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REVIEW ARTICLE

Review on Pharmacological Activities and Homeopathic Uses of *Eucalyptus globulus*

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ABSTRACT

Medicinal plants are very important from very ancient times to treat the ailments. It is the oldest method of treatment and becomes very popular especially in developing countries. Eucalyptus an evergreen plant belonging to the family Myrtaceae is present in many countries such as Australia, California, Pakistan, New Zealand as well as tropical and subtropical countries. The dominant compounds are eucalyptin, eucalypton, gentisic acid and maslinic acid. It is a rich source of essential oils. Majority of the actions of the plant are attributed by its essential oil. The plant has wide application in homeopathic medicine. Traditionally it is known as folk medicine and used for treatment of various diseases such as digestive aid, carminative, antitussive, expectorant, stimulant, analgesic and in aromatherapy.

Keywords: Prevalence, pre-eclampsia.

Botanical Description of *Eucalyptus globulus*

Eucalyptus globulus is an evergreen and very tall tree gaining height of 90 m. Bark is of ash grey in color, smooth and peeling off in elongated strips. Leaves are arranged opposite on young shoots while alternate on older ones [1]. Mature leaves are dark shining green, narrow and sickle-shaped. Flowers are large, cream or white in color. Thick, warty and conical operculum cover the calyx tube in each flower. Fruit is a woody truncated capsule containg very small seeds present in it [2, 3], (Table **1**).

Table 1. Systemetic taxonomy.

Source	Vegetable kingdom
Order	Myrtales
Family	Myrtaceae
Genus	Eucalyptus
Species	*E. globulus*
Synonyms	In English: Blue gum leaves. In French: Feuilles d'eucalyptus. In German: Fiberbaum.
Part used for preparation of homeopathic mother tincture	Leaf
Homeopathically proved by	Roder, Allg. Hom. Zeit

Geographical Distribution

Eucalyptus globulus was originated from Australia, Tasmania, southern Europe and california but now cultivated in many tropical and sub-tropical areas [4].

Active Constituents

The dominant compounds in *E. globulus* are eucalyptin, eucalypton, 8-desmethyleucalyptin, 8-desmethylsideroxylin, sideroxylin, quercitrin, quercetin, quercetol, chrysin, rutin hyperoside, 4-hydroxytritriaconate-16-18-dione, *n*-tritriacontan-16-18-dione, 11,12-dehydroursolic lactone acetate, 16-hydroxy-18-tritriacontanone, caffeic acid, gallic acid, ferulic acid, gentisic acid, maslinic acid oleanolic acid and protocatechuic acids [5-8], (Figure **1**).

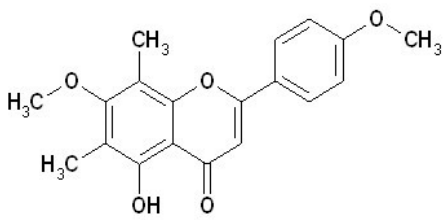

Figure 1. Structural formula of Eucalyptin.

Traditional Uses of *Eucalyptus globulus*

Eucalyptus globulus is a source of essential oils. Traditionally these essential oils were used as, cardiac tonic, oleaginous, astringent, deodrant, anodyne, carminative, anthelmintic, stimulant, diuretic, thermogenic, sudorific, expectorant, insect killer, antiseptic, rubefacient and fibrinolytic [9-11]. It is uesd in the treatment of cephalagia, tuberculosis, chronic cough, asthma, pneumosis, pyorrhoea, burns, dyspepsia, flatulence, threadworm infestation, cardiac debility, pharyngodynia, hoarseness, stranguary, skin diseases, chronic and intermittent fever, abcess, boils, arthritis, asthama, burns, diabetes, cancer, diarrhoea, dysentary, diphtheria, inflammatic conditions such as bronchitis, laryngitis, rhinitis, encephalitis, mastitis andenteritis [12, 13].

Method for Preparation of Mother Tincture

Leaves of *Eucalyptus globulus* are used to prepare its mother tincture (Figure **2**). 100g of *Eucalyptus globulus,* moist magma along with 914ml of strong alcohol is required to make one liter of mother tincture [14].

Figure 2. Leaves of *Eucalyptus globulus*.

Pharmacodynamics of *Eucalyptus globulus* Mother Tincture

It acts upon throat, respiratory system, urinary system, digestive system, immune system and muscular system [15, 16].

Physio-pathological Changes Produced by *Eucalyptus globulus* During Drug Proof

On proving, *Eucalyptus globulus* produced congestion by affecting throat, lungs and kidneys. Secretion of mucous membrane became increase. Hot, pungent taste of mouth along with increase salivation. Gastric juice production were increased lead to burning sensation in the stomach, odorous eructations and indigestion. *Eucalyptus globulus* causes diarrhoea of eucalyptol odor by increasing intestinal secretions. The spleen size be [17] comes decreased due to its hardness and contraction. After an hour of *Eucalyptus globulus* ingestion, odor of Eucalyptol was present in urine, increase urea excretion and cause congestion of kidneys [18-20].

Cardiovascular system was also affected by *Eucalyptus globulus*. It causes violent cardiac palpitations,increase respiration, lower arterial tension and intense headache but if it is given in repeated doses, it causes sadation, low pulse and lower the body temperature.

Extreme muscular debility was caused by taking 75 grains of *Eucalyptus globulus* characterized by numbness of the limbs and painful movement due to feelings of excessive weight in them. Sweat glands were also activated and produce exessive sweat [21, 22]. homeopathic medicine are based on simila similibusus caurenture,like cure like so homeopthaic pharmacopeia is different with allopathic pharmocopia. Similar symptoms causes cure to healthy individual [23].

Homeopathic Uses

Homeopathically, *Eucalyptus globulus* mother tincture was used as disinfectant and used externally to treat bad conditioned and foul-smelling ulcers and wounds [24,25]. Influenza,malaria, gastric, intestinal catarrh and atonic dyspepsia are treated by *Eucalyptus globulus.* Locally *Eucalyptus globulus* is applied as influential antiseptic. It also treats the relapsing or intermittent type of fever, toxaemic and exhaustic symptoms of typhoid, vascular tumours of the female urethra. It relieves spasmodic strictures, vesical catarrh, nodular swellings over joints, enlargements of glands and cure gonorrhoea. In all conditions,

periodicity of symptoms, burning picking, stabbing, sharp pains and sensations are dominate especially at night along with desire of exercise [26, 27].

Relationship with Other Homeopathic Medicine

It can be compared with its own other species and products as well as with Anacardium, Hydrastis and Kali sulph. It antidotes ill effects of Strychnin [28].

Pharmacological Activities

Antibacterial Activity of *Eucalyptus globulus*

In a study, Oils from *Eucalyptus globulus, Melaleuca alternifela* and *Cinnamomum cassia Blume* were evaluated for antibiotic activity against *Staphylococcus aureus* (Gram positive) and *Escherichia coli* (Gram-negative) bacteria. On Kirby-Bauer disk diffusion assays, *Eucalyptus globulus* expressed 0.313%, *Melaleuca alternifela* expressed 1.25%and *Cinnamomum cassia Blume* expressed 0.0391% minimum Inhibitory concentration (MIC) values. Among all oils, cinnamon bark oil was more effective than others [29].

Essential oil from fruits of *Eucalyptus globulus* was evaluated for its chemical composition and antibacterial potential against multidrug resistant bacteria. Aromadendrene, 1,8-cineole and globulol were major constituents found inessential oils of Eucalyptusglobulus. These constituents were tested individually as well as combinally for their antibacterial activity by using microdilution method.Multidrug-resistant bacteria including vancomycin-resistant enterococci (VRE), Enterococcus faecalis and methicillin-resistant Staphylococcus aureus (MRSA) were inhibited by oil of *Eucalyptus*. The results revealed that aromadendrene have greater antimicrobial potential than 1,8-cineole and globulol [5, 30].

In a research study, essential oils were extracted from the leaves of *Eucalyptus globulus* by using hydrodistillation method. Dilution broth and agar disc diffusion methods were used to evaluate antimicrobial potential of extracted oils against *Staphylococcus aureus* and *Escherichia coli*. Results expressed significant antibacterial potential of *Eucalyptus globulus* leaves and suggest its use as best natural antibiotic for several infections caused by tested bacteria [31].

In another study, essential oil of leaves were extracted from *Eucalyptus camaldulensis* and *Eucalyptus globulus* were used to evaluate antibacterial activity against two bacteria, *Staphylococcus aureus* and *Escherichia coli*. Micro atmosphere, aromatogramme and germs in suspension were used for this purpose. Results verified brilliant antimicrobial potential of both species leaf essential oils against *S. aureus* and less inhibitory effects against *E. coli* [32].

Leaves extract of *Eucalyptus globulus* was evaluated for its antibacterial potential against several bacteria including *Staphylococcus aureus*, *Streptococcus pyogenes*, *Streptococcus pneumoniae* and *Haemophilus influenzae*, isolated from 200 specimens of patient suffring from respiratory tract disorders. Results of this study expressed the effects of *Eucalyptus globulus* leaf extract and suggested for further investigation of *E. globulus* regarding respiratory tract infections treatment [33].

A study was conducted to evaluate chemical constituents of *Eucalyptus globulus* essential oil as well as its antimicrobial activity against bacterial, fungal and yeast strains which were responsible for food spoilage. The disc volatilization and agar dilution methods were used for both in liquid and vapour phase to evaluate antimicrobial activity. Solid phase micro extraction-gas chromatography mass spectrometry (SPME GC-MS) gas chromatography/mass spectrometry (GC-MS) and gas chromatography (GC) were used for both in liquid and vapour phase to evaluate chemical contents of *Eucalyptus globulus*. Results expressed significant higher antimicrobial activity of vapour phase and 1,8-cineole as the major component of *Eucalyptus globulus* essential oil [34].

In another study, *Eucalyptus globulus, Rosmarinus officinalis* and *Thymus algeriensis* essential oils were evaluated for their antimicrobial activity and chemical profile. Gas chromatography/mass spectrometry (GC-MS) was used to analyse chemical constituents. Results expressed 1,8-cineole (79.85%) and (43.99%) as major component of *Eucalyptus globulus* and *Rosmarinus officinalis* essential oils respectively. While *Thymus algeriensis* essential oil contain high content of borneol. Antibacterial acticvity expressed significant results of all essential oils against seven pathogenic bacteria. Among all, *Thymus algeriensis* exhibited greatest bactericidal and bacteriostatic potential then *Eucalyptus globulus* and *Rosmarinus officinalis* [35].

Antioxidant Activity of *Eucalyptus globulus*

Sephadex LH-20 column was used to make four fractions of *Eucalyptus globulus* wood hydrolysates (ethyl acetate-soluble fraction) in which mobile phase was of methanol. These fractions and raw extracts were analysed for their phytochemical composition as well as antioxidant activity by using DPPH radical-scavenging method. Among all tested materials, fraction 4 expressed excellent antioxidant activity in which ellagic acid was the major phenolic content [36, 37].

In an *in vitro* study *Corymbia ficifolia* (F. Muell.) and *Eucalytus globulus* Labill leaves extracts were evaluated for their antioxidant, antibacterial potential and phenolic contents. HPLC/MS method was used to analyze quality and quantity of phenolic contents in both extracts. Both extracts of leaves expressed high concentration of phenolic contents, chiefly flavonoids. *E. globulus* expressed highest amount of hyperoside flavonoid (666.42 ± 5.02 µg/g dw plant material) while *C. ficifolia* leaves expressed highest amount of myricetin flavonoid (124.46 ± 0.24 µg/g dw plant material). In antibacterial analysis, *C. ficifolia* extract expressed significantly high antibacterial potential than *E. globulus* against gram-positive and gram-negative bacterial strains except *Bacillus subtilis.* Hemoglobin ascorbate peroxidase activity inhibition (HAPX), DPPH, TEAC and inhibition of lipid peroxidation catalyzed by cytochrome c assays were used to evaluate antioxidant potential for both extracts which expressed significant results [38].

CONCLUSION

The present study concluded that that *E. globulus* process many pharmacological activities alcoholic dilution in the form of homeopathic medicine, extract and crude dosage shows a best microbial, antifungal and contain ability to oxides the free radicals.

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