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Review Article

A Review Article on Eucalyptus Plant and Their Pharmacological Activities

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ABSTRACT

Eucalyptus, an evergreen tall tree native to Australia and Tasmania, has been used since ancient times by the aboriginal population for several purposes. In particular, the species *E. globulus* is widely used in the pulp industry, as well as for the production of eucalyptus oil extracted on a commercial scale in many countries as raw materials in perfumery, cosmetics, food, beverages, aromatherapy and phytotherapy. The 1,8-cineole (eucalyptol), the principal and the most important constituent extracted from eucalyptus leaves, demonstrated an antimicrobial and anti-inflammatory activities. Eucalyptus is the most generally established hardwood crop in the tropical and subtropical world on account of its prevalent development, wide versatility and multipurpose wood properties. Eucalyptus globulus is a shrubby plant or a blossoming tree having a place with the family Myrtaceae. The phytochemical and pharmacological investigations discussed in this review attest to Eucalyptus globulus' medicinal benefits. Phytochemicals derived from plants have been promoted as effective replacements for several ailments. Numerous research has demonstrated the wide range of qualities exhibited by Eucalyptus globulus, including anti-inflammatory, anticancer, antibacterial, antiseptic, and astringent effects.

INTRODUCTION

Eucalyptus is a large genus of the Myrtaceae family, which includes 900 species and subspecies. This evergreen tall tree is native from Australia and Tasmania and is the second largest genera after acacia. [1]. In recent decades, the demand for plant derived products for therapeutic uses has been increased [2]. In many countries worldwide aromatic herbs are used in primary health care, especially in rural areas [3], and 80%

of the populations in developing countries use these traditional resources [4]. Therefore, unless the species from which it is obtained is specified, the term "Eucalyptus oil" is scientifically useless. Several different kinds of Eucalyptus trees produce essential oils, with some having more pungent foliage than others and the oils from the various species having quite different properties. Eucalyptus leaves have long been utilized by the Aborigines (original Australians) to treat wounds

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and fungus diseases.[5]. In this brief review, the authors will focus the attention on eucalyptus, which is a plant used for several purposes. is considerably used in the pulp industry, as well as for the production of eucalyptus oil (henceforth EO), extracted on commercial scale in many countries and adopted in perfumery, cosmetics, food, beverages, aromatherapy and phytotherapy [6]. Eucalyptus plants draw the attention of researchers and environmentalists worldwide because it represents a fast-growing source of wood as well as a source of oil used for several purposes. The oil is extracted from leaves, fruits, buds and bark showing antibacterial, antiseptic, antioxidant, anti-inflammatory, anticancer activities [7, 8].

The aromatic constituents of EO are used as analgesic, anti-inflammatory, and antipyretic remedies [9]. Juergens et al., examined the role of eucalyptol as inhibitor of the production and synthesis of tumor necrosis factor- α (TNF- α), interleukin-1 β (IL-1 β), leukotriene B₄, and thromboxane B₂ in human blood monocytes, suggesting that eucalyptol is a strong inhibitor of cytokines that might be suitable for long term treatment of airway inflammation in bronchial asthma and other steroid-sensitive disorders [10]. Moreover, in a double-blind, placebo-controlled trial, the anti-inflammatory activity of eucalyptol was evaluated in patients with severe asthma suggesting the efficacy of this molecule and a new rationale for its use as mucolytic agent in upper and lower airway diseases [11]. These results should help to clarify functional applications for the future of eucalyptus plant and its EO in anti-inflammatory treatments.

BOTANICAL DESCRIPTION

Leaves

Most of the species of eucalyptus is evergreen but at the end of the dry season there are some species

who lose their leaves. Therefore, the mature one is usually are very tall and fully leafed the shade of their leaves are somewhere patchy because they hang towards the ground. On the mature eucalyptus tree, the leaves are often lanceolate, petiolate, waxy or glossy green and apparently alternate, Fig. 1.2 shows eucalyptus leaves clearly. As opposed to the seedling on the leaves is usually glaucous and opposite sessile but we can see many inconsistency in their figure.

Flower

The flowers and fruit which are capsule or gumnuts the most recognizable characteristics of Eucalyptus species. Fluffy stamen is in numerous numbers which is present on flowers these stamens may be off some colors and these are pink or red, cream, pink, yellow. Stamens which are often confined within a cap which is called as an operculum and this situation remain present in bud. Operculum is composed of both petals or fused sepals. Eucalyptus flower doesn't have petals to decorate themselves they have numerous stamens their most prominent feature which unite their genus is when the stamens expands then the operculum is forced off.

Bark

Observe as we can see the eucalyptus bark it may be varying from the age of the tree. Therefore, there is no as such common identifying features of the eucalyptus bark though it has smooth bark because every year the old bark dries and sheds there are also some species of eucalyptus which have fascinating multicolored bark such species are rainbow eucalyptus (*Eucalyptus deglupta*) native to the south East Asia. there are some more varieties of eucalyptus tree which have stringybark. In many species of eucalyptus dead bark is retained [12].





a (Leaves)



b (Flower)



c (Bark)

Scientific Classification [13]

Kingdom	Plantae
Subkingdom	Tracheobionta
Super Division	Spermatophyta
Division	Magnoliophyte
Class	Dicptyledons
Subclass	Rosidae
Order	Myrtales
Family	Myrtaceae
Genus	Eucalyptus
Species	<i>Eucalyptus Globulus</i>

Pharmacological Uses

Eucalyptus oil is used as an anti-septic and anti-spasmodic stimulant agent in bronchitis, asthma and minor respiratory complaints [14]. By using externally, it has increasing effects on blood flow and skin temperature. Therefore, it has been used in semi-solid dosage forms for the treatment of cough, to promote scar formation in burns and injuries and as an anti-rheumatic agent. It is used as an inhalant because 1,8-cineole is a well-known medicinal component that causes a sensation of cold and this is accompanied with a facilitated respiration [15]. Thus it is often inhaled in asthma, pharyngitis and related conditions [16].

Anti-inflammatory

The aromatic constituents of EO are used as analgesic, anti-inflammatory, and antipyretic remedies [17]. Juergens et al., examined the role of eucalyptol as inhibitor of the production and synthesis of tumor necrosis factor- α (TNF- α), interleukin-1 β (IL-1 β), leukotriene B₄, and

thromboxane B₂ in human blood monocytes, suggesting that eucalyptol is a strong inhibitor of cytokines that might be suitable for long term treatment of airway inflammation in bronchial asthma and other steroid-sensitive disorders [18]. Moreover, in a double-blind, placebo-controlled trial, the anti-inflammatory activity of eucalyptol was evaluated in patients with severe asthma suggesting the efficacy of this molecule and a new rational for its use as mucolytic agent in upper and lower airway diseases [19]. These results should help to clarify functional applications for the future of eucalyptus plant and its EO in anti-inflammatory treatments

1, 8-cineole, one of the main components in Eucalyptus violat oil, is known to reduce airway inflammation in cases of bronchial asthma and other steroid-sensitive conditions.[20]

one of the major constituent of Eucalyptol are used as analgesic, it exhibit the anti-inflammatory as well as anti-pyretic effect within. The major constituent which is present in volatile oil of eucalyptus is 1-8cineole which help in the airway inflammation in bronchial asthma and other steroid sensitive disorder [21].The essential oil which is extracted from the various parts of the eucalyptus globulus which produced anti- inflammatory effects as it can be demonstrated by the inhabitation of rat paw edema induced by carrageenan and dextran, carrageenan and histamine is responsible for the vascular permeability[22].The oil which is extracted from the leaves of the eucalyptus which exhibit the anti-inflammatory and has an effect on chronic bronchitis induced by

lipopolysaccharide in rats and the inhibition effect on hypersecretion of airway mucins[21].

Analgesic Activity

Eucalyptus globulus oil induced analgesic effects. Analgesic effect was demonstrated by i.p. injection at doses of 10 or 100 mg/kg (rats, positive control: morphine; HED=1.6 and 16 mg/kg) and by subcutaneous injection at doses of 0.1, 10 and 100 mg/kg (acetic acid induced writhing mice; HED=0.16, 1.6 and 16 mg/kg). The effect of 1,8-cineole (oral administration) in mice on chemical (acetic acid and formalin) nociception. In the formalin test, a dosage of 400 mg/kg (HED=32.5 mg/kg) inhibited significantly the paw licking response while a dosage of 200 mg/kg (HED=16.2 mg/kg) inhibited only the second phase. The incidence of abdominal constriction response was found to be significantly less even in the lowest dose of 100 mg/kg (HED=8.1 mg/kg). Anti-nociceptive effects of 1,8-cineole was examined in rats and mice (tail-flick, hot plate). A dosage of 0.3 mg 1,8-cineole/kg in rats (i.p.) provoked a significant effect on reaction time to nociceptive effects in rats, while changes in reaction in mice, could not be seen. The β -pinene in-vivo studies: anti-nociceptive effects of β pinene were examined in rats and mice (tail-flick, hot plate). The β -pinene provoked a supra spinal anti-nociceptive action in rats only (0.3 mg/kg, i.p.).[23,24]

Antiseptic and Antibacterial Effects

The most potent is undoubtedly the medicinal Eucalyptus oil. Especially when it is outdated like ozone is, it is the best class antiseptic. exposed to the air, formed in it. It has chosen to use disinfection destroying the lower form of life through action.[25] Eucalyptus plant was used traditionally as antiseptic and for the treatment of respiratory tract infections [26]: the herb is, in fact, very helpful for colds, flu, sore throats and chest infections including bronchitis and pneumonia [27]. Several studies showed a moderate antimicrobial activity of EO from E. globulus both

on Gram-negative (Salmonella enteritidis, Escherichia coli and Pseudomonas aeruginosa) and Gram-positive bacteria (Staphylococcus aureus, Enterococcus faecium, Listeria monocytogenes 4b and Listeria monocytogenes EGD-e) and a bacteriostatic activity against all strains tested (with the exception of Pseudomonas aeruginosa) [28]. This effect on bacteria may be attributed to the dominant presence of eucalyptol which, in the past, has demonstrated a strong antimicrobial activities against many important pathogens [29]. To strengthen these results, other researchers showed a significant activity of EO from different Eucalyptus species against various microorganisms, including human pathogen spoilage bacteria, Candida albicans [30], Propionibacterium acnes and Pityrosporum ovale [31]. These studies supported the potential use of EO (specifically from E. globulus and E. bridge Siana) as natural preservative for food and pharmaceutical industries, which may be useful as an alternative antimicrobial agent in natural medicine for the treatment of numerous infectious diseases.

Antibacterial Activity

The emerging concern of the ineffectiveness of conventional antimicrobial agents, as well as the growing multidrug resistant strains, as a global threat, generated a true need for the exploration of natural alternatives, with a potent antibacterial potential to cure infectious diseases that were an increasing threat to human health [32,33]. Thus, the antibacterial impact of different parts of the plant, as well as their essential oils, have been greatly investigated for tremendous Gram-positive and Gram-negative bacterial strains, The extracted essential oil from fruits exerted pronounced antibacterial potency against tested multidrug-resistant bacteria. Furthermore, the combination of 1,8-cineole and aromadendrene from fruit oils produced a higher inhibition through an additive and synergistic effect against methicillin-resistant Staphylococcus aureus, Streptococcus pyogenes,



and *Bacillus subtilis*, as compared to using a single compound [34]. The antibacterial efficacy was ascribed to the highest percentage of oxygenated monoterpenes (87.32%) in *Eucalyptus* leaf oil, and the synergism also resulted from other minor components [35]. The antimicrobial effects of the methanolic extract from leaves, against *S. aureus* and *B. subtilis*, could be attributed to the existence of tannins and saponins [36]. Similarly, leaf extracts proved the anticariogenic activity, due to the existence of sesquiterpene alpha-farnesene that would lead to an advancement of effective drugs for the treatment of dental caries [37].

Antioxidant Activity

The increasing awareness of synthetic antioxidants motivated a number of scholars, on a global scale, to identify alternative antioxidants of plant origin, to avoid the unfavourable effects of synthetic antioxidants [38,39,40]. In this regard, the antioxidant potential of different *Eucalyptus* plant parts (leaves, fruits, roots, and stump wood) as well as their essential oils were formerly reported as being able to be utilized to diminish oxidative stress-associated diseases, and also as food preservatives [38,41,42,43]

The leaf essential oil of Nigerian-grown *E. globulus* exhibited a low antioxidant capacity via its potential to scavenge DPPH radicals, with elevated IC₅₀ values (136.87 µL/mL) as compared to the standard antioxidant ascorbic acid. This may be attributed to the absence of some components such as 1,8-cineole in the leaf oil as well as the potential antagonistic impact between other components in *Eucalyptus* oil [44].

Anti-Viral Activity

The potential anti-viral effect of *Eucalyptus globulus* oil was determined against Herpes simplex virus type I (HSV-1) [45]. HSV-1 was incubated with various concentrations of *Eucalyptus globulus* oil for one hour at room temperature. The IC₅₀ could be given with 55µg/ml. At maximum non-cytotoxic

concentration (200 µg/ml = ~0.02%) plaque formation was significantly reduced 3 days after cell infection by >96% after pre-incubation of HSV-1 and essential oil compared with untreated control. Only moderate activity was seen when the essential oil was added to host cells prior or after infection. Some scientists demonstrated that *Eucalyptus globulus* oil (0.01%) reduced virus titers by 58-75% for HSV-1 and HSV-2. It could be shown that pre-treatment of virus with the essential oil showed best results while pre-incubation of the cells did not reduce virus production. The anti-viral activity of *Eucalyptus globulus* essential oil on strains of adenovirus and mumps virus isolated from patients. In a concentration of 0.25 µl/ml (0.025%), the essential oil showed a mild antiviral activity (~40%) against mumps virus, but nor against adenovirus. The potential anti-viral effect of 1,8-cineole was determined against Herpes simplex virus type I (HSV1). The IC₅₀ could be given with 1200 µg/ml. The potential antiviral effect of α-pinene was determined against Herpes simplex virus type I (HSV-1) in-vitro. The IC₅₀ could be given with 4.5µg/ml [46].

Anti-Fungal Activity

Eucalyptus globulus oil was found effective against twelve yeast-like fungi and filamentous fungi. MICs values between 0.025 and 1% (V/V) were found [47]. The 30 plant's oils for anti-candida activity were tested against two different strains of *Candida albicans*. A concentration of 0.05% (V/V) was enough to inhibit their growth completely, MIC values of 2-8 mg/ml. Anti-fungal effects of *Eucalyptus globulus* oil were also observed against five *Fusarium* species.

Antiparasitic, insecticidal and repellent effects

In studying anti - schistosomal effect of *Eucalyptus* essential oil, the scanning electron microscope observation showed that of essential oil produced sever damage in *Schistosoma* worm's typography [48]. The effect of the



leaves, stem and root barks extracts of *Eucalyptus camaldulensis* was investigated in *Trypanosoma brucei* infected mice. 200-600 mg/kg body weight/day of the hexane, ethyl acetate, methanol and water extracts for 21 consecutive days. One control group was treated with 3.5mg/kg bodyweight of berenil while the other control group was left untreated. The methanol extract of *Eucalyptus camaldulensis* (leaf) produced complete cure for the animals in the different dose groups and survived as long as those treated with the standard drug, berenil, although the clearance time was faster for the standard drug. Sub inoculation of healthy mice with the blood and cerebrospinal Fluid (CSF) of the cured mice did not result in infection, thus indicating a complete and permanent cure. Bioassay-guided fractionation of the crude methanol extract of *Eucalyptus camaldulensis* leaf gave 10 fractions, only fractions 8 and 9 exhibiting minimal antitrypanosomally activities that were not comparable to those of the crude extract and the standard drug ($p \leq 0.05$) [49]. The effect of methanolic and aqueous extracts of *Eucalyptus camaldulensis* was studied on the promastigotes of *Leishmania major*. The stationary phase promastigotes of *Leishmania major* was incubated in the methanolic and aqueous extractions in vitro. Tartar emetic was used as the positive control drug. After 72 h of incubation, the activity of the extracts was measured, using MTT method. The IC₅₀ values were 586.2 ± 47.6 and $1,108.6 \pm 51.9$ $\mu\text{g/ml}$ for methanolic and aqueous extracts, respectively, whereas it was 32.5 ± 6.8 $\mu\text{g/ml}$ for tartar emetic [50].

Effects on oral and dental health:

The antimicrobial properties of aqueous and alcoholic extracts of *Eucalyptus* leaves was investigated against the most cariogenic bacteria in mouth (*Mutans streptococci* and *Lactobacilli*) and against *Candida albicans*. There was statistically highly significant difference ($P <$

0.001) between different concentrations of the aqueous and alcoholic extracts on the sensitivity of the isolates, whilst the alcoholic extract was more effective than aqueous extract just at low concentrations. At 100 and 150 mg/ml the alcoholic and the aqueous extracts showed more potent effect than 2mg/ml chlorhexidine against *Mutans streptococci* and *Candida albicans*. Minimum bactericidal concentration for the aqueous extract was 5-8mg/ml, 6-10mg/ml and 3-7mg/ml against, *Mutans streptococci*, *Lactobacilli* and *Candida albicans* respectively while that of alcoholic extract was 4-8mg/ml, 6-10mg/ml and 2-6mg/ml against the same microorganisms respectively [51]. The effect of chewing gum containing *Eucalyptus* extract on periodontal health was investigated in a double-masked, randomized, controlled trial. Healthy humans with gingivitis but not deep periodontal pockets were randomly assigned to the following groups: high-concentration group ($n=32$): use of 0.6% *Eucalyptus* extract chewing gum for 12 weeks (90 mg/day); low-concentration group ($n=32$): use of 0.4% *Eucalyptus* extract chewing gum for 12 weeks (60 mg/day); and placebo group ($n=33$): use of chewing gum without *Eucalyptus* extract for the same period. Plaque accumulation (PLA), gingival index (GI), bleeding on probing (BOP), periodontal probing depth (PD), and clinical attachment level (CAL) were measured at weeks 0, 4, 8, 12, and 14. The interaction between the effects of *Eucalyptus* extract chewing gum and the intake period was statistically significant for PLA, GI, BOP, and PD, but not for CAL. The low- and high-concentration groups exhibited statistically significant ($P < 0.05$) improvements compared to the placebo group for PLA, GI, BOP, and PD [52].

Dermatological effects:

A long-term usage of a scalp lotion containing *Eucalyptus* extract, was investigated to explore the change in physical properties of the hair fiber. Half-head or whole-head usage studies of a scalp



lotion with Eucalyptus extract were carried out on the following groups: Japanese female, Japanese senior female, Japanese male, and Caucasian female panelists. The improvement in hair luster and bounce in the root part of the hair were recognized by the panelists after the long-term application of the scalp lotion with Eucalyptus extract. The results indicated that the recognition of panelists was based on an actual change in the hair fiber properties. The efficacy of Eucalyptus extract was expressed regardless of race, age, or gender, since similar results were confirmed in all panelist groups. To study the mechanism, the elasticity (Young's modulus) of the new-growth part of the cortex in Eucalyptus extract-treated hair and placebo hair were evaluated by the nano-indentation method of atomic force microscopy (AFM). The results suggested that the Young's modulus of the new-growth part of the cortex in Eucalyptus extract treated-hair was increased in comparison with placebo hair. The IR spectra of treated samples of hair showed changes that appear to confirm a decrease in the alpha-helix structure and an increase in the beta-sheet structure [53].

Antidiabetic effect:

The anti-hyperglycemic activity of the ethanolic extract of Eucalyptus camaldulensis leaves was studied on oral glucose tolerance test on albino rats. The administration of the ethanolic extract at a dose of 500 mg/kg of body weight showed a highly significant reduction in blood glucose when compared with control ($P < 0.001$) [54].

CONCLUSION

The plant has various phytoconstituent steroids, tannins, polyphenolics, glycosides, terpenes, alkaloids, flavonoids, saponins, lignin's, vitamin C, and fatty acids. which have various pharmacological activity. This plant have more potential need to be explore in future to get more of its medicinal property. In this review article be search various other research article and review to

get latest data gather by the various researcher. According to a thorough review of the literature, the eucalyptus species is a significant source of numerous medicinally and pharmacologically significant compounds, including essential oils and terpenoids that have been used in aromatherapy. According to a thorough review of the literature, the eucalyptus species is a significant source of numerous medicinally and pharmacologically significant compounds, including essential oils and terpenoids that have been used in aromatherapy. The pharmacological effects of various Eucalyptus species, including their analgesic, antifungal, anti-inflammatory, antibacterial, antidiabetic, antioxidant, antiviral, antitumor, antihistaminic, anticancer, cytochrome p450 inhibitor, and hepatoprotective properties, have also been extensively studied.

REFERENCES

1. Elliot WR, Jones DL. Encyclopaedia of australian plants suitable for cultivation. Melbourne: Lothian Publishing 1984.
2. Hermann R, von Richter O. Clinical evidence of herbal drugs as perpetrators of pharmacokinetic drug interactions. *Planta Med* 2012; 78(13): 1458-77. [http://dx.doi.org/10.1055/s-0032-1315117] [PMID: 22855269]
3. Kamatou GP, Viljoen AM, Gono-Bwalya AB, et al. The in vitro pharmacological activities and a chemical investigation of three South African Salvia species. *J Ethnopharmacol* 2005; 102(3): 382-90. [http://dx.doi.org/10.1016/j.jep.2005.06.034] [PMID: 16099614]
4. Begossi A. Use of ecological methods in ethnobotany: Diversity Indices. *Econ Bot* 1996; 50(3): 280-9. [http://dx.doi.org/10.1007/BF02907333]
5. Takahashi T, Kokubo R, M.Sakainom. Antimicrobial activities of Eucalyptus leaf extracts and flavonoids from eucalyptus maculate: *Letters in Applied Microbiology*, 2004; 39: 60–64.



6. Chao LK, Hua KF, Hsu HY, Cheng SS, Liu JY, Chang ST. Study on the antiinflammatory activity of essential oil from leaves of *Cinnamomum osmophloeum*. *J Agric Food Chem* 2005; 53(18): 7274-8. [http://dx.doi.org/10.1021/jf051151u] [PMID: 16131142]
7. Chao LK, Hua KF, Hsu HY, Cheng SS, Liu JY, Chang ST. Study on the antiinflammatory activity of essential oil from leaves of *Cinnamomum osmophloeum*. *J Agric Food Chem* 2005; 53(18): 7274-8. [http://dx.doi.org/10.1021/jf051151u] [PMID: 16131142]
8. Egawa H, Tsutsui O, Tatsuyama K, Hatta T. Antifungal substances found in leaves of *Eucalyptus* species. *Experientia* 1977; 33(7): 889-90. [http://dx.doi.org/10.1007/BF01951263] [PMID: 560980]
9. Silva J, Abebe W, Sousa SM, Duarte VG, Machado MI, Matos FJ. Analgesic and anti-inflammatory effects of essential oils of *Eucalyptus*. *J Ethnopharmacol* 2003; 89(2-3): 277-83. [http://dx.doi.org/10.1016/j.jep.2003.09.007] [PMID: 14611892]
10. Juergens UR, Stöber M, Vetter H. Inhibition of cytokine production and arachidonic acid metabolism by eucalyptol (1.8-cineole) in human blood monocytes in vitro. *Eur J Med Res* 1998; 3(11): 508-10. [PMID: 9810029]
11. Juergens UR, Dethlefsen U, Steinkamp G, Gillissen A, Repges R, Vetter H. Anti-inflammatory activity of 1.8-cineol (eucalyptol) in bronchial asthma: a double-blind placebo-controlled trial. *Respir Med* 2003; 97(3): 250-6. [http://dx.doi.org/10.1053/rmed.2003.1432] [PMID: 12645832]
12. J. Silva, W. Abebe, S. Sousa, V. Duarte, M. Machado, F. Matos. (2003). Analgesic and antiinflammatory effects of essential oils of *Eucalyptus*. *Journal of ethnopharmacology*. 89(2- 3): 277-283
13. <http://plants.usda.gov/java/classificationServlet>
14. J.-H. Kim, M.-J. Kim, S.-K. Choi, S.-H. Bae, S.-K. An, Y.-M. Yoon. (2011). Antioxidant and antimicrobial effects of lemon and eucalyptus essential oils against skin floras. *Journal of the Society of Cosmetic Scientists of Korea*. 37(4): 303-308.
15. R. Sailer, T. Berger, J. Reichling, M. Harkenthal. (1998). Pharmaceutical and medicinal aspects of Australian tea tree oil. *Phytomedicine*. 5(6): 489-495.
16. N. Negishi, K. Nakahama, N. Urata, M. Kojima, H. Sakakibara, A. Kawaoka. (2014). Hormone level analysis on adventitious root formation in *Eucalyptus globulus*. *New forests*. 45(4): 577-587.
17. Silva J, Abebe W, Sousa SM, Duarte VG, Machado MI, Matos FJ. Analgesic and anti-inflammatory effects of essential oils of *Eucalyptus*. *J Ethnopharmacol* 2003; 89(2-3): 277-83. [http://dx.doi.org/10.1016/j.jep.2003.09.007] [PMID: 14611892]
18. Juergens UR, Stöber M, Vetter H. Inhibition of cytokine production and arachidonic acid metabolism by eucalyptol (1.8-cineole) in human blood monocytes in vitro. *Eur J Med Res* 1998; 3(11): 508-10. [PMID: 9810029]
19. Juergens UR, Dethlefsen U, Steinkamp G, Gillissen A, Repges R, Vetter H. Anti-inflammatory activity of 1.8-cineol (eucalyptol) in bronchial asthma: a double-blind placebo-controlled trial. *Respir Med* 2003; 97(3): 250-6. [http://dx.doi.org/10.1053/rmed.2003.1432] [PMID: 12645832]
20. Kesharwani V, Gupta S, Kushwaha N, Kesharwani R, Patel DK. A review on therapeutics application of eucalyptus oil. *Int. J. Herb. Med*, 2018; 6(6): 110-5.
21. Williams, Stockley, Yan W, Home VN. Essential oils with high antimicrobial activity for therapeutic use.



- International Journal of Aromatherapy. 1998;8(4) 30-40.
22. Akolade, Olajide, Afolayan MO, Akande, Idowu DI, Orishadipe AT.,// Chemical composition, antioxidant and cytotoxic effects of Eucalyptus globulus grown in north-central Nigeria, Scholars Research Library.2012;2(1):1-8.
23. J. Silva, W. Abebe, S. Sousa, V. Duarte, M. Machado, F. Matos. (2003). Analgesic and antiinflammatory effects of essential oils of Eucalyptus. Journal of ethnopharmacology. 89(2- 3): 277-283.
24. kumar, Laxmidhar., // A review on phytochemical and pharmacological of eucalyptus globulus: a multipurpose tree. International Journal of Research In Ayurveda and Pharmacy. 2011;2(5):1527 1530.
25. Kokate CK, Purohit AP, Gokhale SB. Text book of Pharmacognosy. Pune: Nirali Prakashan, 2003; 8(66): 1-624.
26. Chevallier A. Encyclopedia of Medicinal Plants. St. Leonards, New South Wales, Australia: DK Publishing 2001.
27. Williams LR, Stockley JK, Yan W, Home VN. Essential oils with high antimicrobial activity for therapeutic use. Int J Aromather 1998; 8(4): 30-9. [http://dx.doi.org/10.1016/S0962-4562(98)80079-9]
28. Ait-Ouazzou A, Lorán S, Bakkali M, et al. Chemical composition and antimicrobial activity of essential oils of Thymus algeriensis, Eucalyptus globulus and Rosmarinus officinalis from Morocco. J Sci Food Agric 2011; 91(14): 2643-51. [http://dx.doi.org/10.1002/jsfa.4505] [PMID: 21769875]
29. Bakkali F, Averbeck S, Averbeck D, Idaomar M. Biological effects of essential oils-a review. Food Chem Toxicol 2008; 46(2): 446-75. [http://dx.doi.org/10.1016/j.fct.2007.09.106] [PMID: 17996351]
30. Damjanović-Vratnica B, Đakov T, Šuković D, Damjanović J. Antimicrobial effect of essential oil isolated from Eucalyptus globulus Labill.
31. Tsai ML, Lin CC, Lin WC, Yang CH. Antimicrobial, antioxidant, and anti-inflammatory activities of essential oils from five selected herbs. Biosci Biotechnol Biochem 2011; 75(10): 1977-83. [http://dx.doi.org/10.1271/bbb.110377] [PMID: 21979069]
32. Pino, J.A.; Moncayo-molina, L.; Spengler, I.; Pérez, J.C. Chemical composition and antibacterial activity of the leaf essential oil of Eucalyptus globulus Labill. from two highs of the canton Cañar, Ecuador. Rev. CENIC Ciencias Químicas 2021, 52, 26–33.
33. Bencheikh, D.; Gueddah, A.; Soualat, K.; Ben-aissi, H.; Benslama, A.; Harrar, A.; Khennouf, S. Polyphenolic contents, antioxidant and antibacterial activities of aqueous extracts of Eucalyptus globulus L. and Trigonella foenum-greacum L. J. Appl. Biol. Sci. 2021, 15, 53–63.
34. Mulyaningsih, S.; Sporer, F.; Zimmermann, S.; Reichling, J.; Wink, M. Synergistic properties of the terpenoids aromadendrene and 1,8-cineole from the essential oil of Eucalyptus globulus against antibiotic-susceptible and antibiotic-resistant pathogens. Phytomedicine 2010, 17, 1061–1066.
35. Damjanović-Vratnica, B.; Đakov, T.; Šuković, D.; Damjanović, J. Antimicrobial effect of essential oil isolated from Eucalyptus globulus Labill. from Montenegro. Czech J. Food Sci. 2011, 29, 277–284.
36. Obiorah, S.; Eze, E.; Obiorah, D.; Orji, N.; Umedum, C. Phytochemical and antimicrobial studies on the extracts from leaves of Cajanus cajan and Eucalyptus globulus. In Proceedings of the International Conference on Environment, Chemistry and Biology, Singapore, 17–18 March 2012; Volume 49, pp. 192–197.

37. Ishnava, K.B.; Chauhan, J.B.; Barad, M.B. Anticariogenic and phytochemical evaluation of *Eucalyptus globules* Labill. Saudi J. Biol. Sci. 2013, 20, 69–74.
38. Luís, Â.; Duarte, A.; Gominho, J.; Domingues, F.; Duarte, A.P. Chemical composition, antioxidant, antibacterial and anti-quorum sensing activities of *Eucalyptus globulus* and *Eucalyptus radiata* essential oils. Ind. Crops Prod. 2016, 79, 274–282.
39. Usman, L.A.; Oguntoye, O.S.; Ismaeel, R.O. Effect of seasonal variation on chemical composition, antidiabetic and antioxidant potentials of leaf essential oil of *Eucalyptus globulus* L. J. Essent. Oil Bear. Plants 2020, 23, 1314–1323.
40. Ferreira, C.d.S.; Pereyra, A.; Patriarca, A.; Mazzobre, M.F.; Polak, T.; Abram, V.; Buera, M.P.; Ulrih, N.P. Phenolic compounds in extracts from *Eucalyptus globulus* leaves and *Calendula officinalis* flowers. J. Nat. Prod. Resour. 2016, 2, 53–57.
41. Sharma, A.D.; Farmaha, M.; Kaur, I.; Singh, N. Phytochemical analysis using GC-FID, FPLC fingerprinting, antioxidant, antimicrobial, anti-inflammatory activities analysis of traditionally used *Eucalyptus globulus* essential oil. Drug Anal. Res. 2021, 5, 26–38.
42. ta, B.N. Antioxidant activity of *Eucalyptus globulus* Labill root extracts. J. Pharmacogn. Phytochem. 2020, 9, 190–194.
43. Luís, A.; Neiva, D.; Pereira, H.; Gominho, J.; Domingues, F.; Duarte, A.P. Stumps of *Eucalyptus globulus* as a source of antioxidant and antimicrobial polyphenols. Molecules 2014, 19, 16428–16446.
44. Akolade, J.O.; Olajide, O.O.; Afolayan, M.O.; Akande, S.A.; Idowu, D.I.; Orishadipe, A.T. Chemical composition, antioxidant and cytotoxic effects of *Eucalyptus globulus* grown in north-central Nigeria. J. Nat. Prod. Plant Resour. 2012, 2, 1–8.
45. A. Astani, J. Reichling, P. Schnitzler. (2010). Comparative study on the antiviral activity of selected monoterpenes derived from essential oils. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*. 24(5): 673-679.
46. P. Schnitzler, A. Astani, J. Reichling. (2011). Antiviral effects of plant-derived essential oils and pure oil components. *Lipids and Essential Oils*. 239
47. Elicura. Local Environment. 22(8): 1019-1034. [25] J. Silva, W. Abebe, S. Sousa, V. Duarte, M. Machado, F. Matos. (2003). Analgesic and anti inflammatory effects of essential oils of *Eucalyptus*. *Journal of ethnopharmacology*. 89(2- 3): 277-283.
48. El-Baz FK, Mahmoud K, El-Senousy WM, Darwesh OM and ElGohary AE. Antiviral – antimicrobial and schistosomicidal activities of *Eucalyptus camaldulensis* essential oils. *Int J Pharm Sci Rev Res* 2015; 31(1): 262-268.
49. Kabiru YA, Ogbadoyi EO, Okogun JI, Gbodi TA and Makun HA. Anti-trypanosomal potential of *Eucalyptus camaldulensis*. *British Journal of Pharmacology and Toxicology* 2013; 4(2): 25-32.
50. Nosratabadi SJ, Sharifi I, Sharififar F, Bamorovat M, Daneshvar H and Mirzaie M. In vitro antileishmanial activity of methanolic and aqueous extracts of *Eucalyptus camaldulensis* against *Leishmania major*. *J Parasit Dis* 2015; 39(1): 18-21.
51. Qanbar FH and Al-Mizraqchi AS. The antimicrobial effect of aqueous & alcoholic extracts of *Eucalyptus* leaves on oral Mutans streptococci, *Lactobacilli* & *Candida albicans* (an in vitro study. *J Bagh Coll Dentistry* 2009; 21(4): 109-112.
52. Nagata H, Inagaki Y, Tanaka M, Ojima M, Kataoka K, Kuboniwa M, Nishida N, Shimizu K, Osawa K and Shizukuishi S. Effect of *Eucalyptus* extract chewing gum on periodontal health: a double-masked,



- randomized trial. J Periodontol 2008; 79(8): 1378-1385.
53. Mamada A, Ishihama M, Fukuda R and Inoue S. Changes in hair properties by Eucalyptus extract. J Cosmet Sci 2008; 59(6):481-496.
54. Dawoud ADH. Effects of ethanolic leaf extract of Eucalyptus camaldulensis on oral glucose tolerance test in type-2 model diabetic rats. Journal of Network Communications and Emerging Technologies (JNCET) 2015; 2(2): 6-8.

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