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E-Mail :

editor.ijasem@gmail.com

editor@ijasem.org



www.ijasem.org

Fundamentals of Eucalyptus Oil Extraction and Use

Y.V.VEERENDRANADH,DR. I.V RAMARAO,U. SAMBAMOORTHY

ABSTRACT;The aboriginal people of Australia and Tasmania have long recognized the many benefits of the evergreen tall tree eucalyptus (*Eucalyptus spp.*). The *E. globulus* species in particular sees extensive commercial usage for the extraction of eucalyptus oil, which finds use in several industries including perfumes, cosmetics, food, beverages, aromatherapy, and phytotherapy. The primary and most significant component isolated from eucalyptus leaves, 1,8-cineole (eucalyptol), showed antibacterial and anti-inflammatory properties. Research has proven that eucalyptus has a variety of health benefits, but further studies are needed to determine the plant's other primary effects and its potential use in the treatment of a wider range of pathological disorders.

I. INTRODUCTION

There has been a rise in the demand for medicinal plant extracts in recent decades [1]. Primary health care with aromatic herbs is common in many countries [2], particularly in rural regions, and is practiced by as much as 80% of the population in poor nations [3]. Because of the various biological activities of oils, including antimicrobial [4, 5], antioxidant [6], and anti-inflammatory, the use of essential oils extracted from plants for clinical purposes has become an important topic in scientific research and industrial application.

There are around 900 species and subspecies of the Myrtaceae family's genus *Eucalyptus* (*Eucalyptus spp.*). Originally from Australia and Tasmania, this tall evergreen tree is the second biggest genus after acacia [7]. Since its introduction in the 1850s, it has spread to 90 countries, making it one of the world's most significant and extensively planted genus [8]. The

aboriginal inhabitants of Australia employed the eucalyptus plant for both medicinal and culinary uses throughout history. In modern times, people have found several uses for this plant, including in the fields of forestry (wood, fuel, paper pulp), environmental planting (water and wind erosion management), and the pharmaceutical and perfume industries as a source of essential oil [7]. The *E. globulus* is one of the most extensively exported *Eucalyptus* species [9], where it has been successfully grown in the subtropical and Mediterranean areas [10] and even in Nigeria. *E. globulus*, known by a variety of local names (eucalyptus in Bengali and Hindi, blue-gum eucalyptus in English, and Karpuramaram in Tamil [11]), is widely used in the pulp industry and for the commercial extraction of eucalyptus oil (henceforth EO), which has found widespread use in the fragrance, cosmetics, food, beverages, aromatherapy, and pharmacology industries.

Department of PHARMACEUTICS^{1,2,3}
NRI College Of Pharmacy,
Pothavarappadu Village, AgiripalliMandal, Krishna Dist, Andhra Pradesh pin Code:521212

Researchers and environmentalists from all over the globe study eucalyptus trees because they provide a fast-growing supply of wood and oil with several applications. As a result of its antibacterial, antiseptic, antioxidant, anti-inflammatory, and anticancer effects [12,13], the oil is extracted from leaves, fruits, buds, and bark and used to treat respiratory disorders such the common cold, influenza, and sinus congestion [14,15]. The purpose of this study is to show the good and healthy features and prospective uses of eucalyptus plants by providing and collecting relevant scientific information.



Fig.1EucalyptusOil

1. INTRODUCTORY PROFILE

1.1 Synonyms

- CaswellNo.618A
- Dinkumoil
- EPAPesticideChemicalCode040503
- Essentialeucalyptus oil
- Essentialoils,eucalyptus
- Eucalyptusabsolute(EucalyptusglobulusLabille)
- Eucalyptuscitriodoraoil
- Eucalyptus citriodora oil
(Eucalyptuscitriodora)
- Eucalyptusconcrete(EucalyptusglobulusLab.)
- Eucalyptusglobulusoil
- Eucalyptusoil
- Eucalyptusoil(EucalyptusglobulusLabille)
- Eucalyptusterpenoile
- Eukalyptusoel
- Eukalyptusoel[German]
- FEMANo.2466
- Oileucalyptusglobulusormacarthuri
- Oilofeucalyptus
- Oils,essential,eucalyptus
- Oils,eucalyptus
- Redgum
- UNII-2R04ONI662.[16]

1.2 Biological Source

When the fresh leaves of many Myrtaceae species, including *Eucalyptus globulus*, *E. polybractea*, *E. viminalis*, and *E. smithii*, are distilled, the resulting essential oil is known as eucalyptus oil [18].

1.3.1 Originating Area

The continents of Australia and Tasmania, the United States, Spain and Portugal, Brazil, North and South Africa, India, France, and Southern Europe are the most common places to find it [18].

1.4 History

The intermittent fever treatment of choice for many years has been eucalyptus globulus. In cases of dyspepsia, catarrh of the stomach, typhoid fever, asthma, whooping cough, etc., the leaves and their preparations have been employed as a tonic, stimulant, stomachic, with positive results. Its use as a diuretic in the management of dropsy has gained popularity as of late [17].

1.5 Characteristics

The trunk of a eucalyptus tree, which may reach heights of 300 feet or more, is coated in peeling, papery bark. The opposing, sessile, delicate, oblong, pointed, hoary blue leaves may be found on a young plant for up to five years. Mature leaves are scimitar-shaped, alternating, petioled, and leathery. The blooms stand alone and are pure white in color; they also lack petals.

You may dissolve eucalyptus oil in its own weight

of alcohol, and it has a distinct aroma and flavor. The oil is colorless or straw-colored. The British Pharmacopoeia specifies that eucalyptus oil must have a specific gravity between 0.910 and 0.930, an optical rotation between -10 degrees and 10, and a concentration of at least 55% (by volume) eucalyptol.

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliophyta
Class	Dicotyledons
Subclass	Rosidae
Order	Mytales
Family	Myrtaceae
Genus	Eucalyptus
Species	<i>Eucalyptus globulus Labill.</i>

1.3 Scientific Classification [19] Table:1

1.4 Vernacular Names

Various Indian regions and languages have given it its own names.

Gum Tree (English), Gum Eucalyptus (English), Neelgir (Hindi), Nilgiri (Kannad), and HaritParn (Gujrati) are all names for the same plant, *Eucalyptus globulus*.

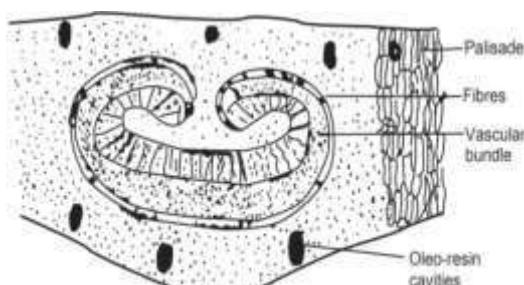
1.5 Major Species [15]

Major Species of Eucalyptus	Major Species of Eucalyptus
<i>Eucalyptus amygdalina</i>	<i>Eucalyptus microtheca</i>
<i>Eucalyptus australiana</i>	<i>Eucalyptus nitens</i>
<i>Eucalyptus botryoides</i>	<i>Eucalyptus ovata</i>
<i>Eucalyptus calophylla</i>	<i>Eucalyptus pauciflora</i>
<i>Eucalyptus camaldulensis</i>	<i>Eucalyptus perriniana</i>
<i>Eucalyptus citriodora</i>	<i>Eucalyptus pilularis</i>
<i>Eucalyptus cladocalyx</i>	<i>Eucalyptus polyanthemos</i>
<i>Eucalyptus consideriana</i>	<i>Eucalyptus polybractea</i>
<i>Eucalyptus cypellocarpa</i>	<i>Eucalyptus populnea</i>
<i>Eucalyptus dives</i>	<i>Eucalyptus radiate</i>
<i>Eucalyptus gigantean</i>	<i>Eucalyptus regnans</i>
<i>Eucalyptus globulus</i>	<i>Eucalyptus risdonii</i>
<i>Eucalyptus gomphocephala</i>	<i>Eucalyptus robusta</i>
<i>Eucalyptus grandis</i>	<i>Eucalyptus rossi</i>
<i>Eucalyptus gunnii</i>	<i>Eucalyptus rostrata</i>
<i>Eucalyptus incrassate</i>	<i>Eucalyptus saligna</i>
<i>Eucalyptus kino</i>	<i>Eucalyptus sideroxylon</i>
<i>Eucalyptus largiflorens</i>	<i>Eucalyptus sieberiana</i>
<i>Eucalyptus lesouefii</i>	<i>Eucalyptus smithii</i>
<i>Eucalyptus macrocarpa</i>	<i>Eucalyptus tereticornis</i>
<i>Eucalyptus macrorhyncha</i>	<i>Eucalyptus tetrodonta</i>
<i>Eucalyptus maculata</i>	<i>Eucalyptus umbra</i>
<i>Eucalyptus marginata</i>	<i>Eucalyptus urophylla</i>
<i>Eucalyptus melanophloia</i>	<i>Eucalyptus viminalis</i>
<i>Eucalyptus melliodora</i>	<i>Eucalyptus wandoo</i>

There are over 500 species of Eucalyptus. The major ones are enlisted below, (Table:2).

1.6 Microscopy

Each side of a eucalyptus leaf is identical. Both surfaces have depressed, anomocytic stomata. Polygonal epidermal cells have a thick cuticle and straight anticlinal walls. Each epidermis is protected by three or four layers of elongated palisade cells. Some of the cells in the spongy parenchyma that forms between the palisades are studded with clusters and prisms of calcium oxalate. Places with Palisades exhibit large subglobular oleoresin cavities. The midrib region shows no collenchymatous cells. Transverse section through the midrib region shows nearly uninterrupted or coiled pericyclic fibres just outside the vascular bundle.



T.S. (schematic) of eucalyptus leaf

Fig.2T.S(schematic)ofeucalyptusleaf

1.7 MorphologicalCharacters

- As the flower opens, it sheds its cup-shaped covering (thus the name of the species, which comes from the Greek for "well covered," eucalyptus). The fruit has a cup-like receptacle made of wood and is filled with tiny seeds. After four or five years, the plant develops new leaves that are more sword-shaped in shape, 6 to 12 inches in length, bluish-green in color, and alternate and vertical, i.e. with the edges turned towards the sky and earth, an arrangement more suited to the climate and productive of peculiar of light and shade. It blooms alone or in small groups, and its stem is almost invisible.
- The mature shape of a eucalyptus may range from a small shrub to a massive tree. Species may be broadly classified according to three distinct patterns of behavior.

2.2BotanicalInformation

The family contains more than 500 species, including the useful E. biostatica. Blue Gums of the South, Eurabbie, and Blue Gums of Victoria Australian Blue Gum, or Eucalyptus globules

Maiden's Gum, or E. maiden

It is also known as Maiden's Gum, Southern Blue Gum, and Tasmanian Blue Gum.

Nervine and anxiolytic substances of high potency.
Utilized Plant Parts: Branches and Leaves

2. Phytoconstituents

Fresh eucalyptus leaves are distilled in water to produce the oil used in medicine. When correctly produced, it is a clear or straw-colored fluid with a distinct odor and flavor that dissolves in its own weight of alcohol. E. globulus contains up to 70% eucalyptol by volume, making it one of the most essential components.

3. ChemicalConstituents

Seventy-five to eighty-five percent of the volatile oil in eucalyptus is 1,8-cineole, also called eucalyptol. In addition to p-cymene and -pinene, you'll find aldehydes, ketones, and alcohols, as well as a trace amount of sesquiterpenes like ledol and aromadendrene. Flavonoids such as eucalyptin, hyperoside, and rutin; polyphenolic acids like ferulic acid, caffeic acid, and gallic acid.

- **ChemicalConstituentsoftheLeavesofEucalyptusGlobulus**

- Oxygenated monoterpenes, monoterpenes, and sesquiterpenes were the primary components of the essential oil. Numbers 1-8 and
- The most abundant oxygenated monoterpenes in eucalyptus were - terpineol (2.54%), terpiene- 4-ol (0.34%), and linalool (0.24%), whereas the most abundant oxygenated sesquiterpenes were - eudesmol (0.39%), (-)-globulol (2.77%), and epilobulol (0.44%). The chemicals

terpineolacetate (3.1%), geranyl acetate (0.71%), and Lpinocarveol (1.1%) were very noteworthy.

- Combined, these three compounds account for 0.36 percent of the mixture. Unknown components account about 0.26 percent of the whole.
- **ChemicalConstituentsintheFruitofEucalyptus Globulus**

Fifteen compounds were obtained and identified as betasitosterol, betulinic acid, stigmasterol, eu-

scaphic acid, 2-hydroxybetulinic acid, macrocarpal B, macrocarpal A, oleanolic acid 3,4,3'-O-trimethyl elladic acid, 3-O-methyl ellagic acid 4-O-(2''-O-acetyl)

-alpha-Lrhamnopyranoside, 3-O-

methyl ellagic acid, ellagic acid and gallic acid [24].

- **ChemicalConstituentsoftheWoodofEucalyptusGlobulus**

The main compound identified included sterols, sterolesters, fatty acid, steroid ketones, hydrocarbons and triglycerides. Minor compounds such as fatty acids, mono-and diglycerides, waxes and tocopherols were also identified among the lipids from E. globulus wood. Sterols, sterolesters, fatty acids, steroid ketones, hydrocarbon and triglycerides were the major compound identified.

4. TypesandProduction

According to its chemical make-up and intended use, the eucalyptus oil commerce divides its wares into three basic categories: medical, fragrance, and industrial. The most common kind is the "oil of eucalyptus" made from standard cineole; it is a colorless, mobile liquid with a strong, camphoraceous, woody-sweet aroma.

About 75% of global production comes from China, however this is mostly camphor oil fractions masquerading as eucalyptus oil. Countries including South Africa, Portugal, Spain, Brazil, Australia, Chile, and Swaziland are major producers of genuine eucalyptus oil.

Eucalyptus globulus accounts for the vast majority of global output. However, the cineole concentration is maximum (80-95% or so) in Eucalyptus kochii and Eucalyptus polybractea. In order to be considered pharmaceutical grade, the oil must contain at least 70% cineole, as specified by the British Pharmacopoeia. Oils of a lesser quality may be rectified to meet the requisite high cineole level. The yearly output of eucalyptus across the world An estimated 3000 tons of oil. Non-cineole oils, such as piperitone, phellandrene, citral, methylcinnamate, and geranyl acetate, are also produced by the eucalyptus genus. Do not mistake eucalyptol, which is another name for cineole, with eucalyptus oil.

5. Uses of Eucalyptus oil

Oil has several medicinal purposes, including as a stimulant, antiseptic, flavoring agent, fragrant, deodorant, expectorant, antibacterial, febrifuge, diuretic, and antispasmodic. Asthma, bronchitis, and

other respiratory conditions, as well as a sore throat and a cold, may all benefit from a vapour bath containing this herb.

- **Medicinal and antiseptic**

Cough drops, lozenges, ointments, and inhalants are just a few examples of the medicinal items that use oil derived from cineole to alleviate the discomfort of the common cold and influenza. It has been shown that eucalyptus oil may kill off respiratory tract pathogens. Decongestant and bronchitis therapy, inhaling eucalyptus oil vapors. By inhibiting anti-inflammatory cytokines, cineole prevents asthma and reduces mucus excess production in the airways. Effects on the phagocytic capacity of human monocyte-derived macrophages are another mechanism by which eucalyptus oil promotes the immune response. Topical use of eucalyptus oil in the form of a liniment has been shown to have anti-inflammatory and analgesic effects. For its antibacterial characteristics, eucalyptus oil is frequently used in dental care and soaps. Additionally, it may be used to treat wounds and stave against infection.

- **Repellent and biopesticide**

Eucalyptus oil containing cineole is a biopesticide and insect repellent. The United States initially approved the use of eucalyptus oil as an insecticide and miticide in 1948.

- **Flavouring**

- Flavoring using eucalyptus oil is common. Eucalyptus oil derived from cineole is utilized as a flavoring in a variety of items, including baked goods, candies, meat products, and drinks, at very low concentrations (0.002%).**Fragrance**
- Soaps, detergents, lotions, and perfumes all employ eucalyptus oil because of its fresh, clean scent. It has a reputation for being very.

- **Industrial**

The separation issue with ethanol and gasoline fuel mixes may be avoided, according to studies, by adding 5% cineole-based eucalyptus oil to the mixture. The octane value of eucalyptus oil is high enough that it may be used as a fuel in its own right. However, the high cost of manufacturing prevents the

- **Essential oil**

The leaves are steam distilled to extract eucalyptus oil. Globules are primary source of global eucalyptus oil production. Oil has therapeutic, perfume, flavouring, antimicrobial & biopesticide properties.

- **Herb tea & honey**

Blue gum flower is considered a good source of nectar & pollen for bees.

- **Phenolics**

Its bark contains quinic, caffeic acid, dihydroxy phenylacetic acid, myricetin, methyl ellagic acid & eucalbanin.

oil from becoming commercially feasible as a fuel source. In the mining industry, eucalyptus oils containing phellandrene and piperitone have been put to use in the flotation process for separating sulfide minerals.

- **Toxicology & Safety**

Cineole-based 'oil of eucalyptus' is safe for adults if taken internally at modest dosages as a flavoring component or in medicinal goods at the prescribed rate. However, systemic toxicity may occur if dosages taken orally or applied topically are larger than what is safe.

Pure eucalyptus oil may be fatal to an adult at a dosage of between 0.05 and 0.5 milliliters per kilogram of body weight. Children are more susceptible to transdermal toxin absorption due to their larger body surface area. Children have had severe poisoning after ingesting only 4 to 5 milliliters of eucalyptus oil.

- **Therapeutic applications**

- **Benefits shown by clinical evidence**

A short-term symptomatic therapy for uneasiness, stress, or tension-related moderate anxiety or sleeplessness.

Uses documented in both modern medical literature and historical pharmacopoeias

As a means of relieving stress, cutting calories, and combating yeast infections.

- **Applications backed by evidence from experiments**

Useful as a local anesthetic, with additional benefits including antispasmodic, musculorelaxant, antimycotic, sedative, analgesic, and neuroprotective properties.

Uses mentioned in traditional medicine that have no basis in science Antidepressant, antistress treatment for asthma, the common cold, cystitis, gonorrhea, headache, menstrual irregularities, UTI infection, and warts.

- **In General:** 5.2 Timber

Timber from the blue gum tree is a difficult species to season because of its heavy, yellow-brown color, interlocking grain, and heft. It's used for building materials, fence posts, and utility poles.

6. Therapeutic Application

Eucalyptus (Myrtaceae) is one of the world's most important and most widely planted genera. In Australia, this genus is the second largest genus, after Acacia, and contains about 750 species. UAs an expectorant for symptomatic treatment of mild inflammation of the respiratory tract and bronchitis. Also for symptomatic treatment of asthma, fever and inflammation of the throat described in pharmacopoeias and in traditional systems of medicines. Treatment of cystitis, diabetes, gout, arthritis, kidney disease (unspecified), laryngitis, leucorrhoea, malaria, pimples, ringworm, wounds, ulcers, of the skin, urethritis and vaginitis uses described in folk medicine.

edicines, but not supported by experimental or clinical data[43].

6.1 Air Fresheners

Most of eucalyptus oils are in aromatherapy lamps, electric room diffusers, and spray mists. To make a simple mist spray, Dilute 50 to 100 drops or so of essential oils in 4 fluid ounce (120ml) of pure water. Spray to refresh and cleanse the air.

6.2 Allergy

Eucalyptus is used in many of allergies.

- **Bronchitis:** A nagging cough that lingers and causes difficulty in breathing is often symptomatic of bronchitis.
- **Congestion:** Congestion in the airways, lungs, sinus and chest makes breathing difficult and being sick even more miserable.
- **Sinus:** The cold that lingers may not be just a cold. The congestion and headache may be signs of a sinus infection.
- **Asthma:** Eucalyptus has been shown to help ease breathing in asthma.

6.3 Antiseptic

The medicinal Eucalyptus oil is probably the most powerful antiseptic of its class, especially when it is old, as ozone is formed in its exposure to the air. It has decided disinfectant action, destroying the lower forms of life[45].

6.4 Stimulant

Eucalyptus oil is used as a stimulant and antiseptic gargle. Locally applied, it impairs sensitivity. It increases cardiac action[45].

6.5 Antimalarial

Its antiseptic confers some antimalarial action, though it cannot take place of Cinchona[46].

6.6 Anthelmintic action

For some years Eucalyptus-chloroform was employed as one of the remedies in the tropics for hookworm. Due to the presence of phytochemical constituents such as borneol, cineol, linalool, geranyl acetate, saffrol, and heptadecane which it exhibits its anthelmintic action of different intestinal worms[46].

6.7 Spasmodic action

In croup spasmodic throat troubles, the oil may be freely applied externally[47].

6.8 UTI and RTI Infection

An emulsion made by shaking up equal parts of the oil and powdered gum-arabic with water has been used as a urethral injection, and has also been given internally in drachms doses in pulmonary tuberculosis and other microbial diseases of the lungs and bronchitis..

6.9 Irritant action and parasitic Infection

In large doses, it acts as an irritant to the kidneys, by which it is largely excreted, and as a marked nervous depressant ultimately respiration by its action on the medullary center. In veterinary practice. Eucalyptus oil is administered to horses in influenza, to dogs in distemper, to all animals in septicemia.

6.10 Antihistaminic

Hexane extract of leaves, ethanol extract of fruits & leaves of *Eucalyptus globulus* inhibited IgE dependent histamine release from RBL-2H3 cells.

7.11 Antiviral

Twelve euglobals from *Eucalyptus globulus* & their twenty-six related compounds were examined for their inhibitory effects on Epstein-Barr virus activation by a short term in vitro assay. The results showed the most of the euglobals having monoterpene structures, & euglobal-III had strong inhibitory activity. Grandinol, homograndinols showed stronger inhibitory effects.

7.12 Antitumor

Antitumor-promoting activity of Euglobals Ia1, Ia2, Ib, Ic, IIa, IIb, IIc, III, IVa, IVb, and V and VII waste sted invitro on 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced Epstein Barr virus early antigen (EBV-EA) activation test system. Euglobal-III showed strong inhibitory activity, followed by euglobals Ib, IIa, Ic, Ia1, Ia2. *Eucalyptus globulus* oil inhibits the nuclear translocation of NF-kappa B induced by LPS in THP-1 cells.

7.13 Antifungal

Treatment of human facial demodicidosis with freshly prepared camphor oil (*Eucalyptus globulus*) with or without glycerol dilutions gave complete cure with concentrations of 100%, 75%, and 50%. *Eucalyptus globulus* leaf extracts and oil showed antifungal property as they progressively inhibited the growth of *Malassezia furfur* and *Sabouraud's dextrose agar medium*.

7.14 Antibacterial

A 50% EtOH extract of *Eucalyptus globulus* leaves yielded eight phloroglucinol-sesquiterpene-coupled constituents, including three novel compounds named macrocamps, H, I and J. Some of these compounds possessed antibacterial activity against oral pathogenic microorganisms with MIC values ranging from 0.20 µg/ml to 6.25 µg/ml. A 50% EtOH soluble material was extracted from the dried leaves of *E. globulus*. The extract showed appreciable antibacterial activity against *S. Mutans*, *Ingbritt* & *P. gingivalis* ATCC33277 (causes dental caries & periodontal disorders) using the broth dilution method (MICs were 12.5 & 6.25 µg/mL, respectively) [53].

7.15 Antiviral

Euglobal-G1,-G2 and -G3 strongly inhibited the Epstein Barr virus activation. Euglobal-G1-G5 isolated from leaves of *Eucalyptus grandis* exhibited significant inhibitory effects on Epstein-Barr virus (EBV) activation induced by the tumor promoter, 12-O-tetradecanoylphorbol-13-acetate (TPA).

7.16 Anticancer

Phloroglucinol-monoterpenederivative, euglobal-G1 (EG-1), was obtained from the leaves of *Eucalyptus grandis* as an active constituent inhibited the promotion stages on two-stage carcinogens induced by both TPA-type & non TPA-type promoter (fumonisin B1) and inhibited the pulmonary tumorigenesis induced by 4-NQO & glycerol. Therefore, EG-1 might be valuable as a chemo protective agent in chemical carcinogenesis.

7.17 Hepatoprotective

Ursolic acid isolated from the leaves of *Eucalyptus hybrid* E. tereticornis showed a dose-dependent (5-20 mg/kg) hepatoprotective activity (21-100%) in rats against thio acetamide, galactosamine and carbon tetrachloride induced hepato toxicity in rats.

7. PHARMACOLOGICAL ACTIONS

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

Invitro and animal studies

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

Antibacterial effect

These results suggest that further studies to clarify the possible therapeutic role of *E. Globulus* leaf extract in the treatment of

respiratory tract infection are warranted.

Neurophysiologic effect

The effects eucalyptus oil preparations on neurophysiologic, psychological and experimental alg esimetric 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 eucalyptol increased cognitive performance and had muscle relaxing and mentally relaxing effect, but had little influence on pain sensitivity.

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 islets by stereological methods. The results suggested that *Eucalyptus globulus* 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.

Antioxidant effect

Crude extract from fruit of *Eucalyptus globulus* was screened for its in vitro antioxidant properties. These results suggest that fruits of *E. globulus* have interesting antioxidant activities [58].

Anthelmintic Activity

It was found that oil inhibited the radical to about 68% and kill the earth worms at 37 min at the highest concentration (100g/ml/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 Peroxidation 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 *Tinospora 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.

II. CONCLUSION

In conclusion, studies conducted on *eucalyptus* plant demonstrated its biological activities, due to the multitude of compounds contained in the leaves, stem and roots. In particular, the abundance of bioactive secondary metabolites, such as terpenoids, tannins, flavonoids, and phloroglucinol derivatives confers both the antiviral and antibacterial effects that explain the traditional use of the plant as an antiseptic and in the treatment of respiratory tract infections. Among the genus *Eucalyptus*, the species *E. globulus* is the most widely cultivated in the subtropical and Mediterranean regions, which have therapeutic importance thanks to its phytochemical compounds. However, despite these several known healthy effects of eucalyptus plant, further studies are necessary to investigate other prime effects of the plant and the possible implication in the treatment of other pathological conditions, and in case of plant toxicity, to define diffusion of injuries prevention strategies. A variety of *Eucalyptus* species have also been widely studied for their various therapeutic activities, like Analgesic, Antiviral, Anti-Inflammatory, Antibacterial, Antidiabetic, Antioxidative, Antitumor, Anti-histaminic, Anticancer, and hepatoprotective properties. In present review, we have made an attempt to conglomerate the description, phytochemical, therapeutic application and information on *Eucalyptus* species.

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