**Cinnamomum camphora (Kapur): Review**

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**Abstract**

Medicinal plants play a vital role for the development of new drugs. The bioactive extract should be standardized on the basis of active compound. The bioactive extract should undergo safety studies. Almost, 70% modern medicines in India are derived from natural products. Medicinal plants play a central role not only as traditional medicines but also as trade commodities, meeting the demand of distant markets. Camphor is familiar to many people as a principal ingredient in topical home remedies for a wide range of symptoms, and its use is well consolidated among the population of the whole world, having a long tradition of use as antiseptic, antipruritic, rubefaciency, abortifacient, aphrodisiac, contraceptives, and lactation suppressant. This compound has also a long history of scientific studies on its action and on the way through which it is metabolized in the organisms of both humans and animals, due to the general interest that it has always arisen among common people and scientists.

**Key words:** Medicinal plants, Camphor, Antiseptic, Abortifacient, Lactation suppressant.

**INTRODUCTION**

Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. Natural products from plant, animal and minerals have been the basis of the treatment of human disease. Today estimate that about 80% of people in developing countries still relays on traditional medicine, for primary health care because of better cultural acceptability, better compatibility with the human body and lesser side effects which is based largely on species of plants and animals for their primary health care. Herbal medicines are currently in demand and their popularity is increasing day by day. About 500 plants with medicinal use are mentioned in ancient literature and around 800 plants have been used in indigenous systems of medicine. India is a vast repository of medicinal plants that are used in traditional medical treatments. The various indigenous systems such as Siddha, Ayurveda, Unani and Allopathy use several plant species to treat different ailments. The use of herbal medicine becoming popular due to toxicity and side effects of allopathic medicines. This led to sudden increase in the number of herbal drug manufactures. Herbal medicines as the major remedy in traditional system of medicine have been used in medical practices since antiquity. The practices continue today because of its biomedical benefits as well as place in cultural beliefs in many parts of the world and have made a great contribution towards maintaining human health.[1]

India is sitting on a gold mine of well-recorded and well-practiced knowledge of traditional herbal medicine. But, unlike China, India has not been able to capitalize on this herbal wealth by promoting its use in the developed world despite their renewed interest in herbal medicines. This can be achieved by judicious product identification based on diseases found in the developed world for which no medicine or only palliative therapy is available; such herbal medicines will find speedy access into those countries. Backward integration from market demands will pay rich dividends. Strategically, India should enter through those plant-based medicines which are already well accepted in Europe, USA and Japan. Simultaneously, it should identify those herbs (medicinal plants) which are time-tested and dispensed all over in India.[2]

Camphor is a natural product derived from the wood of the camphor laurel (Cinnamomum camphora L.) trees through steam distillation and purification by sublimation; the
Medicinal Uses Of Cinnamomum Camphora

Camphor has a long history of herbal use. It has been used internally in the treatment of hysteria, but in modern day herbalism it is mainly used as an essential oil and internal use is not advised. The wood and leaves are analgesic, antispasmodic, odontalgic, rubefacient, and are also used as a stimulant. An infusion is used as an inhalant in the treatment of colds and diseases of the lungs. The essential oil, which can be obtained by distillation of the chipped branches, trunk and wood of the tree, or from the leaves and twigs, is the most suitable form of usage. Wood 24 - 40 years old is normally used. The essential oil is anthelmintic, antirheumatic, antispasmodic, cardiotonic, carminative, diaphoretic, sedative and tonic. It is used externally in liniments for treating joint and muscle pains, balms for chilblains, chapped lips, cold sores, skin diseases, etc., and as an inhalant for bronchial congestion. Some caution is advised, excessive use causes vomiting, palpitations,

descriptions of the leaves, flowers and fruits are provided. The flowers are white, the fruit is a drupe; the seeds are large, and the exocarp is very hard. The sapwood is white, the heartwood is light yellow, and the wood is hard and heavy.

Taxonomy of Cinnamomum Camphora

Kingdom – Plantae
Order – Laurales
Family – Lauraceae
Genus – Cinnamomum
Species – C. camphora
Common name – Kapur

Chemical Constituents

The oil’s high eugenol content also makes it valuable as a source of this chemical for subsequent conversion into isoeugenol, another flavouning agent. Major oil constituent of C. camphora are camphor, linalool, borneol, camphene, dipentene, terpeneol, safrole and cineole.[6]
convulsions and death. It is possible that the oil can be absorbed through the skin, causing systemic poisoning. The essential oil is used in aromatherapy. Its keyword is ‘Piercing’. It is used in the treatment of digestive complaints and depression. Sassafras oil from *Cinnamomum camphora* is a source of safrole, which is used to manufacture heliotropin, a valuable flavour and fragrance compound. *C. camphora* is also a source of natural camphor.\[^4\]

**Probable Mechanism of Action**

Camphor, a natural product derived from the wood of the tree *Cinnamomum camphora*, has a long history of use as antiseptic, analgesic, antipruritic, counterirritant and rubefacient. Its success and wide medical use, especially in topical preparations, is connected to its mild local anesthetizing effect and to the production of a circumscribed sensation of heat, together with its characteristic and penetrating odour that is by most of people associated to the idea of a strong and effective medicine. Camphor is today mostly used in the form of inhalants and of camphorated oil, a preparation of 19% or 20% camphor in a carrier oil, for the home treatment of colds as a major active ingredient of liniments and balms used as topical analgesics. The antitussive, nasal decongestant and expectorant action of camphor and of its derivatives was one of the first ones to be systematically investigated. Its nasal decongesting activity seems to be not purely mechanic, but connected with the stimulation of cold receptors in the nose. The inhalation of camphor vapours (so as the one of eucalyptus and menthol vapours) on a sample of volunteers increased the nasal sensation of airflow through the induction of cold sensation in the nose, despite of actually not affecting nasal resistance to airflow. The analgesic proprieties of camphor are largely known and applied, but little is known about the molecular mechanisms that are at their basis. Demonstrated that camphor activates TRPV3, a member of transient receptor channel superfamily, leading to excitation and desensitization of sensory nerves. The notorious effect of generation of a sensation of heat associated with topical application of camphor is a consequence of this activation. Anyway excessive and repeated application of camphor can lead to sensibilization of TRPV3, in apparent contrast with its analgesic role. The antipruritic, analgesic and counterirritant activity of camphor is instead associated with its capacity of activating TRPV1—a member of TRP channel superfamily—at the level of dorsal root ganglion (DRG) neurons and inhibiting TRPA1 channels, action that is in common with other TRPV1 agonists. Camphor also inhibits other related TRP channels such as ankyrin-repeaTRP1 (TRPA1), which is a further evidence underlying its analgesic effects. Camphor can modulate the activities of hepatic enzymes involved in phase I and phase II drug metabolism. 50, 150 and 300 mg Kg-1 of camphor dissolved in 0.1 ml of olive oil was administered daily to female Swiss Albino mice during 20 days. At its highest concentration it caused a significant increase in the activities of cytochrome P450, cytochrome b5, aryl-hydrocarbon hydroxylase and glutathione S-transferase, significantly elevating the level of reduced glutathione in the liver. Camphor was shown to inhibit mitochondrial respiration. Administration of up to 8 μM of camphor inhibited respiration rate in rat-liver mitochondria, nearly halving the oxygen consumption; this suggests that camphor may be used in oxygenating tumors prior to radiotherapy. Camphor can also be a potential radiosensitizing agent in radiotherapy. D-camphor (1100 μg ml-1) inhibited oxidative metabolism in *E. coli*. Succinic, lactic and NADH-oxidase activities were inhibited, while NADH and succinic DCPIP oxidoreductase enzymes were unaffected. The restoration of succinic oxidase activity by ubiquinone (Q6) but not by vitamin K1 indicates that D-camphor may operate this inhibition by affecting quinone functions.\[^3\]

**Interactions**

Very few studies of pharmacological interactions between camphor and other compounds are present in literature. In a study combining the administration of D-camphor and an extract from fresh crataegus berries, a synergic action of the two preparations emerged in ameliorating cardiac performances. Both D-camphor and the extract contributed in an increase in total peripheral resistance induced by an increase tone of the arterioles, and while the former appeared to be the main factor in inducing the rapid initial effect, the former added a long-lasting effect.\[^3\]

**Known Pharmacological affect of *Cinnamomum Camphora***

1. **Anthelmintic Activity - Investigation of in Vitro Anthelmintic activity of *Cinnamomum Camphor Leaves***. Infections with helminth are among the most widespread infections in humans and other domestic animals affecting a large number of world population. The majority of these infections due to worms are generally restricted mainly to the tropical regions and the occurance is accelerated due to unhygienic lifestyle and poverty also resulting in the development of symptoms like anaemia, eosinophilia and pneumonia. Parasitic diseases cause ruthless morbidity affecting principally in population. From the observations, higher concentration of extract produced paralytic effect much earlier and the time taken for death was shorter for all types of worms. Aqueous extract of *Cinnamomum camphora* exhibited anthelmintic activity in dose-dependent manner showing maximum efficacy at 50 mg/ml concentration for all three types of worms. The plant extract exhibited more potent activity at lowest concentration (10 mg/ml) against (roundworm)
Astaridia galli. Anthelmintic activity of the extract was compared with the standard drug Piperazine citrate.[7]

2. Antibacterial Activity- Screening Of Antibacterial Sensitivity Of Essential Oils Of Camphor And Cinnamon. Cinnamon oil was found to be a better antibacterial agent, exhibiting broad range of antibacterial activity against common bacteria. Hence, it represents an alternative source of natural antimicrobial substances for use in food systems to prevent the growth of food-borne bacteria extend the shelflife of processed food. The study also shows that further research on the effects of spices and essential oils on microorganisms can be rewarding to pursue in the search for new broad spectrum antimicrobial agent.[8]

3. Sperm Motility And Sperm Viability- Effect of Cinnamomum camphora on human sperm motility and sperm viability. Sperm motility is a crucial part of examination for studying the effect of any compound. On microscopic examination, spemms look like a swimming tadpole. Each sperm structure is composed of a head which contains the genetic material of father in its nucleus part, a tail which lashes back and forth to propel sperm along, and a midpiece which has mitochondria (power house of sperm) which provide energy for sperm motion. The presence of sugar fructose produced by seminal vesicles provide energy for sperm motility. This study of effect of camphor on human sperm motility and its viability, a decrease in sperm motility and sperm viability investigated with increased concentration of camphor solution. It may be due decrease in fructose levels, or denaturation of proteins, cholesterol which are indirectly connected with energy source for sperm motility. Thus, it can be indicated that there is a positive relation between Camphor and sperm parameters. Hence, camphor treated samples shows descent in sperm motility count which counts for decreasing effectiveness for fertilization and thus acts as a contraceptive.[9]

4. Uterus Histology- Effect of Camphor on Uterus Histology of Pregnant Rats. The study was conducted to investigate the effect of camphor on the rat uterus histology during pregnancy period. In this study, the histological examination for control group uterus (one week gestation) was performed by using the light microscope showed a similar histological structure to rodent uterus at one week gestation. This study was focused on the endometrium (the place of the implantation and placenta formation) where many of the changes could occur during pregnancy. The cellular level showed clear epithelial cells containing oval nucleuses filled by a large amount of chromosomes and is surrounded by granular cytoplasm with regular shape of the outer edge. The results of this research indicate that there is a direct correlation between the amount of the dose used and the negative impact of camphor on the histo-architecture of the uterus of pregnant rats; suggesting negative influence on the reproductive health of the animals which might cause abortion in animals with higher doses of camphor.[10]

5. Cerebral Cortex Activity- Effect Of Camphor Essential Oil On Rat Cerebral Cortex Activity As Manifested By Fractal Dimension Changes. Fractal dimension (FD) values of the parietal electrocorticogram activity were calculated before and after intraperitoneal administration of camphor essential oil (450-675 µl/kg) in anesthetized rats. Camphor oil induced seizure-like activity with single and multiple spiking of high amplitudes in the parietal electrocorticogram and occasional clonic limb convulsions. The FD values of cortical activity after camphor oil administration increased on the average. Only FD values of ictal ECoG sequences were lower than those before camphor oil administration.[11]

6. Sexual Behaviour- Effects of Camphor on Sexual Behaviors in Male Rats. According to Iran's folk medicine, camphor, a crystalline ketone obtained from essential oils of Cinnamomum camphora, has both sexual behavior attenuating and enhancing properties. The findings of the study showed that there were no significant differences in MF (mount frequency) and IF (intromission frequency) from the control and camphor treated groups. However, there were significant decreases in ML (mount latency) and IL in rats received camphor at a dose of 50 mg/kg compared to that of the control group. The reduction of ML indicates that camphor enhanced sexual desire and motivation, and the reduction of IL is suggestive of enhanced sexual performance. The enhancement of sexual desire by camphor might be mediated through the increase of the synthesis of testosterone in male rats. The peak of plasma testosterone levels in the rat occurs around 50-60 days of age.[12]

7. Anti-inflammatory and Antioxidative Activity- In vitro anti-inflammatory and anti-oxidative effects of Cinnamomum camphora extracts. Cinnamomum camphora Sieb (Lauraceae) has long been prescribed in traditional medicine for the treatment of inflammation-related diseases such as rheumatism, sprains, bronchitis and muscle pains. In this study, therefore, we aimed to investigate the inhibitory effects of Cinnamomum camphora on various inflammatory phenomena to explore its potential anti-inflammatory mechanisms under non-cytotoxic (less than 100 µg/ml) conditions. Cinnamomum camphora is an active, oriental herbal medicine used in various inflammatory diseases. In spite of its famous legacy, the pharmacological effects have not been fully explored from the immunopathological view point. The modulatory effect of Cinnamomum camphora on
macrophage-mediated inflammatory phenomena such as cytokine production, NO release, PGE2 release, functional activation of adhesion molecules and oxidative stress in order to understand its anti-inflammatory action.\textsuperscript{13}

8. Common cold associated with headache—Evaluation of the clinical efficacy and safety of the herbal cold balm in the treatment of the common cold associated with headache. \textit{Cinnamomum camphora} is a plant which contains a volatile oil comprising of camphor, safrol, linalool, eugenol etc. The oil has antimicrobial activity against common pathogens. It acts as reflex expectorant and is helpful in respiration as well as circulation. Topically it is used as a rubefacient and mild analgesic.\textsuperscript{14}

9. Immunoglobulin E-suppressing Activity—Identification of Dimethylmatairesinol as an Immunoglobulin E-suppressing component of the leaves of \textit{Cinnamomum camphora}. Immunoglobulin E (IgE) plays an important role in allergic diseases. The study shows that a methanol extract of leaves of the camphor tree \textit{Cinnamomum camphora} reduced the amount of IgE secreted by human myeloma U266 cells. When the methanol extract was fractionated by extraction with organic solvents, the ethyl acetate fraction showed the highest activity. The fraction was further separated into several subfractions by preparative TLC. It was identified that component of one of the active subfractions as dimethylmatairesinol. Thus, the extract of \textit{C. camphora} and its component including dimethylmatairesinol have potential as an anti-allergic agent.\textsuperscript{15}

**CONCLUSION**

Roots, branches, leaves, and wood of \textit{C. camphora} can be used for extracting camphor and camphor oil or pharmaceutical use and as a flavoring. The core of the fruit, which has both industrial and medicinal uses, is approximately 40 percent oil. The wood is used for construction, shipbuilding, and cabinet-making. A large proportion of the world’s camphor is now produced synthetically from the world’s camphor is now produced synthetically from

The large number of medicinal applications for cinnamon indicates the widespread appreciation of folk herbalists for its healing properties. In the Indian System of Ayurvedic medicine, it is used against a wide spectrum of diseases like bronchitis, colds, congestion, diarrhoea, dysentery, oedema, flu, gas, metabolic and heart strengthening, hiccups, indigestion, liver problems, menorrhagia, melancholy, muscle tension, nausea and vomiting. It assists uterine contractions during labour and menstrual pain from low metabolic function. For external applications, it is used against headaches and pain. In Unani medicine, it is used as a cephalic tonic and cardiac stimulant and for the treatment of coughs.

Flowers are used in the European tradition as a blood purifier. \textit{Cinnamomum camphora} may find its way to a diabetic’s daily diet. It contains a chemical called methoxy hydroxy chalcone polymer, which can reduce the blood glucose level. \textit{Cinnamomum camphora} is used for religious purposes also.

**REFERENCES**