

## THERAPEUTIC BENEFITS OF LONG PEPPER (PIPPALI)

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### ABSTRACT

Long pepper (Pippali) can be classified in to *Kingdom (Plantae), Division (Magnoliophyta), Order (Piperales), Family (Piperaceae), Genus (Piper) and Species (Longum)*. The pepper word is obtained from sanskrit word for long pepper (pippali). It is thin and redolent climber. . Researchers conducted a variety of test which suggest that piperine can increase intestinal brush border membrane fluidity and microvilli length, modify enzyme formation and induct the synthesis of proteins connected with cytoskeletal function, resulting in at increase in the absorptive surface of the small intestine. Long pepper is an essential medicinal plant used in many drugs and medicinal formulation. In india, most of the long pepper in still collected from the natural state leading to destruction of the population in their natural habitats. The present review shows the effectiveness of Pippali in cure of various diseases.

### INTRODUCTION

Long pepper is also called Piper longum. It is a flowering creeper and belongs to piperaceae family. It is used as a spice and seasoning. It is dried and only a little amount is sufficient for flavour in a dish. When it is fresh and moist, it has a sweet taste but the drying process makes it much more epoxy. It grows on creeper and is native to the Himalayan sectors of the India.

The long pepper plant lasting for three seasons or more (perennial) and roots are woody. The stems are jointed with fleshy fruits inserted in the spikes. The flower of this plant is unisexual and its spikes are stands during or just after the rainy season. The female flower is up to 2.5mm long and 4-5mm diameter but the male flower is larger and narrow. When in flower, the female spikes are about 1.25cm to 2cm long, when in fruit, growing to about 3 cm while the male spikes are larger, narrow and are 2.5cm to 7.5cm long. The seeds are ovoid, sunk in thick spine about 0.25cm in diameter <sup>(1)</sup>. The riped fruit of pippali contain red colour and when it dries the colour converts in to black colour. The fruits of long pepper are three layered shell. The outline of inner layer is wavy, which a distinguishing character. It is a thick walled fruit in which, in the pericarp have heavy brown substances <sup>(2)</sup>. The middle layer of P.longum fruit with thickened cells and the innermost layer and

testa combined to form a deep zone with transparent substance in the epicarp and orange - red colour <sup>(3)</sup>. The root of the plant also known as Pippalimulam <sup>(4)</sup>. The sampling of root shows thick walled parenchyma, simple or compound starch grains, woody and striated stone cells, viscous cells in the outer layer, pericyclic fibers in bast and radial strips of xylem which meet at the center. Pith is absent. In the center of the stem has a secretory cavity. The starch grains as well as viscous some stone cells shows in the outer layer of the stem. The woody part of this plant is arranged v- shaped groups and bast capped by perivascular fibers<sup>(5)</sup>.

The Indian long pepper appears to be arrived from two or three species including the one which is imported from Malaysia and Indonesia. The *P. longum* or *P. pelloides* produces a product of long pepper while from the *P. officinarum* obtains the java long pepper.

It includes a volatile fragrant oil ; piplatin, sisenin and pipla- sterol. It contain 1% volatile oil, 1.25% piperine, 40% starch. The essential oil of the fruit *P. longum* is a convoluted mixture , the three major elements of which are caryophyllene and pentadecane ( both about 17.8%) and bisabolene ( 11%) other contain tujine ,terpinolene, zingiberene , p- cymene, p- methoxy- acetophenone and dihydrocarveol <sup>(6)</sup>. Roots and berries are especially usable in this plant. A chemical substance (steroids) found in the roots of the long pepper whereas some chemical substances are also contain by the root like 1- piperonyl piperidine, glucosides, piplartin and piperlingumin. It is bitter and hot in nature.

It is cultivated in hot and temperate areas ( Assam, Tamilnadu and Andhra pradesh) of India. *Piper longum* was cultivated from lower hills of Bengal, evergreen forests of western ghats, Uttar pradesh Nicobar Islands and Nepal. It is cultivated on a large scale in limestone soil and where dampness is high in heavy rainfall areas. Laterite soil are suitable with good water holding capacity and organic matter content. High relative wetness and good rainfall areas are suitable for its successful growth. It can be cultivated in coconut plantations as an intercrop in the field though altitude of above sea level or 900-1500 is recommended. It also grows well in the shade of tree in areas where rainfall are abundant and only 50% shade is best for better fruiting <sup>(7)</sup>. Long pepper likely came to Europe before the non prevailing black pepper . It was highly priced during the Roman Empire ie. about three times the price of black pepper. With its taste spicy and sweet at the same time it was favoured for Roman cookery. Long pepper is popular and known in North and East region of Africa.

It is also known as piplu, pipal (Assam) ,pipli ( Hindi, Gujarati), piplamore (Bangali), Hippali, hippalibali (kannada), tippali (Malayalam), pimpli (Marathi), piplamool ( Punjabi), tippli ( Tamil , telugu), pipul ( Urdu) , pippoli, videhel (oriya). It is known as in foreign country langwerpige pepper (Dutch), poivre long (French) , longer peper ( German), pepe lungo ( Italian), pipo biba (China) , pimenta longa ( Portuguese), tlathancaye (Mexican), langer pfeffer (German), long pepper ,bengal pepper, java pepper, balinese pepper ( English).

Long peppers are most nutritious spices today. Many nutrients are found in it like Betaine, calcium, choline, folic acid, iron, magnesium, manganese, niacin, pantothenic acid, riboflavin, potassium, selenium, sodium, thiamine, vitamin A, B, C, D, E, K, vitamin B12, vitamin B6 and zinc. The approximate composition of the plant is: moisture 9.5%, protein 12.2%, starch 38.5%, fiber 5.8%, total ash 5.9%, fixed oil 6.6%, volatile oil 1.5%, piperine 4.5%.

### MEDICINAL USES

Long pepper is a medicinal herb that shows many uses in Ayurveda, Unani and Siddha system of medicines. It has some Ayurvedic properties:

Rasa : katu ( pungent)

Guna: laghu ( light), snigdha (unctuous) tikshna (sharp)

Veerya: Anushnashita (slight cold)

Vipaka: Madhur ( sweet)

Dosha : Pacifies kapha and vata

Pippali is very various necessary in the world of Ayurvedic medicine. The name of long pepper in itself means “to drink and digest” revealing one of its main benefits of increasing the digestion and burning toxins. As an herb or spices, pippali is commonly used to treat a wide range of disorders like coughs, colds and overcrowding to digestive issues.

Pippali can be great herbal option any time of year. However due to its powerful lung regenerate properties, it is especially amazing herb to take during the spring season. It is well known for treatment of irritating allergies, mucus and colds in the spring seasons. The months of march, april and may are the main time of year for mucus dosha, this is mentioned in the Ayurvedic states therefore dosha imbalances such the one just will grows up. The seasonal infection can be care by adding long pepper in the daily diet. Pippali is a herb it also known as “tridoshic”, it is good for all body types. Pippali can be used for Pitta balance due to its cooling post- digestive effect opposite of close relative, black pepper. When there is increase in body heat which is also known as Pitta, infusion of long pepper can be safe and a effective option. It is added in soup, sauce and curry as a spice and also used in pickles. Long pepper have more pungency according to black pepper so it must be used carefully when till the flaming food is needed. In its aroma, terpene elements are missing. It cannot be replaced by black pepper. Because of its hot and sweet aroma it can be used in some spicy specialities or wine sauce. Long pepper plant part like mature spikes of female plant, thick stems, roots and leaves was converted in medicines and used in curing bronchial diseases. It is very useful in improving memory power and also regain health by drive away disease. It is used in the treatment of respiratory and digestive system. It has anti- tumour properties and regulates the immune system. It is useful for cold and mucus condition of the lungs and increases circulation to the lung. Long pepper is also useful in treatment of mucus, asthma, high blood sugar level, hemorrhoid,

stomach pain and indigestion, lack of blood, lepers, heart disease and spleen disorders, long duration fever and loss of food appetency. Roots and dried ripe fruits are the medicinal parts. It is also used as an antidote to scorpion- sting and snake - bite. In the treatment of dyspnoea in children it is very useful.

The unripe fruit of long pepper useful in nausea because of its sweet and cooling. The ripe fruit of long pepper is sweet, pungent, a aphrodisiacal, increase appetite, purgative, anti diarrheal, antitormina, is useful in vata and mucus, stomach complaints, vitiligo, urinary elimination, tumor, spleen disorders, hemorrhoid, lepers, inflammation, sleeplessness, bilirubin disorder, singultus, reduce nausea and dyspnoea ( in the Ayurvedic system of medicines). The fruits and roots of long pepper plant are used as a medicine in curing certain condition like coma, drowsiness, paralysis, gouty arthritis and lumbar pain. The root has a strong and pungent in taste. In the Unani system, it is used for a intestinal gas relieving , increase appetite, promotes the menstrual discharge, aborticide, aphrodisiac, treat iron- deficiency anemia, water pill, peptic and a general tonic useful in inflammation of the liver, joint pains, lumbar pain, snakebite, sting of scorpion and night blindness. In India and china, excerpt of the plant *P.longum* Linn is used as a folk medicine. In ancient literature the roots of this plant are used for the treatment of heart disease. In the form of decoction of dried immature fruits and the roots are widely used in inflammation of the membrane lining of the bronchial tube.

The important using the drug are : Abhayarishtam, Draksharishta, Chyavanaprasam, Pippalyasavam etc .The main alkaloid present in the pippali is piperine which is reduces Blood Pressure, reduces fever, liver protecting and CNS stimulating. Powdered of long pepper when give with honey provides relief from cold, hoarseness and hiccup. It act as aphrodisiacal and promote the reproductive system. The necessary oil of the fruits showed insect - repellent activity. The toxicity of two piperidine alkaloid such as piperonaline and piperocaticidaline which act as a pesticides for arthropods pest. These alkaloids are separated from the long pepper and both of these alkaloids showed insecticidal activity. It is very useful to maintain lung strength, because it is vital and anti aging, and because it improves appetite, it helps to avoid weight loss associated with tuberculosis and its treatment. It also helps to prevent liver damage that sometimes results from the medicines used in tuberculosis management. One part of long pepper powder and two part of jaggery is mixed and administered to relieve cough, asthma, anemia, cardiac disorders and intestinal worm infestation. This combination improves digestion strength, acts as aphrodisiac and Medhya – improves intelligence. In case of paralysis make a ointment of long pepper with composition of some snuffs; mustard oil, boiled with ginger, butter- milk and curd. This ointment used in paralysis cases. First of all, the fruits of long pepper plant are roasted and then beaten up with honey to treat inflammation or pain in joints. They are also used by mixing with black pepper and rock salt in powdered form.

## Home remedies of Pippali

**Cough:** Take about 10 gms of each of holy basil leaves, dried ginger and long pepper. A fine powder of 4-6 pieces of small cardamoms. For relieves mucus, this powder take with equal amount of honey.

**Fever:** In the fever, make decoction of long pepper root and in water and drink two times in a day. This decoction treats fever, excretes toxins and regenerates liver function.

**Head Pain:** For the treatment of head pain, smell hot long pepper

**Sleeplessness:** In sleeplessness condition consumes of 1 gm long pepper in powder form with milk is very beneficial.

**Dyspnoea:** Take 2 gm powder of long pepper with honey.

In certain condition like Enlarged spleen and liver: Consumption of 1 gm of long pepper and 5 gm of long pepper root powder after boiling in 200 gm of water is very useful.

**Fast heartbeat:** For fast heartbeat take root of long pepper and green cardamom each of 25gm and make a powder. This powder take daily 3 gm with ghee gives relief from constipation and fast heartbeat.

**Chronic malaria with enlarged spleen:** The consumption of long pepper fruits which boiled in milk and water give a relief in splenomegaly.

Long pepper is a primary ingredient in Ayurvedic remedy Trikatu which is used in many formulation to raise the other components in compound production. It was shown to increase the blood levels of vasicine by nearly 233% ,under the influence of piperine alone , spartein blood levels were high by more than 100%, indicating an ability to high the bioavailability of some drugs. Researchers conducted a variety of test which suggest that piperine can increase intestinal brush border membrane fluidity and microvilli length, modify enzyme formation and induct the synthesis of proteins connected with cytoskeletal function, resulting in at increase in the absorptive surface of the small intestine.

## Pharmacological Activities

### Antiasthmatic activity

The antiasthmatic activity of *Piper longum* have been carried out of accepted the conventional claims of Ayurveda in the studies. Consumption of long pepper extract with milk decrease the inactive cutaneous anaphylaxis in rat and protect guinea against antigens- induced bronchitis asthma<sup>(8)</sup>.

### Antifertility activity

A number of part of raw extract and the cleaned compound were separated from the active part of long pepper and made a powder. Then this powdered form of *P. longum* fruits were studied for antifertility effect in female rats. The raw extract and its hexane part displayed 100% and 86% effectiveness respectively. Then that the 1 butanol insoluble, 1 butanol soluble and chloroform fractions were inactive. The benzene extract of *P. longum*

Linn fruit along with methanol excerpt of the Embelia ribes berries inhibited pregnancy by 80% when administrate to female rats<sup>(9)</sup>.

Hepatoprotective activity : For its hepatoprotective action the excerpt of fruit of long pepper plant was assessed in rodentia against carbon tetrachloride -stimulates acute, chronic and reversible damage and chronic irreversible damage, using morphological biochemical and histopathological parameters. The excerpt of long pepper fruits improves the reformation process by restricting fibrosis, but against acute damage or against firehouse's changes no prevention offered. Long pepper was found to defense against tertiary butyl hydroperoxide and carbon tetrachloride stimulates the hepatotoxicity, by decreasing both in vitro and in vivo lipid peroxidation <sup>(10)</sup>.

#### Hypocholesterolaemic activity

The peak of total serum cholesterol, and the total cholesterol to HDL-cholesterol ratio is inhibited by the methyl piperine, in rats fed with a high cholesterol diet. Piper longum oil decreased total serum cholesterol and hepatic cholesterol in hypercholesterolemic mice<sup>(11)</sup>.

#### Anti-inflammatory activity

P.longum acts as a anti inflammatory activity. Its fruit decoction has been using carrageenan-induced rat edema<sup>(12)</sup>.

#### Antiamoebic activity

The fruits was tested for their effectiveness against Entamoeba histolytica in vitro and experimentation of caecal amoebiasis in vivo. The condition of rats improved 90% and 40% by using ethanolic excerpt and piperine which leads to increased in antibacterial activity<sup>(13)</sup>.

#### Bioavailability enhancement

To raise the bioavailability of therapeutically and structurally various medicine has been shown of the piperine, due to its easy diverging and increasing permeability by regulating membrane active. Piper longum is one of the greater constituents comprising to a compound of Ayurvedic preparation and its constituents was tested with other drug combination. The study reported that combination of three pepper increased their bioavailability by encouraging fast absorption from the gastrointestinal tract or by metabolism during its first passage through the liver after being absorbed, or by combination of both mechanisms <sup>(14)</sup>.

### Antibacterial activity

The antibacterial action showed in the essential oil of *P. longum* against number of bacterial strains although did not show any effect of 50% fruits ethanolic excerpt. Piperine was more effective against *Staphylococcus aureus* while piperlongumine was found to have protective activity against *Bacillus subtili*. Recently, in Isoprenaline and Coronary artery ligation in medicine it has found to play a role as a cardioprotective agent<sup>(15)</sup>.

### Coronary vasodilation

The study showed on long pepper fruits that the amide dehydropiperimoline separated from the long pepper fruits help in curing coronary vasodilation<sup>(16)</sup>.

### Anti- obesity activity

Long pepper work as a anti- obesity substance by pharmacological inhibition of acyl CoA diacylglycerol acyltransferase. The acyl COA diacylglycerol acyltransferase, considered as a inhibitor for the groups of piperidine containing Compounds. It is used as an anti- dermatogenic in traditional regions<sup>(17)</sup>.

### Anti- cancer activity

The alcoholic excerpt of long pepper (10 mg / dose) and piperine prohibits solid tumor produced in mice stimulated with Dalton's Lymphoma ascites cell and the life span increases of mice. Piperine was also found to be cytotoxic towards Dalton's lymphoma ascites and Ehrlich ascites carcinoma cells at 250  $\mu\text{m}/\text{ml}$ <sup>(18)</sup>.

### Immunomodulatory activity

The particular and non particular immune stimulatory action of long pepper fruits have been valuated by hemagglutination titer macrophage transmigration indicant and phagocyte indicant in mice. A well known Ayurvedic preparation containing long pepper, was tested in mice infected with *Giardia lamblia* and found to produce important activation of macrophages as shown by an increased macrophage migration index (MMI) and phagocytic activity<sup>(19)</sup>.

### Insecticidal and Acaricidal activity

Insecticidal and acaricidal activity showed by the necessary oil of the long pepper fruits. The toxicity of two piperidine alkaloid, piperoctadecalidine and pipernonaline, were determined against of five species of arthropod pest<sup>(20)</sup>.

### Anti- arthritic Activity

The activity of anti rheumatoid was studied by the aqueous extract of the long pepper fruits in Freund's auxiliary motivated arthritis rats. The puffiness of paws are reduced by the helping of medication of excerpt of fruits of long pepper plant which may be responsible to the immunomodulatory activity displayed piperine. A digital plethysmometer was used for measuring the swelling of paw as a volume displacement. After the study, has been concluded that the aqueous excerpt of fruits of long pepper have activity of anti arthritis in complete Freund auxiliary model <sup>(21)</sup>.

### Fungicidal activity

The essential oil of long pepper fruits which work as the destroyed of parasitic fungi. A piperonaline and piperidine alkaloid was separated from the hexane part of *P. longum* showed a strong fungicidal activity against *P. recondita*. The fruit educed materials was tested towards some phytopathogenic like puccinia recondita, phytophthora infestans, fungi, botrytis cinerea, rhizoctonia solani <sup>(22)</sup>.

### Anti- diabetic activity

Long pepper show the antidiabetic activity because of aqueous extract of the long pepper after the treatment of 6 hours. Study on rats revealed that infusion of aqueous extract for 30 days in STZ induced diabetic rats revealed a significant decrease in FBG levels with the decrease in the symptoms of diabetic dyslipidemia as compared to untreated diabetic rats. Because of the non toxic property of long pepper extract there was a significant decrease in the activities of liver and renal functional in markers in diabetic treated rats as compared to other rats, showing the protective role of the extract against liver and kidney damage <sup>(23)</sup>.

### Conclusion

Long pepper is an essential medicinal plant used in many drugs and medicinal formulation. In india, most of the long pepper in still collected from the natural state leading to destruction of the population in their natural habitats. It is important to promote commercial cultivation on a larger scale to assure a continuous supply of actual raw material. Adequate acceptability of planting material is also a limiting factor for commercial cultivation. Research on alkaloid has gained a special attention in recent times as several of them have shown promising activities like antiasthmatic ,hypocholesterolaemic ,antiinflammatory, antibacterial, immunosuppressive, stimulant effect, hepatoprotective and anti amoebic etc investigating the new sources of natural products isolate more strong alkaloid and structurally modifying the known compound to retain activity is still the best possible way to develop safe and effective cardioprotective agent drugs of this class. The cost of medicinal plants is highly volatile due to unorganized marketing discouraged farmers to take up cultivation of



medicinal plant on a larger scale . A properly regulated market with guaranteed cost would help in populization and cultivation of important plants. The long pepper excerpt and cleaned part were growth inhibitors of strong plant , therefore could be considered as environmentally and effectiveness safe farming pesticides.

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