

# An Updated Review on Camphor

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**Abstract-** The main aim of this literature review is to study of history, species, practical and therapeutic uses of Camphor. The camphor had been used from ancient times to treat various conditions. Camphor is a bicyclic organic compound. Wide variety of uses of this compound were mentioned in the Ayurveda and also followed from the ancient times. In homeopathy also camphor were used in small doses to treat various condition; use of camphor in the form of tincture, called as divine remedy. In this review tried to cover Its chemical constituents, different kind of preparations, pathophysiology and medicinal uses of camphor.

## INTRODUCTION:

Camphor is organic compound derived from *Cinnamomum camphora* Nees and Eberm (Family: Lauraceae) is chemically natural camphor and that formed in the stems of *Dryobalanops aromatica* Gaertn (Family: Dipterocarpaceae) is natural borneol.<sup>1</sup>

Ayurvedic Pharmacopoeia of India records Natural Camphor obtained during steam distillation of the leaves and barks of *Cinnamomum camphora* as the correct variety to be used in different Ayurvedic Formulations.<sup>2</sup>

Camphor is an FDA-approved topical antitussive, analgesic, and anesthetic used to treat cough, relieve pain, and relieve itchy skin. Camphor is easily absorbed through the skin, creating a feeling of cold or warmth and acting as a local anesthetic and antibacterial agent. It is mainly used for skin problems. Camphor is used to treat medical conditions in humans and is a natural poison to kill insects.<sup>3</sup> The antiviral property of camphor has been exploited for controlling coronavirus (SARS-CoV-2) disease (covid-19).<sup>4</sup> Camphor uses are different in different countries. It is used in the form of medicine, food-flavouring agent, in religious function, in aromatherapy and as a pain-relieving agent.

## History of Camphor

Camphor is a natural product derived from *Cinnamomum camphora* Nees. and Eberm (family: Lauraceae), and is a natural borneol formed from chemically produced camphor and the stems of *Dryobalanops aromatica* Gaertn (family: Lauraceae).

In the Syriac the form of the word is kapur; in the Greek two forms appear, kaphoura and kamphora; in Sanskrit karpura, but in all Indian vernaculars kapur or kappur.<sup>5</sup>

Usually,

Apakva (natural) Karpura: the camphor found on the tree pits and branches.

Pakva (artificial) variety of Karpura: the camphor prepared by using distillation procedure.

The former variety will be heavier than the later and sinks in the water. There is a variety called Bhimseni Karpura – which is correlated to *Dryobalanops camphora* Gaertn (Dipterocarpaceae).

There are explained four varieties of camphor viz.

1) Bhimseni or Baras Karpura (*D. camphora*)

2) Cini or Japani Karpura (*D. camphora*)

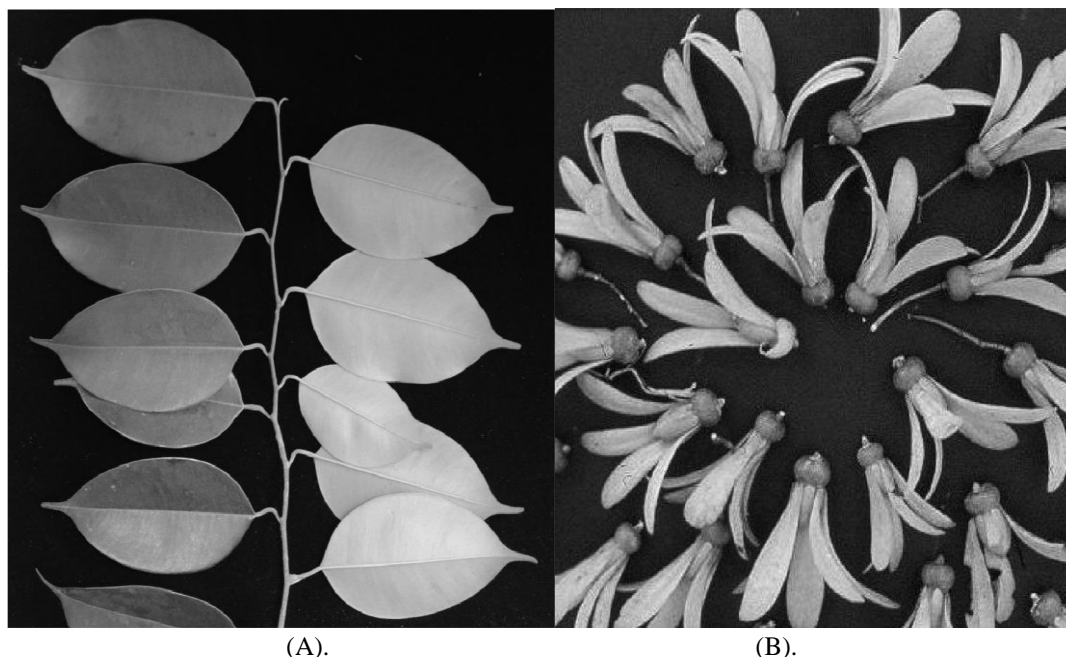
3) Patri or Nagi Karpura- *Blumea balsamifera*; *B. Lacera* *B. desiflora* etc.

4) Krutima Karpura- Synthetic variety camphor.

5) Now a days camphor is being synthetically prepared by using turpentine. This is however used for offerings to god. It is not meant for medicinal use.<sup>6</sup>

As per Indian Materia medica;

The first variety is very expensive in India. It is naturally formed on the stems of *Dryobalanops camphora*, which is cultivated on the island of Sumatra in the Netherlands and sinks in water.



(A).

(B).

*Dryobalanops aromatica* Gaertn (A) fresh leaves and (B) fresh fruit.<sup>7</sup>

Camphor is a solid bicyclic organic compound derived from the camphor laurel, a tree scientifically known as *Cinnamomum camphora*. It is a ketone of formula  $C_{10}H_{16}O$ . Camphor is a commonly available, nontoxic aromatic compound that is widely used for its anti-inflammatory and analgesic properties.

*Dryobalanops*, locally known as *kapur*, is a genus of large and tall trees from the Family Dipterocarpaceae. The genus consists of seven species which are widely distributed in Sumatra, Peninsular Malaysia and Borneo. The four species found in Brunei Darussalam are *Dryobalanops aromatica* Gaertn, *D. beccari* Dyeri, *D. lanceolata* Burck and *D. rappa* Becc. *D. aromatica*, commonly known as the Bornean Camphor-Tree, and locally known as *kapur peringgi*, is a large and lofty tree, Height: 65 m and Girth: 7 m.

Trunk: Usually a straight, cylindrical and clear bole of 30 m–40 m.

Timber: Moderately hard, heavy and durable.

This species is a well-known and valuable timber tree. It is used as an internal wood and resembles mahogany when given a good polish. It has a camphor odour, and the camphor in the wood was sought after and sold as medicine in the past.<sup>7</sup>

The species also produces camphoraceous oleo-resin. The uses of the wood and camphor of *D. aromatica* in both eastern and European medicines have been well documented. The camphor has also been used by the Malays and the Sumatran people in the ceremonial purification of dead bodies and their preservation until burial. A mixture of the volatile oils of *D. aromatica*, *Piper longum*, *Santalum album*, *Asarum sieboldi* and *Alpinia officinarum* is said to be effective in the treatment of acute anginal attack. The methanol extract of the wood is also shown to have antifungal properties.<sup>7</sup>

Camphor is the most versatile molecule with a multitude of applications. Camphor is used to treat medical conditions in humans and a natural poison to kill insects. The antiviral property of camphor has been exploited for controlling coronavirus (SARS-CoV-2) disease (covid-19).

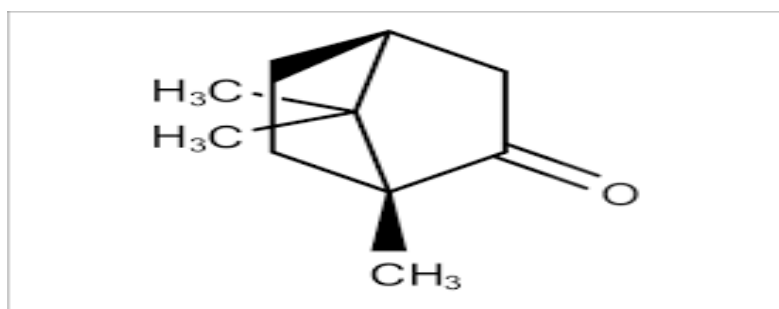


Fig.No.6.1: Structure of Camphor<sup>8</sup>

- **Chemical name:** 1,7,7-Trimethylbicyclo(2.2.1) heptan-2-one, 2-Bornanone
- **Empirical formula:**  $C_{10}H_{16}O$
- **Molecular weight:** 152.2334 gm/mole
- **CAS registry number:** a) Natural camphor [76-22-2]  
b) Synthetic camphor [ 76-22-21]
- Camphor is a cyclic monoterpene ketone that is bornane bearing an oxo substituent at second position.
- Camphor is FDA approved as a chest rub in concentration <11% used to treat cough.

### Chemical constituents of camphor

*D. aromatica* shows that it consists of 35% terpenes (including pinene), 10% alcohols (including borneol), 20% sesquiterpenes and 35% resin. The resin consists mainly of triterpenes and the oxygenated derivatives of asiatic acid as minor constituents. The camphor consists of borneol, camphor, camphene, sesquiterpenes and terpineol, while the wood extracts contain largely terpenes and fatty acids. Camphor (*Cinnamomum camphora*) has several chemical varieties, each with different essential oil compositions. The leaf of *Cinnamomum camphora* contains camphor, as the main component along with cineol, linalool, eugenol, limonene, safrole,  $\alpha$ -pinene,  $\beta$ -pinene,  $\beta$ -myrecene,  $\alpha$ -humulene, p-cymene, nerolidol, borneol, camphene and some other components.<sup>7</sup>

The reason behind the strong fragrance of its barks is the presence cinnamaldehyde compound. The leaf contains eugenol and isoeugenol for which its leaf imparts hard odour. It also contains the active minerals camphor, which is responsible for its overall properties. *Cinnamomum camphora* whole plant contains a volatile oil, camphor, safrole, linalool, eugenol, terpenol and lignans (including secoisolaricicresinol dimethyl ether and kusunokiol). The presence of safrole in the plant has carcinogenic property. The leaf oil is a natural resource of linalool (94.9%) and citronellal (2.4%).<sup>9</sup>

Modern studies and published result have proved that, the product obtained from *Cinnamomum camphora* Nees and Eberm (Family: Lauraceae) is chemically natural camphor and that formed in the stems of *Dryobalanops aromatica* Garten (Family: Dipterocarpaceae) is natural borneol.<sup>9</sup>

**Table No. 1.1: % Concentration of Camphor applied on skin to treat following conditions**

Disease Condition	% Concentration
Cough	Layer of 4.7% to 5.3% camphor ointment to chest and throat area
Itching	3% to 11% 3 to 4 times daily
Acute pain	3% to 11% 3 to 4 times daily

### Preparations of Camphor<sup>10</sup>

- Camphor Liniment
- Camphorated opium tincture
- Turpentine liniment
- Camphor ointment
- Camphor spirit
- Camphor water
- Camphor injection
- Camphorated Para chlorophenol
- Common camphor containing products include ointments often used for herpes simplex on the lips (usually <1% camphor), muscle liniments, rubefacients (usually 4%–7% camphor), and camphor spirits (usually 10% camphor). Paregoric, camphorated tincture of opium, contains a combination of anhydrous morphine (0.4 mg/mL), ethanol (46%), and benzoic acid (4 mg/mL) but only a small amount of camphor.

### Dose:

- 3 to 10 grains (194 mg to 647 mg) in pills, powder and in emulsion.
- 6 to 8 grains (388 mg to 518 mg) in pills which are used in uterine pains and liniment of Camphor rubbed on abdomen.

### Pathophysiology

The mechanism of toxicity of camphor is unknown. Camphor is an irritant. Pathologic changes following ingestion include cerebral edema, neuronal degeneration, fatty changes, centrilobular congestion of the liver, and hemorrhagic lesions in the skin, gastrointestinal tract, and kidneys.<sup>11</sup>

In particular, the analgesic and antipruritic action of the compound make it appreciated by a large number of consumers, by whom it is used in the form of essential oil for cutaneous application. Itch is a complex phenomenon, being difficult to localize and quantify and involving a variety of skin surface receptors, peripheral and central nerves and specific brain regions.

Camphor is an important remedy for symptomatic treatment of itching, especially in patients affected by contact dermatitis, because it goes to affect directly the cutaneous nerve ending, as other agents like pramoxine, phenol and menthol do.<sup>12</sup>

Camphor has also an important role in the treatment of cough and colds due to its antispasmodic activity, due to anti-histaminergic and anti-cholinergic action that causes depression of bronchospasm coupled with inhibition of cough.<sup>12</sup>

In most cases camphor intoxication occurred following accidental ingestion of camphor-containing product, and sometimes lethal episodes of intoxication of infants due to application of camphor to their nostrils were collected.

As it emerges from all the observed data the toxic risks of camphor-containing products in general, and of camphorated oil in particular, are connected essentially with its improper uses, *e.g.* accidental ingestion, but camphor does not represent a threaten for safety when used on the target patients, following the indicated dosages and the contraindications.<sup>13</sup>

In the past, when camphor was used medicinally, the oral doses ranged from 120-300 mg, and the parenteral dose range was from 60-200 mg (not recommended anymore).<sup>14</sup>

Camphorated oil can be used with no risks for safety when following the prescriptions. The relatively diffused tendency to the improper use of camphor (high dosages, accidental ingestion, use on infants) is connected with the perception of the product, by many consumers, as a sort of Opanaceao with no contraindication.

All the above considerations allow the conclusion that camphor in its form of camphorated oil can be safely used at the proposed dosages, on the indicated patients target, for topical application.

#### **Contraindication:**

Special care must be taken during pregnancy, due to the fact that camphor crosses the placental barrier, and camphor and camphor containing products should be avoided in children who have a history of febrile convulsions or other predisposing factors for convulsions.<sup>15</sup>

#### **Practical Uses of Camphor:**

##### **Digestive system**

This plant helps in secreting juices and enzymes helps to improve digestive system.

##### **Strong decongestant**

It acts as very powerful decongestant as instantly blocks the congestion that can create the problem in bronchi, pharynx, nasal tracts and lungs.

##### **Fungicide**

This cures fungal infections that occur on nails and skin.

##### **Cold and cough treatment**

It can be taken as steam as it forms a covering over the organs and gives relief from throat irritation and treating bronchitis.

##### **Aphrodisiac**

This plant helps to stimulate hormones levels that tend to increase sexual desire and urge.

##### **Anesthetic & Nervous Pacifier**

Camphor when applied to a skin or any other surface causes lack of sensation of the sensory nerves and reduces the severity of nervous disorders and convulsions, nervousness, epileptic attacks, and chronic anxiety; hence it acts as a good anesthetic and is very effective for local anesthesia.<sup>3</sup>

##### **In Cancer & Alzheimer's:**

Several studies have proved that some of the components of *Cinnamomum camphora* achieve suppressive and anti-mutagenic results on a variety of human cancer cells without harming the healthy cells.

Since *Cinnamomum camphora* has been very effective in treating and preventing some serious, life-threatening diseases; Camphor and its components should be investigated further as a viable option in the treatment of different types of cancer. Additionally, more studies on the application of camphor for patients with memory disorders and brain dysfunctions such as in autism and Alzheimers are needed.

##### **For heart, fat and cholesterol:**

Chedana, Lekhana – has scraping property, useful in balancing Kapha, in respiratory disorders and in cholesterol / clot deposition in blood vessels

Medohara – reduces fat and cholesterol levels Camphor acts as a blood thinning agent. It is also used in low blood pressure.

##### **For oral disorders:**

Mukhashoshahara – Relieves mouth dryness

Mukha vairasyahara – relieves bad breath problem. This is why camphor has been used as an ingredient in betel leaf combination

– Pan – Tambul Kanta Doshahara – clears throat. It relieves toothache.

Vishahara, Vishapaha – Anti toxic

Chakshushya – improves vision, good for eyes, useful in eye disorders

Madakaraka – over-dosage may cause intoxication.

Yogavahi – acts as a catalyst

Dahahara – being a coolant, it relieves burning sensation

Vrushya – acts as aphrodisiac in lower doses. However, higher doses decrease sexual performance.

Medhya – improves intelligence

Kruminashana – relieves intestinal worm infestation

Cheenaka variety of Karpooora is Ati Pittala – increases Pitta Dosha. Its vapors inhaled lead to relief from chest congestion due to excessive sputum. It is also used in cough treatment.

##### **External application:**

Camphor oil is used externally to treat arthritis pain and rheumatism. A teaspoon of Camphor oil is mixed along with 100 ml of olive oil / sesame oil. This is applied externally to improve blood circulation. Camphor is FDA approved for external application in a concentration of 3 – 11 %.

**In preparing liniments:**

Herbal oils are mixed with camphor, menthol, thymol, Eucalyptus oil etc., to prepare pain relieving liniment. This liniment gives a coolant / counter-irritant effect to the liniment. It also makes the liniment to evaporate from the applied body part.

**Ayurvedic medicines with camphor as ingredient:**

Karpoor rasa, Karpoor asava, Ark karpoor and Amrit bindu.

Vayu Gulika – used in treating cough, cold, fever etc. It is used mainly in respiratory and gastric conditions.

Kombanchadi Gulika – used in treatment of fever, cough and cold

Gandhaka Malahara – An ointment used in eczema and itching skin disorders

Karpoorasava – used in the treatment of vomiting and diarrhoea.

Manasamitra Vatakam – used in Ayurvedic treatment of psychiatric conditions, to improve intelligence, speech problems, etc.

**Therapeutic Uses of Camphor**

During 14th century plague the Black Death, outbreaks of small pox and cholera, Camphor was used as fumigant and considered as a valuable source of antiviral drugs. Since COVID-19 is also an infectious disease caused by the “novel corona virus”. As per the Advisory issued by Ministry of AYUSH. As a therapeutic aid camphor has been suggested and patients of COVID-19 are to be treated with adjuvant Homoeopathic medicines with the permission from local health authorities and Medical Superintendent of the Hospitals and Homoeopathic doctors in India. Camphor is a component of paregoric, an opium/camphor tincture from the 18th century. Also in the 18th century, camphor was used by Auenbrugger in the treatment of mania. Based on Hahnemann's writings, camphor (dissolved in alcohol) was also successfully used to treat the 1854-1855 cholera epidemics in Naples.<sup>16</sup>

Camphor is an active ingredient (along with menthol) in vapor-steam products, such as Vicks VapoRub. It is used as a cough suppressant and as a decongestant.<sup>17</sup>

Camphor may also be administered orally in small quantities (50 mg) for minor heart symptoms and fatigue. Through much of the 1900s this was sold under the trade name Musterole; production ceased in the 1990s.

It has long been used as a medical substance in ancient India, where it generally goes by the name Karpura. It has been described in the 7th-century Ayurvedic work Madhvacikitsa as being an effective drug used for the treatment of fever.

It is indicated in all disease that involves the three dosha i.e., vata, pitta and kapha. Camphor is a rare herb which, being coolant, balances Kapha Dosha and reduces fat and cholesterol levels. It helps relieve muscle cramps and pains when mixed with an effective oil base for example Mustard oil.<sup>6</sup>

- It is very effective for treating acne and acne scars etc. when mixed with coconut oil, olive oil etc.
- It is a great chest decongestant and can be used in vapor form to relieve severe cough and cold.
- It can be used as an effective treatment for hair loss. It is applied when mixed with coconut oil or mustard oil or any of the other such skin friendly oils and massaged over the head. It can help cure dandruff, head lice, itchy scalp.
- It is a great stimulant for the heart and the whole circulatory system.
- It can be used as a mouth cleanser to cleanse the saliva and improve the sense of taste.
- It improves the digestive secretions but it is only to be consumed in small amounts as over dosage of camphor causes indigestion, nausea and vomiting.
- It is a great diuretic and keeps the urinary system free of bacterial infestations.
- It is used in general to control excessive sweating and burning sensation of skin.
- It can treat hair-related problems such as dandruff, head lice, and itching of the scalp. Its strong odor protects animal substances from insect damage.

- **Anti-oxidant effects**

Camphor act as strong Anti-oxidant agent that kills away the free radicals in your body, thus preventing many liver disease and tissue ruptures and hurt troubles. It suppresses the effect of oxidative mechanism of action of camphor is camphor act a rubefacient when it is rubbed on the skin and causes localized vasodilation, which gives feeling of comfort and warmth.

- **Antispasmodic effects**

The monoterpenes present in the camphor showed Antispasmodic activity. It provides instant relief from spasms, cramps and provides relief to stomach. It easily absorbed in the skin epidermis where it stimulates nerve ending sensitive to heat cold and produces a warm and cool sensation to the body.

- **Anti-inflammatory effects**

It helps to decrease the cholesterol level in the body also helpful in relieving muscular pain, aches, chest congestion as well as rheumatism. Camphor oil has anti-inflammatory properties and is often used as an ingredient in vapour rubs, liniments and balms.

- **Act as Fungicide**

Camphor helps to cure fungal infection that occurs on nails and skin. Camphor is the essential bioactive compound of *Cinnamomum camphora* oil, exhibit strong antimicrobial activity by inhibiting pathogenic microorganisms including fungi.

- **Antiarthritic effects**

Camphor is known agonist of transient receptor potential vanilloid subtype 2, TRPA1 as well as TRPV1 quickly deactivating transient receptor potential channels resulting in long-term pain relief. It is a common ingredient in pain relief medications. It may help to treat muscle aches and pain while stimulating circulation by interacting with receptors on the sensory nerves. Camphor induced blockade of TRPA1 as well as desensitization of TRPV1, underlies the pain-relieving effects of camphor.



- **Narcotic effects**

It helps to relax the brain and nerves and act as narcotic. It has been applied as a topical anti-infective and anti-pruritic and internally as a stimulant and carminative.

### Indications and Usage of Camphor

Camphor uses are different in different countries. It is used in the form of medicine, food-flavouring agent, in religious function, in aromatherapy and as a pain-relieving agent.

Chinese uses camphor as a circulatory stimulant and healing agent whereas Japanese uses it as torch light material and add it in small quantity into fireworks to brighten the light.

In India camphor relates to spirituality and used in temple during morning and evening rituals. In household, it is used as camphoric fumes to clean the environment of house. Scientifically it is non-irritant to eyes and used in many religious functions in India.

In modern allopathic medicine, medicines containing camphor is used to relieve pain caused by breast engorgement by intramuscular injections.

- **Cough**

Cough is caused by poor digestion. Poor diet and fails to eliminate waste from the body leads formation of toxicity in the body in the form of mucus in the lungs. Edible camphor has a good role in reducing improper digestion and helps in expelling the mucus from the lungs because of its cold property camphor is beneficial in managing cough and its associated symptoms. Camphor possesses antitussive activity.

- **Pain reliever**

It is very good pain reliever, and very effective in convulsions and respiratory disorders. It has good role in respiratory system as it helps in expelling extra amount of mucus in the respiratory tract and improves the condition of throat and helps in increase in urine output.

It also acts as antipyretic agent and hence decreases the aggravated body temperature.

- **In respiratory disease**

Camphor, if taken internally in small doses acts as carminative, reflex expectorant and reflex stimulant of heart circulation as well as respiration. Camphor is used externally in catarrhal diseases of the respiratory tract and muscular rheumatism and internally in hypotonic circulatory regulation disorders.

- **Indigestion**

Edible camphor helps to improve the weak digestive fire because of its appetizer and digestive properties. However, it is advisable to consume camphor in small amount.

- **Obesity**

Edible camphor improves the digestive secretions and reduces toxicity in the body because of its appetizer and digestive properties. Edible camphor has also scrapped property as it helps to remove all the excess fat from the body.

- **Pneumonia**

It can improve chest congestion and inability. It is also used in high-grade fever, headache, delusions, and paralysis case.

- **For skin treatment**

Camphor has anti-fungal properties and has very good effect in skin infection. Camphor has been applied to relieve skin pain and reduce itching. Camphor stimulates the nerve endings that relieve pain and itching. It can be used in case of fungal infection, as camphor is active against the fungi. While before using camphor directly caution has to be taken to broken skin, as it enters the body quickly.

- **In homeopathy**

In homeopathy, camphor is known as “Camphora” which is derived from the compound camphor. Founder of homeopathy Samuel Hahnemann suggested the use of tincture and named it as “divine remedy”. He further suggested that camphor could remove pathological effects of many other drugs including homeopathy remedies. Camphor can be antidote opium.<sup>9</sup>

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