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Review Article

Pharmacognostic study of zingiber officinale

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ABSTRACT

Ginger is scientifically known as Zingiber officinale. Zingiber officinale {ginger} widely used in pharmaceutical approach. 6-shogaol, 6-paradol,6-gingerole,zerumbone and zingerole are some active ingredients available in ginger. Ginger has been used commonly to treat diarrhea, indigestion, nausea, heart burn, cough, bronchitis, asthma, diabetes and menstrual irregularities. It consist of 80% moisture, 2% protein, 2% fiber, 1% mineral, 0.9% fat, 12% carbohydrate, volatile oil 1.9%. Volatile oil in ginger contain a-Pinene, camphene, o-Phellandrene, zingiberene, o-bisabolene, geranial.
Ginger mostly preferred warm, humid climate for cultivation. It can be grown both under rain fed and irrigated conditions. Ayurveda literature preferred administration of ginger in both of communicable and non-communicable diseases.

1. Introduction

Ginger is subtropical plant grown for its root, ginger rhizomes can be white, yellow and red in colour depend on its varity.[1] The top producing countries of ginger are India, China, Fiji, Indoneshia and Peru. In India and china fresh ginger use as flavouring agent in preparation of vegetables and meat products.[2] Ginger used for treatment of many diseases such as arthritis and rheumatism, indigestion, constipation, and ulcer, atherosclerosis and hypertension, vomiting, cancer. Digestive system is important parts of the body.[3] The digest tract including oral cavity, esophagus, stomach, small and large intestine, rectum and finally end with.[4] Due to GI track infection, smoking, drinking, gender, age, fatty diet The GI cancer is occurs.[5] It can cause mild side effects including heartburn, diarrhea, burping, and general stomach discomfort.[6] In western cuisine, ginger is mostly used in sweet application such as ginger ale, ginger bread, ginger snaps, parkin.[7]

Figure 1:

1.1. Taxonomy, distribution, and botanical description

1. Kingdom: Plantae
2. Division: Magnoliophyta

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3. Class: Liliopsida
4. Order: Zingiberales
5. Family: Zingiberaceae
6. Genus: Zigiber
7. Species: Zigiber officinale var. Roscoe

Figure 2: Properties of ginger

1.2. Organoleptic properties

1. Taste: Bitter
2. Shape: Nodule
3. Colour: light brown
4. Odour: Characteristic
5. Size: Rhizomes are 2 5 -7 5 cm in lenghth
6. Fractura: Easy and splintery
7. Surface: Irregular

1.3. Physicochemical properties

1. Ash: 1 02 g/100g
2. Moisture: 98 23 g/100g
3. Protein: 0 02 g/100g
4. Crude fiber: 0 00g/100g
5. Carbohydrate: 0 22g/100g
6. Energy: 5 40g/100g

1.4. Solubility

Soluble: chloroform, carbon tetra chloride, diethyl ether, n-hexane,100% alchohol

Insoluble: water.[8]

1.5. Therapeutic properties of ginger

1. Antioxidant Activity
2. Antifungal Activity
3. Antibacterial Activity
4. Antinflammatory Activity
5. Anti-Cancer Activity

Chemical constituents:[9]

1. 6-paradol
   (a) Molecular formula=C17H26O4
   (b) Molecular weight =278.392g/mol
2. 6-shogaol[10]
   (a) Molecular formula =C17H24O3
   (b) Molecular weight=276.4g/mol
3. 6-gingerol
   (a) Molecular formula =C17H24O4
   (b) Molecular weight =294.4 g/mol
4. Isolation of 6 gingerol
   Maximum yield of 6-gingerol was obtained with 80% ethanol as extracting solvent at 30°C. We obtained increased yield (7%) of extraction by pretreatment with ultrasonication.[11]
5. Zerumbone
   (a) Molecular formula =C15H22O
   (b) Molecular weight = 218.3 g/mol

2. Isolation of Zerumbone

Was isolated from fresh rhizomes of Zingiber zerumbet Smith in yields of 0.3-0.4% by simple steam distillation and recrystallization.[12]

2.1. Antioxidant activity

Z. officinale is effective in parkinsons disease. Antioxidant stabilize free radicals before they attack target in biological cell. For energy production generated during the process of oxidation,some free radicals are essential. Increases in the production of free radicals show oxidative stress that can lead to damage to DNA.[13] It has powerful antioxidant activity due to its oil which has a protective effect on DNA damage.[14] Ginger show antioxidant effect in human chondrocyte cell. The ginger extract showed antioxidant effect in inhibiting DPPH radical, IC 50 was 4.25 mg /ml. DPPH analysis is one of the test use to prove the ability cof the components of the ginger extract to act as donar of hydrogen atoms.[15] It inhibits an enzyme, namely, xanthine oxidase, which ismainly involved in the generation of reactive oxygen species. Antioxidant activity of the plantsis due to the presence of flavones, isoflavones, flavonoids, anthocyanin, coumarin lignans, catechins and isocatechins.[16]

2.2. Antifungal Activity

The antifungal principle of ginger are Gingerols and gingerdiol. Ginger powder is effective in several antifungal disease (Ernst and Pittler, 2004: Ramkisson et at 2012).

2.3. Antidiabetic activity

In diabetes, many studies show that ginger and other plants have effective both preventively and therapeutically. Diabetes is major global health problem in worldwide. The cause of diabetes is low insulin.[17] A study show that ginger increase update of glucose into muscles cell without using insulin.[18] Ginger also protect a diabetics liver, kidney and central nervous system. In Australia, the university Sydney found ginger was effective in glycemic control for people with type 2 diabetes. In high fat diets the ethanolic extract of ginger was found to reduced total cholesterol, body weight, triglycerides, LDL cholesterol, insulin, glucose, free faty acids and phospholipid.[19]

2.4. Antibacterial activity

Ginger has strong antibacterial properties. Ginger show antibacterial effect on both gram (+ve) and gram(-ve) bacteria. Ginger gives antibacterial activity against Escherchia coli, Salmonella enteriditis and Staphylococus Aureus. Main components,including –gingerol and[20] –gingerol, isolated from ginger rhizome displayed antibacterial activity aginst periodontal bacteria.

2.5. Anti-Inflammatory activity

Z. officinale is highly effective in inflammations associated with alimentary canal. Ginger is useful in treating inflammation, pain and rheumatism.[21] Thomson et al.2002, Wigler et al.2003. Ramadan et. Al 2011, Funk et al. 2016. Clinically investigated the safety and effectiveness of ginger.[22] Ginger and its derivatives are used in many countries to boost the immune system.{22} In ancient herbs use to support the body's immune response, ginger has the capacity to reduce inflammation, swelling, and discomfort.[23] First group to investigate the effect of ginger on platelet, aggregation by using four ginger extract, produced using different solvent i.e.aqueous, n-hexane, chloroform and ethyl acetate.[24]

2.6. Anti-cancer

Z. officinale exhibits anti-inflammatory and anti-tumorigenic effects. Ginger is effective in preventing growth of cancer has been studied in a variety of cancer types, including colorectal cancer, breast cancer, lymphoma, hepatoma, skin cancer, liver cancer.[23] Preclinical studies have shown that ginger extract and its constituents posses chemopreventive and antineoplastic properties in gastric cancer.[25] A component of Asian ginger, zerumbone, also inhibits growth and proliferation of pancreatic cancer through different mechanisms. In animal model, ginger suppresses ethionine –induced liver carcinogenesis by scavenging the free radical formation and by reducing lipid peroxidation, thus ginger prevents rat hepatocarcinogenesis.[26]

2.7. Side Effect

In generally Z. officinale is considered safe for use .There is a slight risk of toxicity in normal doses, but some people may have indigestion.[17] Use ginger with caution in people with liver disorder or liver disease who have been exposed before.

2.8. Land preparation

Prepare field by ploughing land two-three times. After ploughing do planking operation. For turmeric planting, beds of 15 cm in height, 1cm width and of convenient length are prepared. Keep distance of 50 cm between beds.[27]

3. Sowing

3.1. Time of sowing

Sowing is done by first weak of May – June.

3.2. Spacing

Deep plant distance of 15-20 cm between the row and 30 cm between two plant.

3.3. Sowing depth

Depth should be near about 3-4 cm.

3.4. Method of sowing

Direct sowing also transplanting method is used for planting**.**

3.5. Seed rate

For sowing, select fresh and diseased free rhizomes (mother rhizomes as well as fingers) are used. Seed rate of 480-720 kg is sufficient foe sowing one acre land.

3.6. Seed treatment

Before sowing carry out rhizomes treatment with Mancozeb@3 gm/ltr of water. Dip rhizomes for 30 min in solution. It will protect rhizhomes from fungal infestation. After treatment dry rhizomes in shade for 3-4 hours**.**

3.7. Harvesting

In 8 months crop is ready for harvesting. For fresh spice purpose, ginger is harvested from 6th month and if it is to be used for processing, then it is harvested after 8 months. Right time for harvesting of ginger is when leaves gets yellow and dry out completely. Remove rhizomes by dugging and after harvesting clean rhizomes by thoroughly

washing in water for 2 to 3 times. Then dry them in shades for 2-3 days.

3.8. Post harvest

For dry ginger purpose, only the outer skin is to be peeled and then dried in the sun for a week. Outer skin is removed with help of special knife or split bamboos with pointed end.{38} yield of dry ginger is about 16-25% of green ginger.

3.9. Storage

Fresh disease free rhizomes are selected then treated with solution of carbendazim+macrozeb@40gm/10 ltr of water for 30 min. It will prevent rotting of rhizomes in storage. Then dry the rhizomes in pit of convenient size, covered with plank having 2-3 holes for aeration. But storing rhizomes in pit, spread 1 inch thickness sand layers.

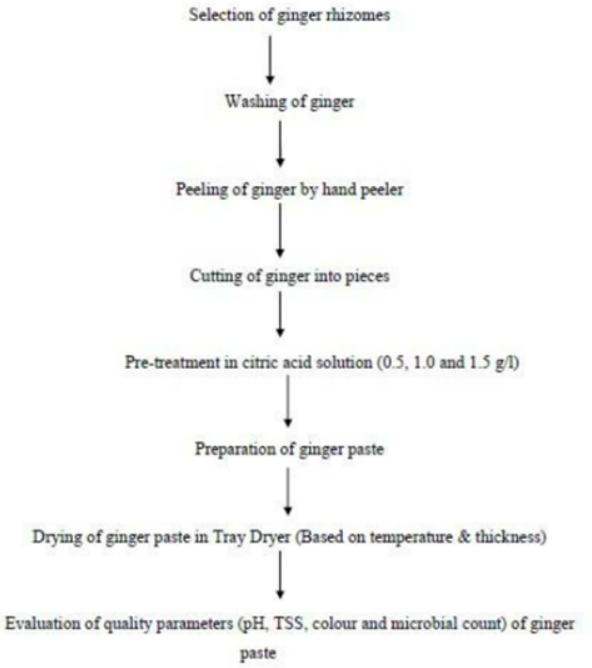

Figure 3: Process: [19]

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6. Conflict of Interest

None.

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