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# Pharmacognostical and Phytochemical Evaluation of Ginger Officinale

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## INTRODUCTION

**Medicinal plants**, also called **medicinal herbs**, have been discovered and used in traditionalmedicinepractices since prehistoric times. Plants synthesize hundreds of chemical compounds for various functions, including defense and protection against insects,fungi,diseases, and herbivorous mammals.[1]

**Introduction of Ginger**

The Ginger (Zingiber officinale) are the flowering plants rhizome, ginger root or ginger, it is broadly use for spice and a phytomedicine. The ginger are leafy steam and yellowish green flowering plant. The ginger are spice plant, then the spices comes from the roots of the plant. The ginger is domestic to warming parts of Asia such as Japan, China and India, but these are growing parts of South America and Africa. It is used as medicine and with food in the Middle East.[2]

**Fig no 1. Ginger**

The ginger is introduced in Mediterranean in 1st century in Japan, 11th century in England and

America in 1585. It is broadly cultivated in subtropical and tropical area's in the world but most of the cultivates in Asia and Africa. Ginger is basically used in flavoring agent for foods and used as spice.

## VASCULER NAME

*International Common Names*

- **English:** common ginger; garden ginger; true ginger
- **Spanish:** gengibre; Jengibre; jenjibre dulce; kion
- **French:** gingembre; gingembre chinos
- **Chinese:** jiang
- **Portuguese:** gengibre-comum

*Local Common Names*

- **Bulgaria:** dzhindzhifil
- **Cambodia:** chnay; khnhei; khnhei phlung
- **Croatia:** dumber

- **Ecuador:** agiringuire; sacha ajo
- **French Polynesia:** rea moru; rea tinito; re'a-ma'ohi; re'amoruru
- **Germany:** Ingwer
- **Guam:** asngod; hasngot
- **India:** aale; ada; adi; adrak; adraka; adu; aduwa; alha; allam; inchi; inji; shing;shonti; shunthi; sunth
- **Indonesia:** atuja; beuing; jae; jahe; jahi; lia
- **Italy:** Zenzero
- **Japan:** oshoga
- **Korea, Republic of:** saeng gang
- **Laos:** khi:ng
- **Malaysia:** haliya; jahi
- **Morocco:** kenjabil
- **Myanmar:** gyin
- **Netherlands:** djahe; Gember
- **Palau:** kesol ra ngebard; sionga
- **Papua New Guinea:** kawawar; kawawari
- **Philippines:** baseng; laya; luya

**Slovakia:** dumbier lekartsvy

- **Sweden:** Ingefaera
- **Thailand:** khing; khing-daeng
- **Vietnam:** cay gung

## ORGANOLEPTIC PROPERTIES

- **Colour -** Yellowish green
- **Odour -** Aromatic
- **Taste** - Spicy, pungent, bitter
- **Height** - Upto 1m
- The plant of ginger grow upto 1m height.
- Its leaves are the 6-12 inches long.
- The flowers of ginger is green purple color of it’s terminal spikes.
- The rhizomes of ginger is buff colored.

**MICROSCOPIC PROPERTIES**

**1]** **Cork –** The two cork are present in ginger.

- **Outer cork –** It may present some layer, which is dark brown in color, it is made up ofirregular parenchymatous cell.
- **Inner cork -** It may be present some layer,which is colorless , parenchmatous cell radially arranged in regular rows.

**2]** **Cortex –** It is consist for the thin walled , cellulosic , rounded parenchyma withintercellular spaces.

- Parenchyma cortex is consist of starch grains.
- Closed collateral fibro Vascular bundles are present in the cortex.
- Brown oleoresin cells is present.

**3]** **Style-** Vascular bundle rings is just under the endodermis, ground tissue of parenchymatous cell are consist fibro vascular bundle, oleoresin cells and starch.

**4]** **Xylem vessels –** Annual, spiral or reticulate thickenings un lignified.

**5]Fibres –** lumen lignified with pectosic transverse septa, thin walled with only centra.

## CULTIVATION

The ginger is vascular plant that grow up to 1m .This is cultivated on height of 600 to 1500m above sea level. The rhizomes are cut in pieces and it's cultivates than the all piecescontinue a bud is planted into trenches in well drained and loamy soil in March or April months. The plant of ginger is required to the 80cm rainfall annually and if rainfall the sufficient water are supplied by watering. The collection of ginger is done in December or January for the plants dry up after flowering period.

The rhizomes of ginger are thecarefully discover , lofty steams , fibrous roots and buds are removed. The ginger is washed and remove mould and soil . The rhizomes on flat surface as well as washed thoroughly between the running water. These is dried completed by keeping the sun rays, it is covered over night, and in rainy and cloudy seasons. The moisture are present in ginger, the drug may become moulds, after drying ginger is loses above 70% of it's weight.

**History and origin:**

Ginger first appeared in the southern parts of the ancient China. From there, it spread to India, Maluku Islands (socalled Spice Islands), rest of the Asia and West Africa. Europe saw ginger for the first time in the 1st century when the ancient Romans traded with the India.Ginger, (Zingiber officinale), herbaceous perennial plant of the family Zingiberaceae, probably native to southeastern Asia, or its aromatic, pungent rhizome (underground stem) used as a Spice, flavouring, food, and medicine. An early form of gingerbread can be traced to the ancient Greeks and Egyptians who used it for ceremonial purposes. Gingerbread made an appearance in Europe when 11thcentury Crusaders brought ack ginger from the Middle East for the aristocrats' cooks to experiment with ..The first written record of Ginger comes from the Analects of Confucius, written in China during the Warring States period (475–221 BC). In it, Confucius was said to eat ginger with every meal. In 406 AD, the monk Faxian wrote that ginger was grown in pots and Carried on Chinese ships to prevent scurvy .During the Song Dynasty (960–1279), ginger was being imported into China from southern countries. Ginger first appeared in the southern parts of the ancient China.[3]

**Chemical Compositions :**

Chemical analysis of ginger shows that it contains over 400 different compounds. … Ginger, ginger rhizome, and its major active components: 6- gingerol, 6-shogaol, and 6-paradol. The aromatic constituents include zingiberene and bisabolene, while the pungent constituents are known as gingerols and shogaols. Ginger extract reduces biofilm formation for various bacteria including some Grampositive (e.g., Staphylococcus aureus and Bacillus megaterium) and Gram-negative bacteria (e.g., Escherichia coli and Pseudomonas aeruginosa).Ginger extract reduces biofilm formation for various bacteria including some Gram-positive (e.g., Staphylococcus aureus and Bacillus megaterium) and Gram-negative bacteria (e.g., Escherichia coli and Pseudomonas aeruginosa).The major constituents in ginger rhizomes are carbohydrates (50–70%), lipids (3–8%), terpenes, and phenolic compounds .Terpene components of ginger include zingiberene, β- bisabolene, α- farnesene, β-sesquiphellandrene, and α-curcumene, while phenolic compounds include gingerol, paradols, and shogaol.The ginger oil contains a mixture of constituents such as monoterpenes, namely phellandrene, camphene, cineole,linalool, limonene, citral, geraniol, citronellol, borneol and sesquiterpenes, namely α-zingiberene, arcurcumene, β-bisabolene, β-sesquiphellandrene, zingiberol and zingiberenol along with some aliphatic aldehydes and alcohols. The characteristic fragrance and flavor of ginger result from volatile oils that compose 1-3% of the weight of fresh ginger, primarily consisting of zingerone, shogaols, and gingerols with -gingerol (1-[4'-hydroxy-3'-methoxyphenyl]-5-hydroxy- 3-decanone)

**Pharmacological Activities Of Ginger**

The pharmacological actions of ginger and compounds isolated therefrom include immuno- modulatory, anti-tumorigenic, anti-inflammatory, anti-apoptotic, anti-hyperglycemic, anti- lipidemic and anti-emetic actions.

**Introduction on Crude Drug :**

Crude drugs are vegetable or animal drug that contain natural substances that have undergone only the process of collection and drying. The term natural substances refers to those substances found in nature that have not had man- made changes made in Their molecular structure. They are used as medicine for human being and animal, Internally and externally for curing disease, e.g., Senna and Cinchona. A crude drug is any naturally occurring, unrefined substance derived from organic or inorganic sources such as plant, animal, bacteria, organs or whole organisms intended For use in the diagnosis, cure, mitigation, treatment, or prevention of disease in humans or other animal.[5]

**Evaluation Of Crude Drug :**

Evaluation ensure the identity of drug and determines the quality and purity of drugs. The main reasons behind the need for evaluation of crude drugs are biochemical variation in the drug, effect of treatment and storage of drugs, and the adulterations and substitutions.[6]

**Drug Profile**

**Fig No. 4 Ginger Officinale**

**Name:** Ginger

**Synonyms :** Black ginger, Cochin ginger,Gegibre, Ingwer, Jamaican ginger.

**Botanical source:** Zingiber officinale

**Family:** Zingiberaceae

**Part use:** Rhizomes

**Morphology:** The whole rhizome has a firm, striated texture. It is 5 to 15cm long, 1.5to 6cm wide, 2cm thick and depending on the variety can be yellow, white, or red in colour. **Chemical constituents:** Gingerols, shagoals, bisapolene, zingiberene, Zingiberol, sesquiphellandrene, curcurmene6dehydrogingerdione, galanolactone, gingesulfonic acid, zingerone, geraniol, neral,monoacyldigalactosylglycerols, gingerglycolipids.

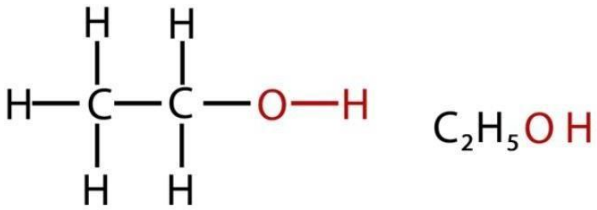
Ginger (Zingiber officinale) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. It is a herbaceous perennial which grows annual pseudostems (false stems made of the rolled bases of leaves) about one meter tall bearing narrow leaf blades. The inflorescences bear flowers having pale yellow petals with purple edges, and arise directly from the rhizome on separate shoots

**Drug Profile**

**Name –**Ethanol

**Synonyms-** Ethanol alcohol, Grain Alcohol

**Chemical Formula –** C2H6O




**Structure**

**Properties**

**Molar mass-** 46.069g mol

**Appearance -** Colour less liquid

**Odor -** Wine like, pungent **Density -** 0.78945g/ $CM^3$

**Melting Point -**114.1 **Boiling point -** 78.37 C

**Solubility in water –** Miscible

**Vapor pressure –** 5.95kPa

**Acidity –** 15.9

**Refractive index –** 1.3611

**Drug Profile**

**Fig No 6. Eugenol**

**Botanical Name**- Syzygium aromaticum

**Synonyms** –Clove Oil

**Botanical Source –** Clove Bud, Cinnamon Bark and leaves, Tulsi Leaves.

**Family –** Mirtaceae

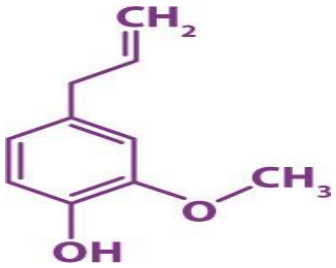
**Appearance –** Colour less pale yellow

**Odor –** Pungent, Clove Leaves **TasteBoiling – Point** spicy - 254 ◦C

**Melting Point** - -7.5 C **Molar mass –** 164.2g/ mol **Density –** 1.06g/ $CM^3$ **Formula –** C10H12O2

**Solubility –** Miscible in alcohol, ether, chloroform

**Structure** -




Eugenol, also called clove oil, is an aromatic oil extracted from cloves that is used widely as a flavoring for foods and teas and as an herbal oil used topically to treat toothache and more rarely to be taken orally to treat gastrointestinal and respiratory complaints. Eugenol in therapeutic doses has not been implicated in causing serum enzyme elevations or clinically apparent liver injury, but ingestions of high doses, as with an overdose, can cause severe liver injury.

**Uses of Eugenol**

- Used as food flavouring clove which is very aromatic, has a fine flavour and imparts warming qualities.
- Used as an inhibitor for additional polymerizing resins and can interfere with subsequent use of resin cement.
- Used as a dental obtundent by dentists and as a topical anaesthetic used extensively to replace clove oil.
- Zinc oxide eugenol cement is one of the oldest used cement. It is only a mild irritant to the pulp, less soluble in oral fluids and produces a better marginal seal.

**Pharmacognostical evaluation**

Pharmacognosy is the study medicines derived from natural sources.The study of physical, chemical,biochemical and biological properties of drugs, drug substances or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources is the definition given by the American society of Pharmacognosy. It is the oldest of all pharmacy sciences. The name

‘Pharmacognosy’ was derived from the Greek pharmacon a drug, and gignosco, acquire knowledge

(the entire meaning of drugs).Pharmacognosy is related to both botany and plant chemistry

‘phytochemistry' , and its history entitles it to be regarded as parent of both.

Pharmacognostical evaluation represents valuable information regarding the morphology, microscopical, macroscopical and physical characters of crude drugs and thus gives the scientific information regarding the purity and quality of crude drugs.[8]

**Collection**

The dried rhizomes of the zingiber officinale was collected from local market. A herbarium sheet was prepared to authenticate the rhizome of ginger and deposited in Botanical Survey of India. A voucher specimen number is SDPZO – 1. Plant material was dried under shed at room temperature and coarsely powdered moderately and passes through sieve

**Materials and Methods :-**

**Macroscopical Characters:-**

The rhizomes are 5 to 15 cm long, 3 to 6 cm wide, and about 1.5 cm thick. The Jamaica ginger occurs as branches. It has a sympodial branching and the outer surface has buff yellow colour with longitudinally striated fibres. Small circular depressions at the portion of the buds are seen and fractured surface shows narrow bark, a well-developed endodermis, and a wide stele, with scattered small yellowish points of secretion cells and grayish points of fibrovascular bundles. The ginger has agreeable and aromatic odour and pungent and agreeable taste.

The rhizomes of zingiber officinale was collected and macroscopical characters like shape , colour , structure and pattern were studied.

**Microscopical Evaluation :-**

The cork is the outermost layer with irregular parenchymatous cells and dark brown colour. The inner cork is few layered, colourless parenchymatous cells arranged in radial rows. Cork is absent in Jamaica ginger. Phellogen is indistinct and the cortex consists of thin-walled rounded parenchyma with intercellular spaces consisting of abundant starch grains. The starch grains are simple, ovate, or sac shaped. Numerous yellowish brown oleoresin are also present along with the collateral fibro vascular bundles. The endodermis is distinct without starch and consists of single layer of tangentially elongated cells containing suberin. Just below the endodermis it has the ground tissue, a ring of narrow zone of vascular bundle which is not covered with sclerenchymatous fibres. The ground tissues contain the large parenchymatous cells rich in starch, oleoresin, fibrovascular bundles. The phloem has well-developed sieve elements, and the xylem consist of vessels, tracheids either annual or spiral, or reticular in nature without lignin. The fibres are unlignified, pitted, and separate.[9]

**Process of TS of Ginger:-**

Make small pieces or scrapping of roots or rhizomes and boil them for 3 – 5 minutes in caustic alkali or in nitric acid and then make pressed specimen and immerse them in glycerol.

For microscopic studies, transverse sections (TS) were prepared, stained and observed under microscope. The microscopic character of the rhizome powder was also observed. Photomicrographs were obtained by observing under compound binocular microscope and the figures were drawn with the help of camera lucida.

**Physicochemical parameters :-**

**Foreign matter :-**

The sample shall be free from visible signs of mold growth, sliminess stones, rodent excreta, insects or any other noxious foreign matter when examined as given below.

Take a representative portion from a large container, or remove the entire contents of the packing if 100 g or less, and spread in a thin layer in a suitable dish or tray. Examine in daylight with unaided eye. Transfer suspected particles, if any, toa petri dish, and examine with 10x lens in daylight.

**Loss on drying :-**

Place about 10 g of sample (without preliminary drying) after accurately weighing (accurately weighed to within 0.01 g) it in a tared evaporating dish. For example, for unground or unpowderd drug, prepare about 10 g of the sample by cutting shredding so that the parts are about 3 mm in thickness.[10]

**Total ash value :-**

Incinerate about 2 to 3 g accurately weighed, of the ground drug in a tared platinum o silica dish at a temperature not exceeding 450 until free from carbon, cool and weigh. If a carbon free ash cannot be obtained in this way, exhaust the charred mass with hot water, collect the residue on an ash less filter paper, incinerate the residue and filter paper, add the filtrate evaporate to dryness, and ignite at a temperature not exceeding 450". Calculate the percentage of ash with reference to the air-dried drug

**Water soluble ash :-**

Boil the ash for 5 minutes with 25 ml of water; collect insoluble matter in a Gooch crucible or on an ashless filter paper, wash with hot water, and ignite for 15 mìnutes at a temperature not exceeding 450". Subtract the weight of the insoluble mater from the weight of the ash; the difference in weight represents the water-soluble ash. Calculate the percentage o water-soluble ash with reference to the air-dried drug.

**Acid insoluble ash :-**

To the crucible containing total ash, add 25 ml of dilute hydrochloric acid. Collect the insoluble matter on an ashless filter paper (Whatman 41) and wash with hot water until the filtrate is neutral. Transfer the filter paper containing the insoluble matter to the original crucible, dry on a hot-plate and ignite to constant weight. Allow the esidue to cool in a suitable desiccator for 30 minutes and weigh without delay. Calculate the content of acid-insoluble ash with reference to the air-dried drug.

**Alcohol soluble extractive value :-**

Macerate 5 g of the air dried drug, coarsely powdered, with 100 ml of alcohol the specified strength in a closed flask for twenty-four hours, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105', to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

**Water soluble extractive value :-**

Proceed as directed for the determination of alcohol-soluble extractive, using chloroform-water instead of ethanol.[11]

**Moisture content :-**

Place about 10 g of sample (without preliminary drying) after accurately weighing (accurately weighed to within 0.01 g) it in a tared evaporating dish. For example, for unground or unpowderd drug, prepare about 10 g of the sample by cutting shredding so that the parts are about 3 mm in thickness.

**Phytochemical Evaluation**

Phytochemicals means plant chemicals. They are naturally occurring in plants.They give plants its colour, flavor, smell and are part of a plants natural defence system (disease resistance). The phytochemicals are bioactive, non nutrients plant compounds in fruits, vegetables, grains and other plant foods that have been linked to reducing the risk of major degenerative diseases.

In plants phytochemicals attract beneficial and repel harmful organizms, serve as photo protectant, and respond to environmental changes. They work together with nutrients and dietary fibres to protect the body against diseases, slow the aging process and reduce the risk of many diseases such as cancer, heart disease, stroke, high blood pressure, cataracts, osteoporosis and urinary tract infection. Alkaloids have analgesic effects, glycosides are used in cardiac diseases, tannins prevent urinary tract infection by preventing bacteria from adhering to the walls. Tannins , along with vitamin c help build and strengthen collagen. Saponins serve as natural antibiotics, which help body to fight infections and microbial invasions. They also enhance the effectiveness of certain vaccines, lower cholesterol and knock out some tumor cells. Flavonoids have antioxidant activity in biological systems and protect the body against allergies, inflammation, free radicals, platelet aggregation, microbes, ulcers, hepatitis viruses and tumors. The flavonoid quercetin is known for its ability to relieve hey fever, sinusitis and asthma while certain flavonoids also can protect low density lipoprotein from being oxidized, thereby playing an important role in atherosclerosis.

**Materials and Methods Collection:-**

The dried rhizomes of the zingiber officinale was collected from local market during the month of January 2023. The fresh rhizomes of wet ginger were purchased from the market. Then rhizomes were chopped into small pieces after that sun dried for a week and dried at 50 C in hot air oven for 6 hours. If a moisture is present, it may become a moldy after a drying it loses about 70% of its weight. Then dried rhizomes were grounded and fine powder formed.[12]

**Preparation of Extract :-**

Ethanol extract of the zingiber officinale.

The method of preparation of extract.

**1.Maceration**

**Extraction by maceration:-**

50 gm of fresh ginger root was soaked in 250 ml of absolute ethanol in Becher for 72 hour.. After 72 hours, the whole mixture was filtered to remove residue completely.

**Preliminary Phytochemical Screening :-**

Phytochemical tests were done to find the presence of the active chemical constituents such as alkaloids , flavonoids , glycosides , triterpenoids , steroids , tannin and phenols , reducing sugar , carbohydrates , protein and amino acids by the following procedures.[13]

**Test for alkaloids:-**

To the extract , dilute hydrochloric acid was added , shaken well and filtered . With the filtrate following tests wwere performed.

**Mayers reagent test :-**

To 3 ml of filtrate , few drops of mayers reagent were added along the sides of tube. Formation of creamy precipitate indicates the presence of alkaloids.

**Hagers reagent test :-**

To 3 ml of filtrate , few drops of the dilute hydrochloric acid and few drops of Hagers reagent were added. Formation of yellow precipitate indicates the presence of alkaloids.

**Test for carbohydrates**

**Barfoeds reagent test:-**

Equal volume of the extract and the barfoeds reagent were added in test tube. Formation of red colour indicates the presence of carbohydrates.

**Molisch test :-**

2 ml of aqueous extract was treated with alcoholic alpha-napthol solution in a test tube and then 1ml of concentrated sulfuric acid was added along the sides of test tube. Formation of violet ring at the junction indicates the presence of carbohydrates.

**Test for reducing sugar**

**Benedict's test :-**

Equal volume of Benedict reagent and the extract were mixed in a test tube and heated in water bath for 5 to 10 minutes.

**Test for Flavonoids**

**Alkaline reagent test:-**

The extract was treated with few drops of the sodium hydroxide solution separately in a test tube. Formation of intense yellow colour, which become a colourless on addition of few drops of dilute acid indicates the presence of the flavonoids.

**Lead acetate test:-**

The extract was treated with lead acetate solution, the formation of yellow precipitate indicates the presence of flavonoids.

**Tests for glycosides**

**Borntragers test :-**

To 3ml of test solution, dilute sulphuric acid was added. Boiled for 5 minutes and filtered. To the cold filtrate, Equal volume of benzene or chloroform was added and it was shaken well. The organic solvent layer was separated and ammonia was added to it. Formation of pink to red colour in ammonia indicates the presence of glycosides.

**Keller – killani test :-**

In 2ml of the extract, glacial acetic acid and 1 drop of the 5% ferric chloride was added. And concentric sulphuric acid also added. Formation of blue colour precipitate indicates the presence of the glycosides.

**Tests for tannins and phenolic compounds**

**Ferric chloride test :-**

A small amount of the extract was dissolved in distilled water. To this solution 2ml of 5% ferric chloride solution was added. Formation of blue , green or violet indicates the presence of phenolic compounds.

**Lead acetate test:-**

A small amount of the extract was dissolved in distilled water and then few drops of the 1% lead acetate solution was added. Formation of white precipitate indicates the presence of the tannins. **Test for saponin**

**Froth test :-**

The extract was diluted with distilled water and shaken in graduated cylinder for 15 minutes. The formation of layer of foam indicates the presence of saponin.

**Test for proteins and amino acids**

**Ninhydrin test :-**

3ml of test solution was heated with 3 drops of 5% ninhydrin solution on water bath for 10 minutes.

Formation of blue colour indicates the presence of amino acids.

**Test for triterpenoids and steroids**

**Salkowski test :-**

The extract was treated with chloroform and filtered. The filtrate was added with few drops of concentrated sulphuric acid , shaken and allow to stand. If the lower layer turns red , sterol is present.

Presence of golden yellow layer at the bottom indicates the presence of triterpenes.[14]

**Chromatographic study :-**

Chromatography comprises a group of methods for separating molecular mixture that depends on the differential affinities of the salutes between two immiscible phases, one of the phase is fixed bed of rough surface area, while the other is fluid which moves through or over the surface of fixed phase.

The fixed phase is called the stationary phase may be a porous or finely divided solid or liquid that has been coated in thin layer on an inert supporting material. It is necessary that a stationary phase particles be as small and homogeneous as possible in order to provide a large surface area so that sorption and desorption of the salutes will occur frequently. The mobile phase may be pure liquid or mixture of solutions.

Chromatographic methods can be classified according to the nature of the stationary and mobile phase is called adsorption chromatography, whereas,the stationary phase is a liquid, it is termed as partition chromatography.[15]

**Thin layer chromatography**

Thin layer chromatography (TLC) is a method of analysis in which the stationary phase is finely divided solid, is spread as a thin layer on a rigid supporting plate and the mobile phase is a liquid allowed to migrate across the surface of the plate The four basic modes of chromatography adsorption, partition, ion exchange and size exclusion can be applied to the analysis of pharmaceutical system or plant natural products by a number of techniques which differ from each other according to the nature of the stationary and mobile phase and the apparatus used[16]

**Preparation of plates for TLC**

The different methods can be classified according to the methods of application:

a) Spreading:

Use a mobile applicator and a stationary plate.

Using a stationary applicator and pushing or pulling the plate through accordingly.

b) Pouring of suspension or shaking of solids on to the plate and then smoothing Down.

c) Dipping of plate in a suspension.

d) Spraying with this suspension (spray technique)

Common apparatus used for the preparation of TLC plate are glass pestle, mortar, glass rod , plates, etc. The plates were washed with chromic acid then dried about 25% of slurry of silica gel G prepare and then poured on clean dry glass plates and spread uniformly, activated at 120 C for 30 minutes in oven.

**Thin layer chromatography of ethanol extract of Zingiber officinale:**

If one of the standard references ( zingiberene , 6 – gingerol or 6 – shoagal ) is available, use it for

TLC analysis. If it is not available, use eugenol as standard reference.

Carry out thin layer chromatography (TLC) using following parameters:-

Mobile phase: toluene – ethyl acetate (93:7 v/v)

Stationary phase: silica gel G

Test solution: 10% ginger powder in ethanol

Standard solution: 1% eugenol in ethanol

Spotted volume: apply separately 0.3ml test solution and 0.1ml standard solution in the plate.

Detection : anisaldehyde sulphuric acid, dry at temperature 100 C for 5 to 10 minutes.

This procedure of TLC analysis use eugenol as a standard reference because it is not easy to obtain shaogal as a marker substance. The correct evaluation of TLC with zingiberene, gingerol or shoagal as a standard reference and Rf will be used instead of Rx. Furthermore, the use of reagent for vvisualization such as anisaldehyde sulphuric acid is a lack of reproducibility. If the constituents of the plant material have fluorescence under UV light such as those from ginger, it will be better to perform TLC without reagent for visualization.

The quantitative evaluation can be done by TLC-densitometry if shogaols or gingerols are available in laboratory. If not, UV/vis spectrophotometry can be used to determine total phenol using Folin- Ciocalteu method. In this method, eugenol can be used as a standard reference. It must be noted that TLC method is the most recommended method for phytochemical screening and not only for the colour and precipitation observation in the tube. As we know

that the colours of extract to be tested are generally green or light chocolate. It gives confusion to the colour produced by reaction occurs. In the colour reaction test of flavonoid for exemple, the produced colour in the tube is yellow. If it is not intensively appears it will be difficult to justify when the extract solution in the tube is green or light chocolate.There were some publications reporting the existence of alkaloid in ginger accord- ing to colour reaction in tube. After verification by TLC method, the result was negative, so the colour reaction in tube was not true and we called it as a false positive reaction. According to chemotaxonomic approach, the existence of alkaloid in Zingiberaceae family is very rare. The similar case is sometimes found in the colour reaction of steroid. The appearance of red-pink colour in green solution is not easy to be detected; hence, it will be better and clear if we use TLC methods.[18]

## RESULT AND DISCUSSION

**Collection And Authentication**

The crude drug Zingiber Officinale was collected and authenticated.

**Extraction**

The powdered material of Zingeber Officinale were successively extracted with ethanol by Maceration method. .

**Pharmacognostical Evaluation**

**Macroscopical Evaluation**

The rhizomes of zingiber officinale was collected and macroscopical characters like shape , colour , structure and pattern were studied.

**Organoleptic Properties**

Colour - Yellowish green

Odour - Aromatic

Taste - Spicy, pungent, bitter

Height - Upto 1m

- The plant of ginger grow upto 1m height
- The rhizomes of ginger was buff colored and were 5 to 15 cm long, 3 to 6 cm wide, and about1.5 cm thick

Macroscopic characters Rhizomes were irregularly branched with node and internodes.The outer surface of the rhizome is smooth and light grey in colour, internally light yellow. These are hard and brittle, breaking with a short fracture, fragrant odour, aromatic, spicy and slightly bitter in taste[19]

**Fig: 8. Z. officinale Roscoe Rhizome**

**2.Microscopical Evaluation**

**Microscopical Properties**

1. Cork –The two cork are present in ginger.

Outer cork – It may present some layer, which is dark brown in color, it is made up of irregular parenchymatous cell.

Inner cork - It may be present some layer, which is colorless , parenchymatous cell radially arranged in regular rows.

2. Cortex – It consists for the thin walled, cellulosic, rounded parenchyma with intercellular spaces.
3. Parenchyma cortex consists of starch grains.
4. Closed collateral fibro Vascular bundles are present in the cortex.

5. Brown oleoresin cells is present.
6. Cork –The two cork are present in ginger.

Outer cork – It may present some layer, which is dark brown in color, it is made up of irregular parenchymatous cell.

Inner cork - It may be present some layer, which is colorless , parenchymatous cell radially arranged in regular rows.

7. Cortex – It consists for the thin walled, cellulosic, rounded parenchyma with intercellular spaces.
8. Parenchyma cortex consists of starch grains.
9. Closed collateral fibro Vascular bundles are present in the cortex.
10. Brown oleoresin cells is present.
11. Style- Vascular bundle rings is just under the endodermis, ground tissue of parenchymatous cell are consist fibro vascular bundle, oleoresin cells and starch.
12. Xylem vessels – Annual, spiral or reticulate thickenings un lignified

The rhizome is circular with epidermis, cortex, endodermis and closed, collateral vascular bundle. Transverse section of the rhizome showed outer single layered epidermis having rectangular and elongated cells, followed by thin-walled cork cells of 6-10 layers, irregularly elongated. Cortex consists of several layers of parenchymatous cells with intercellular air spaces and contains starch. Oil cells are present in cortex. Central cylinder region contains a yellow to orange coloured oleo- resin. Endodermis consists of single layer of cells. Stele consists of a broad central zone of ordinary parenchymatous cells. Closed, collateral vascular bundles are found in a circle in the region just inside the epidermis. The starch grains are abundant in the cortex and mostly globose, ovoid and irregularly rounded. The tracheids are non- lignified and have reticulate, spiral or scalariform thickening on the walls. [20]

**Fig:9 .microscopical representation of Zingiber officinale roscoe rhizome**

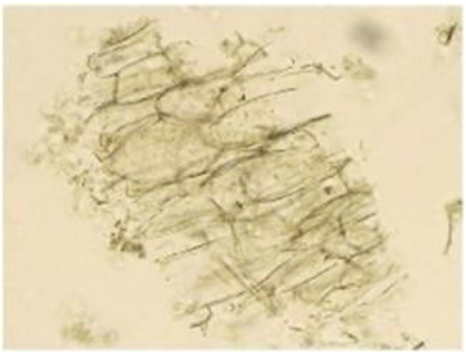


**Fig no 10 Fragment of parenchymal cells**

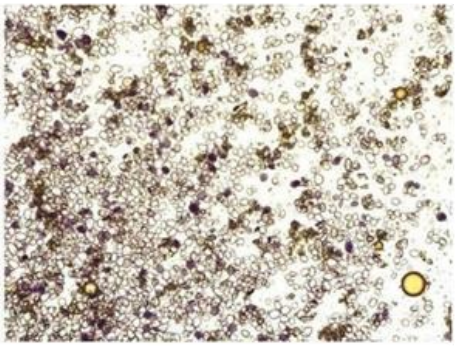


**Fig No 11 Starch grains**

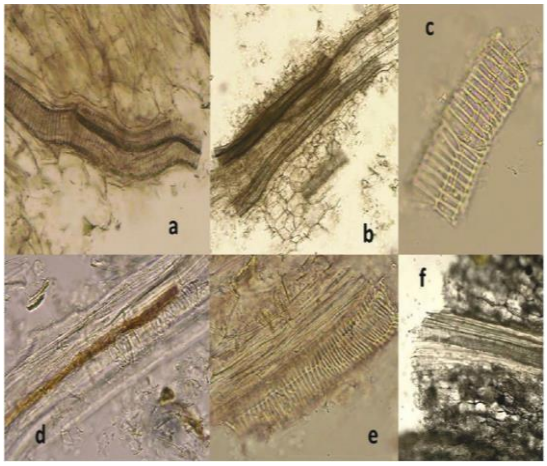



Fig No 12. Fragment of xylem elements and related structure a,b,c scalariform xylem elements; d narrow cells with brown pigment accompanying the xylem elements; e scalariform perforation plant of xylem vessel' f fragment with helical xylem element.

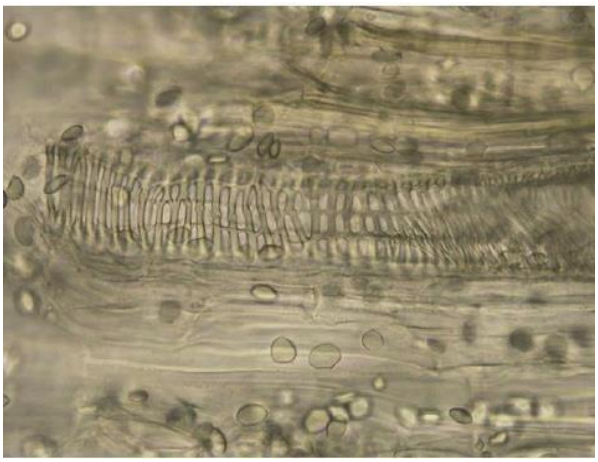


**Fig no 13. Fragment of reticulate xylem vessel.**

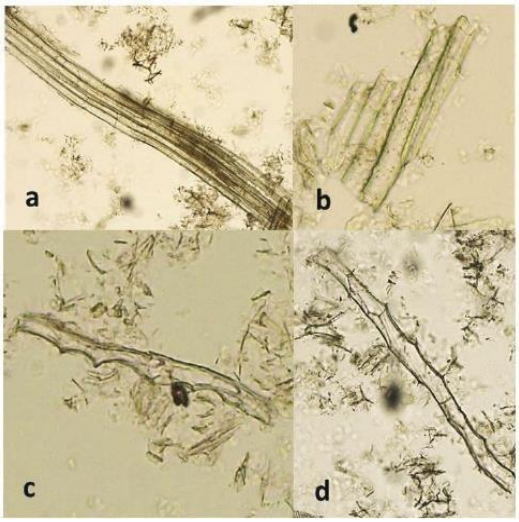



Fig no 14. Fragment of sclerenchymatous fibres; a fragment of bundle sheath; fragment of sclerenchymatous fibers; c,d sclerenchimatous fibers with dentate walls

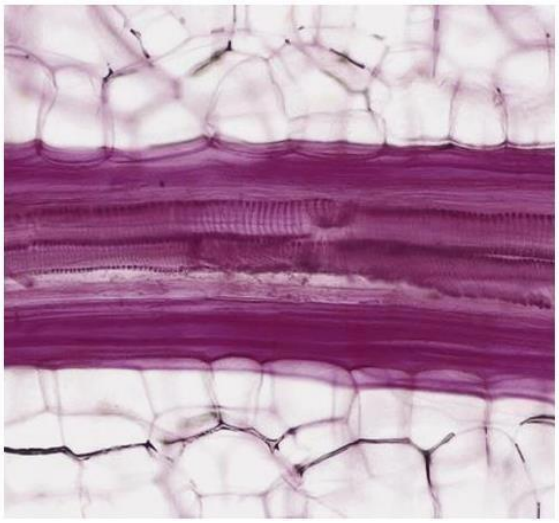


Fig no 15. Stained bundle sheath with xylem elements.

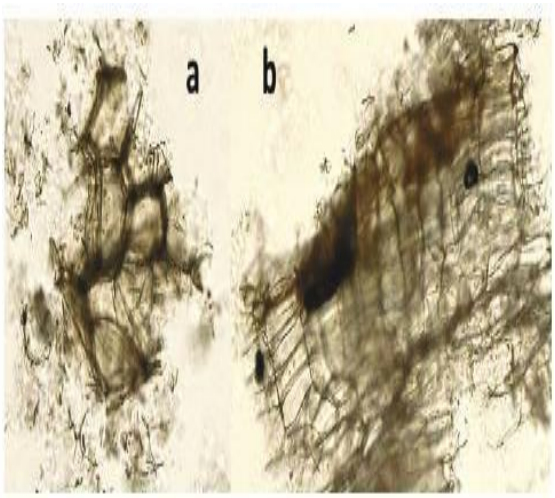



Fig No 16 Cork cells: a longitudinal view; b transverse view.

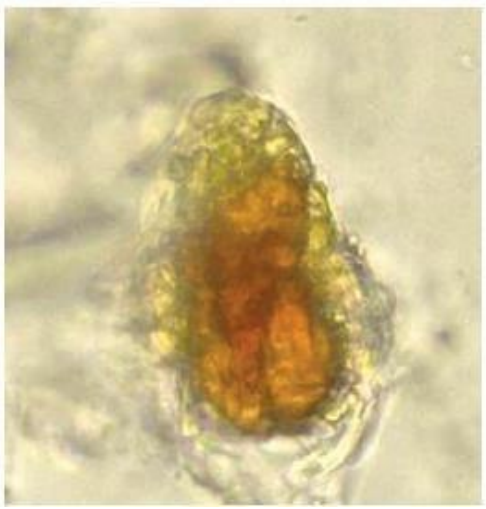


Fig no 17. Oleoreisin cell.

**Powder characters**

Powder characters The rhizome powder was studied under different magnifications, which showed the presence of epidermal fragments, cork cell, parenchyma containing starch grains, fragments of parenchyma with oleoresin, parenchyma cells showing wrinkled walls, starch granules, co-oxalate crystals, unicellular trichomes, isolated vessels, isolated trichrome, and isolated fibers.

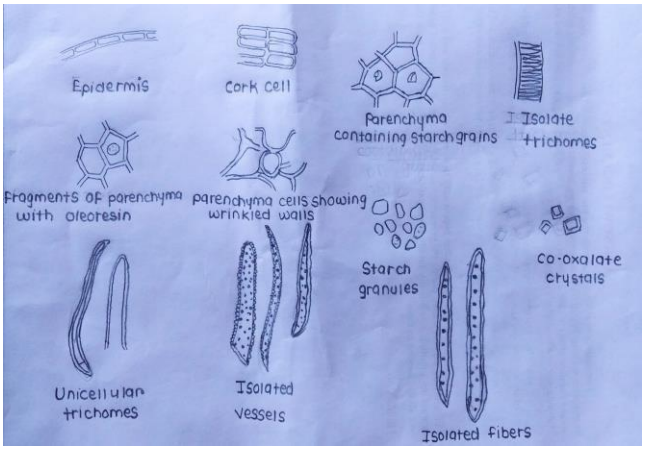



**Fig no 18. Powder characteristics of zingiber officinal roscoe**

**Determination of physicochemical parameters** –

Physicochemical parameters such as foreign matter, moisture content, total ash, acid insoluble ash, water- and alcohol- soluble extractives were determined according to methods described in the Indian Pharmacopoeia.[21]

**Physico-chemical parameters**

The physio-chemical parameters of the rhizomes are presented in Table 1,

**Table No.1.Physiochemical parameters of crude powder prepared from Z. Officinal Roscoe**

| **Sr. No** | **Parameter studied** | **Observed %(W/W) values** |
|---|---|---|
| **1** | Foreign matter | 1.26%(W/W) |
| **2** | Loss on drying | 11.4%(W/W) |
| **3** | Total ash | 9.7%(W/W) |
| **4** | Water soluble ash | 1.4%(W/W) |
| **5** | Acid insoluble ash | 1.9%(W/W) |
| **6** | Alcohol soluble extractive value | 0.62%(W/V) |
| **7** | Water soluble extractive value | 0.91%%(W/V) |
| **8** | Moisture content | 14.67%(W/W) |

**Phytochemical Evaluation**

**Phytochemical screening of Ginger rhizomes**

The Preliminary phytochemical analyses of all extracts were performed qualitatively for different phytoconsttuents. Zingeber Officinale give positive test of ethanol extract contains flavonoids,

tannins, glycosides. Aqueous extract were found presence of carbohydrates, saponins and amino acids, steroids, Phenols, Terpenoids and the results are summarized in Table no.2[22]

**Fig:19.Phytochemical screening of Ginger ethanolic extract**

**TableNo.2.Preliminary Phytochemical analysis of extracts of Zingiber Officinale Roscoe**

| **SR.No.** | **Test For** | **Ethanolic Extract** |
|---|---|---|
| **1** | Alkaloid | - |
| **2** | Glycoside | + |
| **3** | Flavonoid | - |
| **4** | Steroid | - |
| **5** | Triterpene | + |
| **6** | Saponin | + |
| **7** | Tannin | + |
| **8** | Carbohydrate | + |
| **9** | Protein | + |
| **10** | Amino acids | + |
| **11** | Volataic oils | - |

**Thin Layer Chromatography**

TLC analysis of extracts gives the idea about the presence of chemical compounds. The TLC of ethanol extracts of Zingiber Officinale was done in different solvent systems and spots as well as best separation was observed. The layer chromatography of all fractions was carried out with different solvent systems. The TLC of ethanolic extract of Gingerer Officinale was performed and better separation in toluene: ethyl acetate (93:7) solvent system. The spots were Observed with Rfa value 0.73, Rfb value 0.57, Rfc value 0.47 with yellowish Brown, Greenish Brown, Brownish colour spots were observed and shagoal is detected to be present.[23]

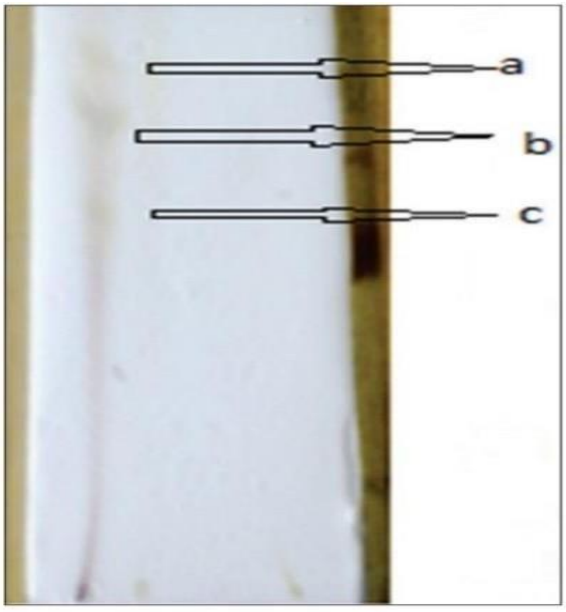



**Figure: 20. TLC studies (Thin layer Chromatography) of Ginger Officinale Roscoe. (S:Ginger**

**Sample R:Standard reference eugenol Detecting Reagent: Anisaldehyde sulphuric acid)**

**Table no.3.Result Of TLC Of Ethanolic Extract Of Ginger**

| Extract Name | Rf | Values | Spot colour | Mobile phase |
|---|---|---|---|---|
| Alcoholic extract | Rfa | 0.73 | Yellowish Brown | Toluene: ethyl acetate (93:7V/V) |
| | Rfb | 0.57 | Greenish Yellow | |
| | Rfc | 0.47 | Brownish | |

## SUMMARY AND CONCLUSION

**Zingiber officinale Rosc.** is a well-known drug of Unani System of Medicine used to treat various body ailments such as inflammatory and rheumatics conditions. Therefore, for this study Zingiber officinale Rosc. was selected and standardized. The authentications of Ginger rhizome is important aspect to identify family, Genus and species of Ginger. The macroscopic and microscopic characters reveal the presence of yellow colour inside the rhizomes, which is important diagnostic characters that help in identification of plant material. The physicochemical studies are carried out on herbal plant powder sample to establish appropriate data that may be utilized for identification and establish the purity, standard of plant sample, and those supplied in powder form. The estimation of ash value commonly applied parameter for the identification, which establishes the quality and the purity of the drug. Ash value can also detect the nature of the material added to the drug for the purpose of adulteration. The moisture content of the material can be identified by percentage weight of LOD. Maceration Extraction of Ginger is useful method for further Phytochemical screening. Phytochemical screening of the drug is very important to identify the different phytoconstituents present in plant materials such as steroids, terpenoids, and flavonoids. It is a very important in the process of standardization and quality control because the constituent vary from plant to plant and also in different samples of the same species depending on various atmospheric factors and storage conditions. TLC method has emerged as an important tool for the qualitative and quantitative phytochemical analysis of herbal drugs. TLC mobile phase detection and separation of active constituents has found a variety of analytical uses in the pharmaceutical industries. Chromatographic analysis is the first step toward understanding the nature of active principles and their detailed photochemistry. The reported pharmacogenetic parameters can be considered as distinctive enough for authentication of this drug in herbal industry and can be included as microscopic standards in

Indian herbal pharmacopoeia.[24]

**Reference:**


1. https://en.m.wikipedia.org
2. Vikas Kumar Gupta jan-2021https://www.ijcrt.org/jcrt/volume9
3. https://www.jiwaji.education
4. https://ansaripharmaeducation.blogspot.com/2022/04
5. https://www.pharmacy180.com/article/ginger-271/
6. "Ginger, NCCIH Herbs at a Glance". US NCCIH. 1 September 2016. Retrieved 2 February
7. https://www.rxlist.com/ginger/supplementshtm#WhatIs
8. Rachit Rathour International Journal of research in Engineering & Science Volume 10 issue
9. Cooper TH, Clark G, Guzinski J (1994) Teas, spices and herbs. In: Food Phytochemicals, ed. Ho, CT, Washington, DC: American Chemical Society 1: 231 - 236.
10. Allen PC, Danforth HD, Augustine PC (1998) Dietary modulation of avian coccidiosis.
11. Peter, K. W. (2006). Handbook of herbs and spices, Vol. 3 (Woodhead publishing, Cambridge
12. Prashanth Tiwari, Bimlesh Kumar, Mandeep Kaur, Gurpreet Kaur and Harleen Kaur Phytochemical screening and extraction: a review.International Pharmaceutica Sciencia
13. Prieto, P., M. Pineda and M. Anguilar (1999). Spectrophotometric quantitation of antioxidant capacity through the formation of a Phosphomolybdenum Complex: Specific application to the determination of Vitamin E. Anal. Biochem., 269 : 337-341.
14. Chen IN, ChangCC, Wang CY, Shyu YT, Chang TL. Antioxidant and Antimicrobial Activity of Zingiberaceous Plants in Taiwan. Plants Foods Hum. Nutr. 2008:63:15-20.
15. Weiss EA. Essential Oil Crops. CAB International. 1997: 76:45
16. McGee H. On food and cooking, the science and lore of the kitchen. 2nd Edition, New York.

17. Utpala P, JohnyAK,Parthasarathy VA, Jayarajan K, Madan MS. Diversity of ginger cultivation in India - a GIS study. Journal of Spice and Aromatic Crop. 2006: 15: 93-99.
18. Shukla Y, Singh M. Cancer preventive properties of zinger: a brief review. Food and Chemical Toxicology.
19. http://www.bmrat.org/index.php/BMRAT/article/view/572/1148
20. Pawar HA, Choudhary PD, Gavasane AY, Malusare V, Shinde P (2015) Standartization of Sunth Powder Prepared using Rhizomes of Zingiber officinale. Medicinal & Aromatic Plants
21. https://www.intechopen.com/chapters/68980
22. Syed Shariq Main Physicochemical analysis of ginger ; Pharma method 2019; 10(1):31/36
23. Kang-jin Cho Agri.chem.Biotechnol..44(1),12-15 (2001)
24. Latif A, Rehman S. Standardization of an herbal medicine- Swertia chirayita linn. Pharmacophore. 2014;5(1):98-108.
25. Bodoki E, et al. Journal of Pharmaceutical and Biomedical Analysis. 2005;37:971- 7.
26. (Kokate 2000 , Harbne1999 , Tiwari et al.2011)
27. (Mukherjee, 2002; Stahl, 1965: Heffman, 1966; Stahl, 1973).