



International Journal of Research in Pharmacology & Pharmacotherapeutics



ISSN Print: 2278-2648

IJRPP |Vol.6 | Issue 1 | Jan - Mar - 2017

ISSN Online: 2278-2656

Journal Home page: www.ijrpp.com

Research article

Open Access

To Study the Pharmacological Effect and Beneficial Effect of *Eucalyptus Globulus* in Different types of Diseases

Priyanka Sonker*, Smita Verma, Polly Gupta

Assistant Professor of Pharmacology, Prasad Institute of Technology, Jaumpur (U.P.) India

*Corresponding author: Priyanka Sonker

Email: priyankasonker2016@gmail.com

ABSTRACT

The plant *Eucalyptus globulus*, On the basis of study conducted on, it was found that *Eucalyptus* has storage of active constituent present in its parts; traditionally it is necessary to explore its importance as an excellent nerving herb. The review describes several pharmacological activities. The main constituent such as 'eucalyptol' are responsible for biological activities which include the local anaesthetic, antispasmodic, musculorelaxant, antimycotic, sedative, anticonvulsive, analgesic and neuroprotective effects etc. which proves it has potent psychoactive ability. This review confirms the therapeutic and biological value of this plant. The results of the studies shows that this plants are important for uses of human and animal disease therapy. The main chemical constituent (1-8 cineole) are responsible for various activities. This constituent is present in its leaves oil, it is also known as eucalyptol. Essential oils are common group of natural product present in aromatic medicinal plants. Essential oils and other extract of plants are of interest as source of natural product [1].

Keywords: *Eucalyptus Globules*, Neuroprotective Neurophysiological, Analgesic, Antibacterial, Chemical Constituent.

INTRODUCTION

Eucalyptus Globules

Eucalyptus Globules is the Tasmanian blue gum, southern blue gum or blue gum, is an evergreen tree, one of trend it was most widely cultivated trees native to Australia. They typically grow from 30–55 m tall. The tallest currently known specimen in Tasmania is 90.7 m tall [1]. *Eucalyptus globules*, was discovered on the island of Tasmania in 1792 by French explorers one of the first eucalypt species to be formally described. The primeval eucalypt forests

of Tasmania were amongst the tallest forest in the world and *Eucalyptus globulus* trees up to 101 m in height were recorded. By the late 1800 trees 60-90 m high were regularly harvested from south-eastern Tasmania and shipped throughout the world for wharf piles [2]. *Eucalyptus globulus* is a member of Myrtaceae. It is an evergreen tree & popularly known as the blue gum and also called fever tree. The leaves are leathery in texture, hang obliquely or vertically. *Eucalyptus* leaf extract has been used to treat influenza, chest problem, skin rashes and its vapour

inhaled in cases of inflammation of respiratory tract. [3]

Biological Descriptions

Leaves

The Eucalyptus leaves are evergreen but some tropical species lose their leaves at the end of the dry season. Although mature Eucalyptus trees are usually towering and fully leafed. [3]

Macroscopic characteristics

Visual examination of morphological characters of leaf.

Leaf colour

Dark green & dull green

Size of leaf

12.5 cm in length & 3.5 cm in breadth

Shape of leaf

Lanceolate & oblong

Venation of leaf

Pinnate [sec. Veins pairs oppositely]

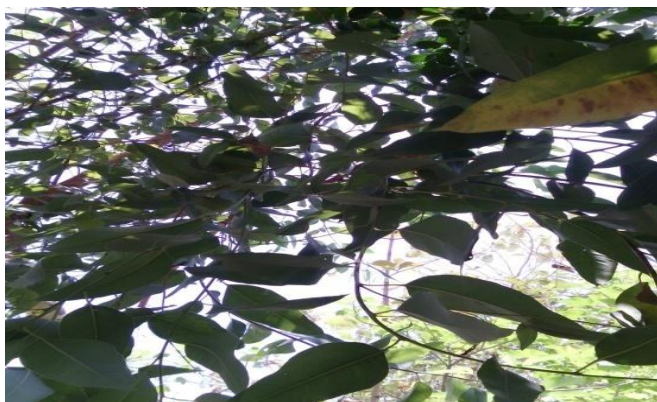


Figure No1. *Eucalyptus Globules*

Scientific Classification

Kingdom	: Plantae
Class	: Magnoliapsida
Order	: Myrtales
Family	: Myrtaceae
Genus	: Eucalyptus
Species	: Globulus

Botanical Information

Species used	: The family includes more than 500 species such as
E. biostatic	: Southern Blue Gum, Eurabbie, Victorian Blue Gum
E. globules	: Tasmanian Blue Gum
E. maiden	: Maiden's Gum
Synonyms	: Southern blue gum, Tasmanian blue gum, Maiden" gum
Category	: Strong nervine and anxiolytic
Plants parts used	: Leaf and Barks

Morphological Description

The *Eucalyptus globulus* bark sheds often, peeling in large strips. The broad juvenile leaves are borne in opposite pairs on square stems. They are about 6 to 15 cm long and covered with a blue-grey, waxy bloom, which is the origin of the common name "blue gum". The mature leaves are narrow, sickle-shaped and dark shining green. They are arranged alternately on rounded stems and range from 15–35 cm (5.9–13.8 in) in length. The buds are top-shaped, ribbed and warty and have a flattened **operculum** (cap on the flower bud) bearing a central knob. The cream-colored **flowers** are borne singly in the leaf axils and produce copious **nectar** that yields a strongly flavored **honey**. The **fruits** are woody and range from 1.5–2.5 cm (0.59–0.98 in) in diameter. [4]

Geographical Distribution

Eucalyptus globulus is naturally distributed in Tasmania and south-eastern Australia, but is now

widely planted and naturalized in subtropical regions around the world. In tropical Africa it is found in cool highland regions, especially in Ethiopia, where it was introduced around 1890. The introduction of *Eucalyptus globulus* to Ethiopia is said to have played a major role in the development of the country. [5]

Eucalyptus oil

Eucalyptus oil is the generic name for distilled oil from the leaf of *Eucalyptus*, a genus of the plant

family Myrtaceae native to Australia and cultivated worldwide. Eucalyptus oil has a history of wide application, as a pharmaceutical, antiseptic, repellent, flavouring, fragrance and industrial uses. The leaves of selected *Eucalyptus* species are steam distilled to extract eucalyptus oil. [6]

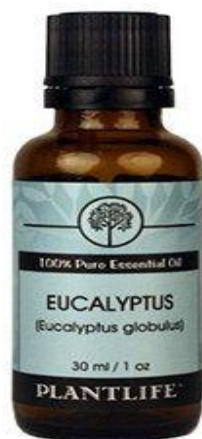


Figure No.2 Eucalyptus oil

Types & Production

Eucalyptus oils in the trade are categorized into three broad types according to their composition and main end-use: medicinal, perfumery and industrial [7]. The most prevalent is the standard cineole-based "oil of eucalyptus", a colourless mobile liquid with a penetrating, camphoraceous, woody-sweet scent.

China produces about 75% of the world trade, but most of this is derived from camphor oil fractions rather than being true eucalyptus oil. Significant producers of true eucalyptus oil include South Africa, Portugal, Spain, Brazil, Australia, Chile and Swaziland [8].

Global production is dominated by *Eucalyptus globulus*.

However, *Eucalyptus kochii* and *Eucalyptus polybractea* have the highest cineole content, ranging from 80-95%. The British Pharmacopoeia states that the oil must have a minimum cineole content of 70% if it is pharmaceutical grade. Rectification is used to bring lower grade oils up to the high cineole standard required. Global annual production of eucalyptus oil

is estimated at 3,000 tonnes. The eucalyptus genus also produces non-cineole oils, includes piperitone, phellandrene, citral, methyl cinnamate and geranyl acetate [9]. Eucalyptus oil should not be confused with the term "eucalyptol", another name for cineole.

Uses of Eucalyptus oil

Medicinal and antiseptic

The cineole-based oil is used as component in pharmaceutical preparations to relieve the symptoms of influenza and colds, in products like cough sweets, lozenges, ointments and inhalants. Eucalyptus oil has antibacterial effects on pathogenic bacteria in the respiratory tract.[10] The Inhaled eucalyptus oil vapors are a decongestant and treatment for bronchitis.[11] Cineole controls airway mucus hyper secretion and asthma via anti-inflammatory cytokine inhibition. Eucalyptus oil also stimulates immune system response by effects on the phagocytes ability of human monocyte derived macrophages. [12]

Eucalyptus oil also has anti-inflammatory and analgesic qualities as a topically applied liniment ingredient. [13]. Eucalyptus oil is also used in personal hygiene products for antimicrobial properties in dental care [14] and soaps. It can also be applied to wounds to prevent infection. [15]

Repellent and biopesticide

Cineole-based eucalyptus oil is used as an insect repellent and biopesticide. In the U.S., eucalyptus oil was first registered in 1948 as an insecticide and miticide.[16]

Flavouring

Eucalyptus oil is used in flavouring. Cineole-based eucalyptus oil is used as a flavouring at low levels (0.002%) in various products, including baked goods, confectionery, meat products and beverages. [17]

Fragrance

Eucalyptus oil is also used as a fragrance component to impart a fresh and clean aroma in soaps, detergents, lotions and perfumes. It is known for its pungent. [18]

Industrial

Research shows that cineole-based eucalyptus oil (5% of mixture) prevents the separation problem with ethanol and petrol fuel blends. Eucalyptus oil also has a respectable octane rating and can be used as a fuel in its own right. However, production costs are currently too high for the oil to be economically viable as a fuel. [19]

Phellandrene- and piperitone-based eucalyptus oils have been used in mining to separate sulfide minerals via flotation.

Safety & Toxicity

If consumed internally at low dosage as a flavouring component or in pharmaceutical products at the recommended rate, cineole-based 'oil of eucalyptus' is safe for adults. However, systemic toxicity can result from ingestion or topical application at higher than recommended doses. [20]

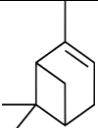
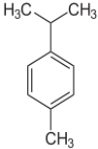
The probable lethal dose of pure eucalyptus oil for an adult is in the range of 0.05 mL to 0.5 mL/per kg of body weight. [18] Because of their high body surface area to mass ratio, children are more vulnerable to poisons absorbed transdermally. Severe poisoning has occurred in children after ingestion of 4 mL to 5 mL of eucalyptus oil. [21]

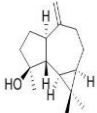
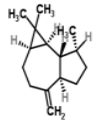
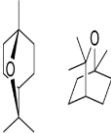
PHYTOCONSTITUENTS

Flavonoids, Eucalyptin, hyperoside, quercetin, quercitrin and rutin. Volatile oils 0.5-3.5%. Eucalyptol (cineole) 70-85%. Other monoterpenes (e.g. Alpha pinene, beta pinene, camphene) and sesquiterpenes (e.g. Aromadendrene, alloaromadendrene, globulol, epiglobulol, ledol), The major components of the leaf oils were α -pinene (0.05–17.85%), p-cymene (trace-27.22%), krypton (0.00–17.80%) and spathulenol (0.12–17.00%). In contrast, the fruit, bud and branch oils contained α -thujene (0.00%, 11.95% and trace respectively), 1, 8-cineole (15.31%, 36.95% and 56.96% respectively) and aromadendrene (23.33%, 16.57% and 8.24% respectively) [22].

Other constituents' tannin and associated acids (e.g. Gallic acid, protocatechuic acid), caffeic acid, ferulic acids, gentistic acid, resins and waxes. [23] The main constituent in eucalyptus is 1-8 cineole, it plays a very important role in pharmacological activities. 1-8 cineole is only present in its eucalyptus oil. [24]

Table-1: List of distribution of chemical profile of *Eucalyptus* plants.

Constituent	Structure	Activity	Reference
Alpha-pinene		Antimicrobial, Anti-inflammatory, Antioxidative, Anticancer	(AT Rufino,2013; E.Ayden,2013)
p-cymene		Antitumor, Antinociceptive	(Weiss, 2014)

Spathulenol		Antimicrobial	(J.chem. Soc,1986)
Aromadendrene		Synergistic	(S. Mulyanings, 2010)
1-8 cineole		Anti-inflammatory, Antinociceptive,	(ER. Hendry, 2009)

Medicinal uses

Uses supported by clinical data

Short-term symptomatic treatment of mild states of anxiety or insomnia, due to nervousness, stress or tension.

Uses described in pharmacopoeias and in traditional system of medicine:

To induce relaxation, reduce weight and treat fungal infection.

Uses supported by experimental data:

Effective as local anaesthetic, antispasmodic, musculorelaxant, antimycotic, sedative and analgesic and neuroprotective effects.

Uses described in folk medicine, not supported by experimental or clinical data:

Treatment of asthma, common cold, cystitis, gonorrhoea, headache, menstrual irregularities, UTI infection, and warts antidepressant, anti-stress. [25]

General Uses

Timber

Blue gum timber is yellow brown fairly heavy with an interlocked grain & is difficult to season. It can be used in construction, fence posts & poles.

Essential oil

The leaves are steam distilled to extract eucalyptus oil. *E. Globules* are primary source of global eucalyptus oil production. Oil has therapeutic, perfumery, flavouring, antimicrobial & biopesticide properties [24].

Herb tea & honey

Blue gum flower are considered a good source of nector & pollen for bees.

Phenolics

Its bark contain quinic, caffeic acid, dihydroxyphenylacetic acid, myricetin, methylellagic acid & eucalbanin.

PHARMACOLOGICAL ACTIONS

Various Pharmacological activities reported in this plant such as diabetic, inflammation, malarial, bacterial infection, neurological disorder and other CNS disorder (epilepsy, depressant etc).

In vitro and animal studies

Anti-inflammatory effect

Results show that pre-treatment with *E. globules* extracts significantly inhibits iNOS mRNA expression. This study thus suggests that the inhibition of net NO production by these two extracts may be due to their NO scavenging activity and/or their inhibitory effects on iNOS gene expression.

Antibacterial effect

These results suggest that further studies to clarify the possible therapeutic role of *E. Globules* leaf extract in the treatment of respiratory tract infection are warranted. [26]

Neurophysiologic effect

The effects eucalyptus oil preparations on neurophysiologic, psychological and experimental algometric parameters were investigated in 32 healthy subjects in a double-blind, placebo-controlled, randomized cross-over design. Four

different test preparations were applied to large areas of the forehead and temples using a small sponge and their effect were evaluated by comparing baseline and treatment measure. Eucalyptus oil and ethanol increased cognitive performance and had a muscle-relaxing and mentally relaxing effect, but had little influence on pain sensitivity. [27]

Antidiabetic effect

The leaves of *Eucalyptus globulus* are used for the treatment of diabetes mellitus in traditional medicine. The aim of this study was to evaluate the effects of eucalyptus on streptozotocin induced damage in pancreatic islands by stereological methods. The result suggested that *Eucalyptus globules* with a dose dependent manner ameliorates diabetic states by partial restoration of pancreatic beta cells and repair of STZ- induced damage in rats. The study suggests a beneficial effect of eucalyptus in the treatment of diabetes. [28]

Antioxidant effect

Crude extract from fruit of *Eucalyptus globules* was screened for its in vitro antioxidant properties. These results suggest that fruits of *E.globulus* have interesting antioxidant activities [6].

Anthelmintic Activity

It was found that oil inhibited the radicals to about 68% and it kill the earth worms at 37min at the highest concentration (100g/ml v/v).

Synergistic effect

The use of this compound of *Eucalyptus globulus* may represent an important source of bioactive compounds and an alternative for the treatment of respiratory infectious disease caused by *P. Aeruginosa*.

Lipid Per oxidation effect

The results indicate that the aqueous extract of *E.globulus* leaves may have deleterious effects on liver membrane structure and functional integrity

Anticancer effect

Methanolic crude extracts of *Eucalyptus globulus* and *Tinosopra Cordifolia* grown in natural and industrial polluted condition were investigated for their anticancer activity against MCF-7 breast cancer cell lines to study the pollution effect on cytotoxicity [29].

Table 2: List and details of experimental studies conducted on *Eucalyptus* plant.

Activity	Part	Animal	Dose	Ref.
Antioxidant & hepatoprotective	Aqueous extract	Rat & mice	250mg/kg	Abdel,et al.,(2005)
Wound healing	Ethanol extract	Rats	5-20mg/kg	Shukhla,etal.,(2006)
Hypoglycaemic	Aqueous extract	Diabetic rats	150 & 2000mg/kg	Hassan,et al(2013)
Anti-inflammatory	Essential oil	Wistar rats		Joachin,et al(2013)
Lipid per oxidation	Aqueous extract	Rats	120mg/kg	Arise,et al.,(2009)
Anticancer	Metholic extract	Rats	200mg/kg	Prema,et al.,(2013)
Antidiabetic	Aqueous extract	Albino rats	20g/mg	Moudi,et al.,(2010)

CONCLUSION

The literature survey proves that *Eucalyptus globulus* are very useful for medical treatment. The chemicals of this plant such as volatile oil which have been use in medicine therapy. Some eucalyptus species have also widely used for their various pharmacological actions like analgesic, antifungal, antifungal, anti-inflammatory, antibacterial, antidiabetic, antioxidative, antiviral, antitumor,

anticancer, hepatoprotective properties. The main chemical constituent (1-8 cineole) are responsible for various activities. This constituent is present in its leaf oil, it is also known as eucalyptol. Essential oils are common group of natural product present in aromatic medicinal plants. Essential oils and other extract of plants are of interest as source of natural product [30].

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