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## Review Article

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## Pharmacological evidences of ancient traditional siddha herb *Zingiber officinale* (Zinger, Inji) – A Bird View

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### Abstract

Siddha system of medicine is one of the traditional system which have been practiced from ancient times. In this system posses a wide variety of using herbal preparation for treating various acute and chronic diseases without any adverse effect. Herbal preparation plays a unique role in treating procedures because of its phyto constituents and anti oxidant property of the plants. This system of medicine deals with not only treating the diseases but also interfere with the mind, body and soul. Herbs plays an important role in treating diseases without adverse effect and easy affordable of nature. In this review the authors compile the informations about a herb *Zingiber officinale* (Zinger, Inji) with Botanical, scientific description, distribution, history, nutritional value, pharmacological uses will provide better solution for various cure in medical World.

**Keywords:** Siddha, Herb, Plant, Traditional system, *Zingiber officinale* (Zinger, Inji), Pharmacological activity.

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### Introduction

India is the largest producer of herbs which have high range of medicinal uses because of its, it was called as botanical garden of the World. Herbals have a broad range of uses in genetic reservoirs. Medicinal herbs have been used since from various decades ago for treating wide variety of human ailments<sup>[1]</sup>.

Herbal medicines plays a popular remedies for treating various diseases by a vast majority of the world's population because of its benefits towards treating the diseases such as anti diabetics, hepatoprotective agents, and lipid lowering agents etc<sup>[2]</sup>.

The plant kingdom plays an important role with its active ingredients in treating many challenging diseases. Many studies have been validated from the herbal components which are highly effective antibiotics<sup>[3]</sup>.

The presence of various metabolites in plant material have been identified for various therapeutic activities. Now a days herbal medicines gaining the property of popularity in the world due to their higher potency of antioxidant activity, minimal side effects and economic viability<sup>[4]</sup>.

In this paper the authors wish to explore the herb *Zingiber officinale* which was herbaceous rhizomatous perennial widely used around the World as food. It was cultivated tropical climate and grows about 90cm ht<sup>[5]</sup>. The rhizome of Ginger have the potential of treating various diseases with less side effects and cost effectiveness. This paper will provide wide range of uses of medicines of Ginger on the basis of Siddha and pharmacological aspects.

*Let food be thy medicine and medicine be thy food*

- *Hippocrates*

### Ginger (*Zingiber officinale*)

Botanical name	:	<i>Zingiber officinale</i>
Family	:	Zingiberaceae
Part used	:	Rhizome

### Scientific classification

Kingdom	:	Plantae
Class	:	Monochlamydeae
Order	:	Zingiberales
Family	:	Zingiberaceae
Genus	:	<i>Zingiber</i>
Species	:	<i>officinale</i> <sup>[6]</sup>

### Metonymy

*Inji, Allam, Aartharagam, Aathiragam, Ilaakkottai, Narumaruppu madhil*

### Vernacular names:

Tamil	:	<i>Inji, Aartherakam, Allam, Narumaruppu matil</i>
English	:	Ginger
Telugu	:	<i>Allamu, Allam</i>
Malayalam	:	<i>Inchi</i>
Kananada	:	<i>Alla, Hasishunti</i>
Sanskrit	:	<i>Ardraka, Katybhadra, Srngavera</i>
Hindi	:	<i>Adarakha</i>
Arabian	:	<i>Zanjabile</i>
Persian	:	<i>Zanjableltar</i>
Duk	:	<i>Adark, South</i>

**Parts used** : Rhizome

### Properties and action

<i>Suvai</i> (Taste)	:	<i>Kaarppu</i> (Pungent)
<i>Thanmai</i> (Potency)	:	<i>Veppam</i> (Hot potency)
<i>Pirivu</i> (Bio-Transformation)	:	<i>Kaarppu</i> (Pungent)
<i>Seigai</i> (Actions)	:	Stimulant, Stomachic, Carminative, Digestive, Sialogogue, Rubefacient.

### Distribution:

It was cultured all over India but more available in Chennai, Cochin, Thiruvangoor, Panjab, West Bengal.

### General Character

“இஞ்சிக் கிழங்குக் கிருமல்யம் ஓக்காளம் வஞ்சிக்குஞ் சன்னிசுரம் வன்பேதி-விஞ்சுகின்ற சூலையறும் வாதம்போந் தூண்டாத தீபனமாம் வேலையறாங் கண்ணாய்-விளம்பு”.

“இஞ்சியின் குணமே தென்றி யல்புட னுரைக்கக் கேளீர் அஞ்சிடுஞ் சன்னியெல்லா மகன்றிடும் பித்த தோடம் நெஞ்சினி லிருமற் கோழை நெகிழ்ந்திடும் கபங்கள் தன்னை மிஞ்சினி வருமோ வென்று விளம்பிடும் தேவ நூலே”.

“மணிலாக் கோட்டையொன்று மாத்திரமே கற்பமென்ப தெண்ணிக்கை யாகி யிருக்குமே-கண்ணுக்கு நன்முறையாஞ் சீதளத்தை நாடாம லேயடிக்குந் தின்முறைமை நியறிந்து தின்”.

- குணபாடம் மூலிகை வகுப்பு

General properties of *Zingiber officinale* shows curative effect of cough, Tb, nausea, vomiting, all types of respiratory diseases, Indigestion, *Vali, Azhal, Iayam* and *Mukkutram* diseases.

### The practical uses of siddha medicine used by the Siddha doctors as prescribed in a siddha literature are explained below:

- The sliced pieces of *Zingiber officinale* was soaked with a honey for few days. Then it was given as a indications for ascities, for curing eye diseases and act as a powerful regenerator.
- The juice of *Zingiber officinale* was mixed with the milk and rock sugar, then it was subjected to the process *Manapagu* is indicated for giddiness.
- Simply on chewing of *Zingiber officinale* gave a good relief for throat infections.
- For nausea and vomiting, the juice of *Zingiber officinale* was mixed with the juice *Alium cepa*. It will give better remedy for nausea and vomiting.
- The juice extract of *Zingiber officinale* along with the candy sugar provide better results in diabetic patients.
- The juice extract of *Zingiber officinale* along with the pomegranate juice and honey reduce the aggressiveness of cough.
- The juice extract of *Zingiber officinale* along with the juice of *Alium cepa* and lemon juice also play a active role in reducing cough.

- *Zingiber officinale* was finely ground with a milk was given as a indications of cough, TB cough, ulcers, giddiness, and act as a stomachic with a adjuvant of milk<sup>[7]</sup>.

### History:

- Ginger has been originated from the Island of Southeast Asia. It does not exist in wild state. The evidence of domestic cultivation was found among the Austronesian peoples since ancient times<sup>[8,9]</sup>.
- During the expansion of Austronesian, Ginger was cultivated in their voyages as canoe plants. They introduced to the Pacific Islands. Then they introduced to India along with the Southeast Asian food plants through the sailors during sailing and also spread the uses and nature of the plant to the Dravidian-speaking peoples of Sri Lanka and South India<sup>[10,11]</sup>.
- From India, it was introduced to the Middle East and the Mediterranean by means of trading. They were abundantly grown in southern India during the spice trade, along with the peppers, cloves, and several spices<sup>[12]</sup>.



### Description:

Edible or culinary ginger is a fat, knobby, aromatic rhizome, a perennial plant. Ginger is cultivated for the characteristic features such as hot, pungent flavor in rhizome which used as a fresh, dried, ground or preserved. It was the most popular spices in the period of Middle Ages. Ginger will grow throughout the world particularly in tropical climates. Commercially it grows well in South and Southeast Asia, Jamaica, Nigeria, Africa, America, Caribbean, and Australia. It takes 8-10 months for harvesting. The rhizomes were thick, warty, branched, brown to golden outer skin, very thin and easily abraded. It grows at a level of 3-4 feet tall. The herb usually develops lateral shoots which is in the form of clumps, Leaves were long with the size of 2 - 3 cm broad sheathing bases, Flowers are rare and blossoms<sup>[13]</sup>.

### Purification of the Ginger:

*Inji* - Outer skin of ginger was peeled off<sup>[14]</sup>.



### Chemical composition of *Zingiber officinale*:

- The Ethanolic and Methanolic plant extract showed presence of alkaloid, phlobotannins, flavanoids, glycosides, saponins, tannin and terpenoids and absence of steroids
- The ethanolic extract of *Zingiber officinale* showed the presence of Gingerene (20.57%), Seiquphellandrene (12.71%), Curcumen (11.27%), Cyclo Hexane (10.61%), Fernesene (9.77%), Cis-6-Shagole (7.45%), Gingerol (4.46%), Gingerol (1.98%)
- The methanolic extract of *Zingiber officinale* showed the presence of Gingerene (15.32%),

Seiquphellandrene (11.80%), 2,6,10 Dodecatrien-1-ol (8.29%), Fernesene (8.22%), Curcumen (8.11%), Cadinene (2.13%)<sup>[15]</sup>.

- The fragrance and flavor of *Zingiber officinale* were due to the presence of volatile oils, non-volatile phenolic compounds such as zingerone, shogaol, gingerol, and gingeridione<sup>[13]</sup>.
- The pungent nature was due to the presence of (phenylalkylketones or vanillyl ketones) in ginger were gingerol and analogues of gingerol such as shogoals, paradol and zingerone were found abundantly in Zinger.

- Phenylalkylketones or vanillyl ketones of ginger include 6-gingerol 8- gingerol and 10-gingerol, 6-shogaol, 8-shogaol, 10-shogaol and zingerone. 6-paradol,6- and 10- dehydrogingerdione and 6- and 10-gingerdione have also been identified.
- Zingerol and shogaol were responsible for various pharmacological activity<sup>[16]</sup>.

#### **Nutritional composition of *Zingiber officinale*:**

100gram of raw drug of *Zingiber officinale* contains the following nutritional compositions such as Energy 333 kJ (80 kcal), Carbohydrates-17.77 g, Sugars-1.7 g, Dietary fiber-2 g, Fat-0.75 g, Protein-1.82 g, Thiamine (B1)- 0.025 mg, Riboflavin (B2)- 0.034 mg, Niacin (B3)- 0.75 mg, 0.203 mg, Vitamin B6-0.16 mg, Folate (B9)- 11 µg, Vitamin C-5 mg, Vitamin E-0.26 mg, Calcium-16 mg, Iron-0.6 mg, Magnesium-43 mg, Manganese-0.229 mg, Phosphorus-34 mg, Potassium-415 mg, Sodium-13 mg, Zinc-0.34 mg<sup>[17]</sup>.

#### **Pharmacological activities of *Zingiber officinale*:**

An ancient system of siddha medicine the plant have been used as a Stimulant, Stomachic, Carminative, Digestive, Sialogogue, Expectorant, Rubefacient. Now a days there were so many pharmacological activities have been validated for *Zingiber officinale*.

- **Hypolipidimic effect**
- **Antioxidant effect**
- **Anti microbial activity**
- **Antiviral effect**
- **Nephroprotective effect**
- **Anti-tussive effect**
- **Anticancer effect**
- **Antitumor effect**
- **Antiemetic**
- **Mutagenic effect**
- **Antiarthritic Effect**
- **Lipid Effects**
- **Immunomodulatory Effect**
- **Hepatoprotective effect**
- **Gastrointestinal Effect**
- **Cardiovascular Effect**
- **Anti-Inflammatory Effect**
- **Anticoagulant Effect**
- **Antinociceptive Effect**
- **Effect of Ginger in Migraine**

#### **Hypolipidimic effect of *Zingiber officinale*:**

The Ethanolic extract of *Zingiber officinale* was given to rabbit. Then there was a marked increase of serum, tissue cholesterol, triglycerides, serum lipoproteins, phospholipids followed by 10 weeks of feeding cholesterol. Then the Ethanolic extract of *Zingiber officinale* was fed to the rabbits. Finally the results were compared with the Gemfibrozil, which was a oral effective standard drug. The severity of the atherosclerosis was compared after treating with the extract of *Zingiber officinale*<sup>[18]</sup>.

#### **Antioxidant effect of *Zingiber officinale*:**

- *In vitro* studies for ginger was carried out to exhibit antioxidant effects<sup>[19]</sup>.
- Ginger oil had a effect of dominative protective on DNA damage which was induced by H<sub>2</sub>O<sub>2</sub>.
- Ginger oil act as a scavenger of free radical and act as an antioxidant<sup>[20]</sup>.
- (6)-gingerol which was the one of the constituent of *Zingiber officinale* have an antioxidant property to protect the HL-60 cells from oxidative stress<sup>[21]</sup>.

#### **Anti microbial activity of *Zingiber officinale*:**

[6]- gingerol and [12]-gingero were demonstrated as an antibacterial activity against periodontal bacteria. *In vitro* studies 32 [10]-gingerol were found as a active inhibitor of *M. avium* and *M. tuberculosis*<sup>[22]</sup>.

#### **Antiviral activity of *Zingiber officinale*:**

Ingenol, [6]-shogaol, which was extracted from ginger rhizome, shows the antiviral activity<sup>[22]</sup>

#### **Nephroprotective effect of *Zingiber officinale*:**

(60)-gingerol obtained from the extract of rhizomes of ginger (*Zingiber officinale*) showed a potent nephroprotective action rats with acute renal failure induced by bilateral nephrectomy<sup>[23]</sup>

#### **Anti-tussive effect *Zingiber officinale*:**

(6)-shogaol, (6)-gingerol, which was extracted from ginger rhizome has the effect of antitussive agents<sup>[24]</sup>.



**Anticancer effect of *Zingiber officinale*:**

- Vallinoids, (6)-gingerol and (6)-paradol, shogaols, zingerone, and Galanals A and B plays a role of anticancer effect.
- Galanals A and B were found as a potent apoptosis inducers of human T lymphoma Jurkat cells [25,26,27].

**Antitumor effect of *Zingiber officinale*:**

The ethonolic extract of Ginger showed a potent anti-tumor effect in a mouse of skin tumorigenesis model<sup>[28]</sup>.

**Antiemetic activity of *Zingiber officinale*:**

The anti-emetic or antinausea effects of ginger were carried through the increased gastro duodenal motility or by increasing the gastric emptying. Using gastro duodenal manometry, Micklefield et al. have demonstrated that the oral intake of ginger will gradually increases antral motility during the phase III of migrating motor complex (MMC) and thus increases the motor response of test meal in the corpus<sup>[29]</sup>.

**Mutagenic effect of *Zingiber officinale*:**

[6]-gingerol and [6]-shogaol were performed as active part in the process of mutagenesis. [6]-Shogaol showed much less mutagenic effect of ( $1 \times 10^3$  revertants/108 viable cells/700  $\mu$ M) than compared with [6]-gingerol ( $1 \times 10^7$  of the same units). Then their relative compounds shows mutagenic effects with  $4 \times 10^1$  for zingerone,  $1 \times 10^7$  for 3-hydroxymyristic acid and  $3 \times 10^2$  for 12-hydroxystearic acid<sup>[30]</sup>.

**Antiarthritic Effect of *Zingiber officinale*:**

The crude ginger extract was [6]-gingerol with their derivatives plays a role in inhibiting the joint swelling in an animal model of rheumatoid arthritis, streptococcal cell wall-induced arthritis. These extracts also have the effect of anti-inflammatory activity<sup>[31]</sup>.

**Lipid Effects of *Zingiber officinale*:**

On oral route of Ginger extracts Showed the effect of hypocholesterolemic, hypolipidemic, and antiatherosclerotic effects in cholesterol-fed rabbits<sup>[32]</sup>.

**Immunomodulatory Effect of *Zingiber officinale*:**

*In vitro* studies of ginge showed the effect of immunomodulatory, antimicrobial and antiviral agent<sup>[22]</sup>.

**Hepatoprotective effect of *Zingiber officinale*:**

(60)-gingerol obtained from the extract of rhizomes of ginger (*Zingiber officinale*) showed a potent hepatoprotective action rats with hepatic failure induced by single oral administration of CCl<sub>4</sub><sup>[23]</sup>.

**Gastrointestinal Effect of *Zingiber officinale*:**

- The extract of Ginger has been reported to inhibit the growth of *Helicobacter pylori in vitro* studies<sup>[33]</sup>.
- *In vitro* studies and animal studies have revealed the gastro protective Properties of ginger<sup>[34]</sup>

**Cardiovascular Effect of *Zingiber officinale*:**

The extract of ginger such as gingerols and shogaols exhibits cardio depressant activity at low doses and it showed the cardiotoxic properties at higher doses of drug<sup>[35]</sup>.

**Anti-Inflammatory Effect of *Zingiber officinale*:**

- Ginger has used as anti-inflammatory agents for a long history and many constituents of Ginger have been identified as a anti-inflammatory properties<sup>[36]</sup>
- Ginger plays a role in inhibiting prostaglandin biosynthesis, then interfere with the inflammatory cascade and the vanilloid nociceptor<sup>[37]</sup>.

### Anticoagulant Effect of *Zingiber officinale*:

The extract of ginger such as (8)-Gingerol, (8)-shogaol, (8)-paradol, and gingerol analogues (1 and 5) showed the effect of antiplatelet activities<sup>[38]</sup>.

### Antinociceptive Effect of *Zingiber officinale*:

The extract of ginger such as (6)-shogaol showed an anti-nociception effect by inhibiting the release of substance P in rats<sup>[39]</sup>.

### Effect of Ginger in Migraine:

The administration of ginger extract may exert the property of abortive and prophylaxis in migraine headache without any adverse effect<sup>[40]</sup>.

### Effect of safety in Ginger:

Ginger has some negative side effects allergic reaction such as rashes, heart burn, gallstones, interfere with the effects of anticoagulants such as warfarin or aspirin. It is on the FDA's "generally recognized as safe" list<sup>[41]</sup>.

### Conclusion

Herbs play a major role in treating acute and chronic diseases because of their chemical composition and lack of side effects. Ginger is a herb which has enormous medicinal uses explained in this review article. This review will give an outline of some of the pharmacological research which has been validated recently and provide footprints for clinical use.

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