* Roscoe on paracetamol induced hepatotoxicity in rats, *Jurnal Sains Kesihatan Malaysia*, 2004, 2(2), 85-95.
16. Lin RJ, Chen CY, Chung LY, Yen CM, Larvicidal activities of ginger (*Zingiber officinale*) against *Angiostrongylus cantonensis*, *Acta Trop*, 2010, 115(1-2), 69- 76.
17. Raji Y, Udoh US, Oluwadara OO, Akinsomisoye OS, Awobajo O, Adeshoga K, Anti-inflammatory and analgesic properties of the rhizome extract of *Zingiber officinale*, *Afr J Biomed Res*, 2002, 5, 121- 124.
18. Carrasco FR, Schmidt G, Romero AL, Sartoretto JL, Caparroz-Assef SM, BersaniAmado CA, Cuman RK, Immunomodulatory activity of *Zingiber officinale* Roscoe, *Salvia officinalis* L. and *Syzygium aromaticum* L. essential oils: evidence for humor- and cell-mediated responses. *J Pharm Pharmacol*, 2009, 61(7), 961-967.

