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Therapeutic Potential of *Zinigiber officinale*: A Review

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Abstract: ***Zingiber officinale or more commonly known as ginger has been used in Chinese and Indian medicine over centuries and is also a common household spice found in those regions. It is known to treat gastrointestinal complaints, nausea and vomiting. Ginger also has an anti-inflammatory action which has proven effective in treating arthritis. Furthermore, it has been found to help improve iron absorption in patients with iron deficiency anaemia and has a hypoglycemic effect. Ginger is a natural remedy for many illnesses and diseases with no known side effects. Ginger contains 80.9% moisture, 12.3% carbohydrates, 2.3% protein, 0.95% fat, 1.2% minerals and 2.4% fibre. Minerals present are iron, calcium and phosphorus, while vitamins are thiamine, niacin, riboflavin and vitamin C. The major active component in fresh ginger is gingerol and in dried ginger is shagaol which is a dehydrated product of gingerol. There's 1-3.5% of volatile oils, primarily sesquiterpenes such as bisabolene, zingi-benene, camphene and acurcumene. Also, 6-10% of lipids comprised of triglycerides, phosphatidic acid, lecithins and free fatty acids. In this article, the therapeutic benefits of Zingiber officinale is reviewed.***

Keywords: Ginger, nausea, vomiting, anaemia, anti-inflammatory

1. Introduction

Ginger is a rhizome commonly used in Indian and Chinese traditional medicine as well as cooking. Scientifically named as *Zingiber officinale* but more commonly known as ginger. It belongs to the botanical family *Zingiberaceae* and is closely related to two other spices, turmeric and cardamom. *Zingiber officinale* is the only medicinal plant in the *zingiber* species. It is widely grown in Asia, Africa, India, Jamaica, Mexico and Hawaii. India is now leads in the global production of ginger. Ginger is a creeping perennial on a thick tuberous rhizome which spread underground. It grows up to one to three feet in height with the stem surrounded by sheathing bases of the two-ranked leaves. The flowers are club-like spikes of yellowish and purple lipped with greenish yellow bracts beneath it.

Figure 1: Ginger rhizome

Figure 2: Ginger plant

Ginger contains 80.9% moisture, 12.3% carbohydrates, 2.3% protein, 0.95% fat, 1.2% minerals and 2.4% fibre. Minerals present are iron, calcium and phosphorus, while vitamins are thiamine, niacin, riboflavin and vitamin C.[1] The major active component in fresh ginger is gingerol and in dried ginger is shagaol which is a dehydrated product of gingerol. Both gingerol and shaogaol are oleoresins which constitutes about 4-7.5% of ginger. There's 1-3.5% of volatile oils, primarily sesquiterpenes such as bisabolene, zingi-benene, camphene and acurcumene. Also, 6-10% of lipids comprised of triglycerides, phosphatidic acid, lecithins and free fatty acids.[15]

Nausea and Vomiting

Acetone and ethanolic extracts of ginger has an anti-emetic effect against cisplastin-induced emesis in dogs. Ginger extracts and juice has also been seen to reverse cisplastin-induced delay in gastric emptying in rats. Hence, ginger can

be used as an anti-emetic for cancer chemotherapy and may be useful in improving the gastrointestinal effects of cancer chemotherapy.[2] Ginger can reduce the severity of symptoms of nausea, dry retching and vomiting commonly seen in early pregnancy and also presents patients with an alternative choice of treatment for the management of their symptoms.[3]

Iron Deficiency Anaemia

Ginger and iron supplements simultaneously given to patients with iron deficiency anaemia showed a result of a higher haemoglobin, iron and ferritin levels after 30 days compared to patients treated with just iron supplements. Ginger contains iron and vitamin C. Vitamin C aids in the absorption of non-heme iron. Ginger also reduces the severity of side effects caused by iron supplements such as nausea, gastric discomfort and constipation.[4]

Diabetes

Gingerol and shagoal present in ginger has the ability to inhibit α-glucosidase, which gives it an anti-diabetic effect. It also mildly inhibits α-amylase which is useful, as excessive inhibition of α-amylase could cause abnormal bacterial fermentation of undigested carbohydrates in the colon.[5]Fresh ginger juice produced a marked decrease in blood glucose levels in alloxan induced diabetic rats.Hypoglemic effect was better with ginger extracts than glibenclamide and metformin in diabetic rats with improved oral glucose tolerance.[6]

Migraines

Ayurvedic system of medicine states that ginger is useful in neurological disorders. Migraine is considered as a neurological disorder with some vascular phenomenon. Ginger may exert abortive and prophylactic effects in migraine headaches without any side effects.[7]

Gastric Ulcers

Ginger prevents the occurrence of gastric ulcers induced by nonsteroidal anti-inflammatory drugs and hypothermic restraint stress. Therefore, suggestive of cytoprotective and anti-ulcerogenic effect of ginger.[8] 6-gingesulfonic acid was isolated from the dried rhizome of ginger which is a new anti-ulcer principle that showed more potent anti-ulcer activity than 6-gingerol and 6-shogaol.[9]

Primary Dysmenorrhea

Administration of 1500mg of ginger powder daily for 3 days is a safe and effective way to produce analgesia in patients with primary dysmenorrhea. Consumption of ginger 2 days before the onset of the menstrual cycle was significantly better at decreasing the duration of pain. The inhibition of prostaglandin synthesis may be the mechanism for ginger's effect on the on menstruation pain.[10]

Anti-Microbial

It has a strong anti-bacterial and mild anti-fungal action. It inhibits the growth of Escherichia coli, Proteus sp., Staphylococci, Streptococci and Salmonella.[11]It inhibits a fungus aspergillus which has been known to produce aflatoxin, a carcinogen.[12] Ginger also inhibits *A. niger, S. cerevisiae, Mycoderma sp.* and *L. acidophilus.*

Anti-Inflammatory

Ginger suppresses inflammatory responses by reducing oxidative stress and its inhibitory effect COX enzyme.[5] Oral administration of eugenol and ginger oil to arthritis induced rats showed significant suppression of paw and joint swelling. Therefore, researchers concluded to it having anti-inflammatory properties.[13]In a study, it was found that ginger extract and ibuprofen had the similar efficacy in the pain level in patients with osteoarthritis. Ginger extract could be used as an alternative drug to NSAIDs and as a supplement drug in patient with osteoarthritis.[14]Ginger therapy consisting of a warm foot bath, resting 30 minutes supine with a ginger compress in place on the kidney region, followed by rest for 15 minutes has been proven to be a potentially significant treatment in osteoarthritis.[15]

Anti-Cancer

Phenolic compounds in ginger such as shagaol and gingerol have been shown to have anti-cancer effects.[16]Ginger extract was shown to reduce the incidence of liver neoplasm in rats. It is able to block the elevated expression of Nuclear Factor Kappa B (NFκB), therefore inhibiting the growth of tumour cells, also blocking metastasis and angiogenesis. Hence, ginger extract may have a chemotherapeutic effect in the treatment of cancer of the liver.[17]

2. Conclusion

Ginger is found to be a natural remedy for many diseases and conditions. Furthermore, as it has virtually no known side effects, it can be used safely and as an alternative method of medication for patients. More studies should be done with ginger and commercially available capsules should be available for consumption.

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