

A REVIEW ON EUCALYPTUS GLOBULUS – AN AUTHENTIC HERB

Sushma*, Shailja Sharma and Nishtha

Department of biosciences, Branch Botany, UIBT, Chandigarh university NH-95, Ludhiana - Chandigarh State highway, Punjab 140413, India

ABSTRACT

In the ancient time *Eucalyptus globulus* used for the various purpose. It is a tall and an evergreen tree that can grow up to the height of 70m and its diameter is about 4 to 7ft. which was first found on the island of Tasmania in 1792 which associate to the Myrtaceae family which is commonly called as Tasmanian Blue Gum, southern blue gum or blue gum are the different names of *eucalyptus globulus* grow in the various parts of India. The particular species of *Eucalyptus globulus* have been used for various purposes. It had been found that eucalyptus is a rich source of phytochemical constituent and also possesses medicinal use. The different part of the eucalyptus is very nutritionally and highly valuable therapeutically property because of the presence of some specific chemical composition as its essential oil contain esters, carboxylic acids, aldehyde etc. phytochemical analysis of this tree has revealed that their leaf oil contain 1.8 cineole, cryptophene etc., essential oil had been extracted from its buds. The aim of this review paper is compiling all the information about eucalyptus such as anti-inflammatory, analgesic, anti-nociceptive antimicrobial, anti-fungal, anti-viral and anti-oxidant agent of the nature.

KEYWORDS: *Eucalyptus globulus*, evergreen, essential oil, leaves, extracted.

INTRODUCTION

Eucalyptus globulus which is repeatedly well known as southern blue gum, it is very huge and indestructible tree, which was first come across on the Tasmania island in the year of 1792. It is one of the large genera of family Myrtaceae There are approximately 900 species of eucalyptus and almost all of them are found in Australia. Eucalyptus is a very prominent tree in India because it was introduced in the year of 1843 as a fuel tree. there are so many searches which acknowledge that the *Eucalyptus globulus* is one of the convoluted species as it consists of peculiar four sub species these are *Eucalyptus bicostata*, *Eucalyptus pseudoglobulus*, *Eucalyptus globulus* and *Eucalyptus maidenii* (Kesharwani et al., 2018).

This is well grown in the different part of India such as Nilgiris, Annamalai, Palani and Shimla hills, and there are numerous species of eucalyptus which are cultivated in the variety of climatic conditions (Anonymous, 2003) but the most suitable one is found in the warm temperature and sub-tropical province, because of their high economical value. There are more than hundred species which have been seek in India at contrasting period of time and some species are below planting. (Kesharwani et al., 2018). In the recent years, the demand

for the product which are derived from the plants their uses in therapeutic have been escalate . In various countries, especially in the rural state as a foremost fitness care aromatic herb is being on the other side 80% of community in the underdeveloped nations this tree is used as the conventional assests. In Indian tradition all the plant are considered to have some medical properties in it and the medicine is apply as the vital source of antitodesince the classical times. Eucalyptus was used as a various purpose such as food and antiode, presently *eucalyptus* plant is commonly used in forest management such as fuel, paper pulp, timber. It is also used in environmentalgadeningsuch as the control of thewind erosion, water control as amajorstarting point of the essential oil which is pull out from the various parts such as perfumery oils and medicinal, for fine arts. Environmentalist and researchers pay their attention on eucalyptus becauseof the good source of wood and essential oil which is used for the various objective. The lubricant which iswithdraw from various parts such as bud, bark, leaves and fruit, they all are showed the pharmalogicalactivies namely anti-viral, anti-inflammatory ,anti-oxidant, anti-fungal, anti- cancerous activitiesand due to these it is used to cure the respiratory disease such as common cold influenzas etc. (Gabriella et al., 2016).



Fig 1: Eucalyptus tree

Vernacular Names

It is known by many Indian names because of their variation in the geographical region or the language which may vary from region to region such as: *Eucalyptus globulus* in latin language it is known as TailParn, in Sanskrit it is often known as Sugandh, in English we usually called Gum Tree or Gum Eucalypt, In hindi language it is best known as Nilgir, Kannad as Nilgiri and in Gujrat people know hin as Harit Parn. (Kesharwani et al., 2018).

Table 1: Scientific classification of eucalyptus

<u>kingdom</u>	<u>Plantae</u>
<u>Sub kingdom</u>	<u>Tracheobionta</u>
<u>Super division</u>	<u>Spermatophyta</u>
<u>Division</u>	<u>Magnoliophyta</u>
<u>Class</u>	<u>Magnolipside</u>
<u>Subclass</u>	<u>Rosidae</u>
<u>Order</u>	<u>Myrtales</u>
<u>Family</u>	<u>Myrtaceae</u>
<u>Genus</u>	<u><i>Eucalyptus</i></u>
<u>Species</u>	<u><i>Eucalyptus globulus labill</i></u>

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. As opposed to the seedling on the leaves is usually glaucous and opposite sessile but we can see many inconsistency in their figure.



Fig 2: Leaves

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:

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 stringy bark. In many species of eucalyptus dead bark is retained. (Kumar and laxmidhar 2011)

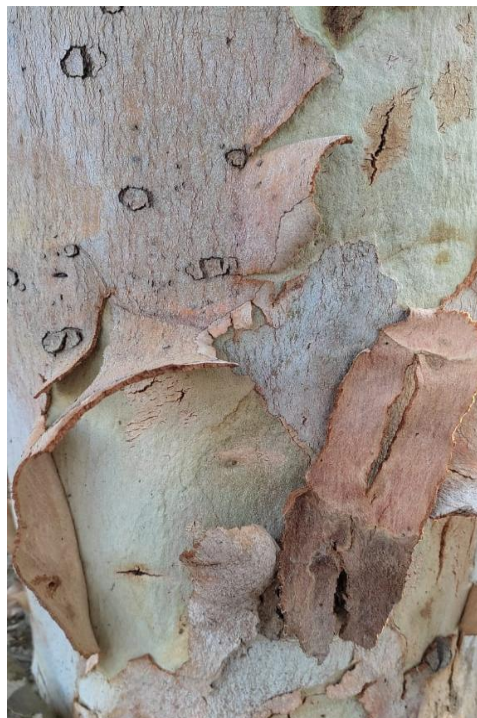


Fig 3: Bark

Parts used widely:

The oil which is extracted from its leaves.

Demography/Location:

Eucalyptus is commonly raised in the different continents such as Australia, Africa (North & South), Europe (in the southern part) Asia (only in India).³ (Kesharwani et al., 2018). It is best grown in various climatic conditions and with the environmental conditions but there is one best known optimum condition which is evident to be found in those countries which are having a warmer climate (Mbuya, H. Msanga, C. Ruffo, A. Birnie, B. Tengnas. (1994). In India, the total area is covered 2,500,000 ha by the eucalyptus because it is the most cultivated plant so far (Hayat et al., 2015).

Chemistry:

The smell of the eucalyptus globulus leaf has a mint like smell it has vibrant spicy and a cooling taste there are various concentration of minerals. The cellulose or protein which are naturally occurring from the eucalyptus while the synthetic fibres are not found and the identification of lipid constituents showed that the eucalyptus tree contain many cutin and soluble lipids. The essential oil which is secreted from the eucalyptus they are colourless it has distinctive taste and odour. They are also highly flammable and these oils contain compound which are natural disinfectants and pest deterrents(Hayat et al.,2015).

Phytoconstituents

The essential oil which are extracted from the eucalyptus are used in medicine and the fresh leaves were obtained by the aqueous distillation. When it is properly prepared this fluid has no colour or transparent with an attribute taste & odour, and it is soluble in its own weight of alcohol. The one of the important constituent which is present in eucalyptus is Eucalyptol which is up to 70% of its volume. The oil which are present in the leaves contain eucalyptol(5.01-51.13%) it is depending upon the maturity and also the origin of the collection site. In contrast the essential oil which are secreted from the fruit, bud and branch and these oils contain alpha-thujene (0.00 percentage, 12.1% and trace respectively), Eucalyptol(16.11 percentage, 37.01% and 55.86 respectively) and aromadendrene (24.11%,15.90%, 38.01 and 9.01 % respectively)(Hayat, Jilani, et al 2015). From the *eucalyptus globulus labill* leaves there is some isolation of the water- distilled volatile oil is the computable examination of the chemical constituents from this essential oil the determination of their quantitative examination by the straight analogy with results from MS databases attached to the Gas chromatography and mass spectrometry instruments which are following to GC-MS analysis. Those essential oil which are extracted to the plant are mainly consisted of oxygenated monoterpenes, and oxygenated sesquiterpenes.

Chemical Composition:

As many studies reveal that eucalyptus tree indicates the storehouse of the numerous phytochemical compounds like tannins, alkaloids, propanoids and flavonoids. These compounds are taken out from the various part of the tree viz. root, stem and leaf.(Dixit A et al., 2012) There are several researchers who conducted the research with the aim of that they confined the phytoconstituents from the plant's organ in particular eucalyptol, aromadendrene, alpha-gurjunene, epiglobulol, beta-pinene, monoterpene Ketone, alpha, beta & gamma terpineol, and these compounds were found in the couple of shoot and leaves of the eucalyptus, and from the fruit we extracted several compounds such as borneol, hexanoic acid, citral, eudesmol, fenchone, para-menthane, myrecene, myrtenol, alpha-terpineol, asparagic acid, glycine, proteinogenic amino acid, asparagine, threonine and non-proteinogenic amino acid or ornithyl. (Makhlouf et al. 2010)

The essential oil which is present in the different part is composed of various mixture of volatile organic compound such as hydrocarbon, alcohol, aldehydes, ketones, acids, ethers and esters. There is numerous component which are monoterpenes and sesquiterpenes in nature and these components are consist of two or more isoprene (C_5H_8) units. There is various

concentration such as calcium, nitrogen, phosphorous, iron, manganese, zinc, boron and copper they all the present in the essential oil(Hayat et al., 2015).

Pharmacological Activities

Eucalyptus globulus is one of the world largest sown genera. There are so many uses of the eucalyptus one use for the treatment of the symptomatic mild inflammation which is usually in the respiratory tract and bronchitis, and also for the symptomatic treatment of various disease like asthma, fever and inflammation of throat which are illustrate in the pharmacopeia & also in classical system of classification(Kumar and Laxmi Dhar 2011). The essential oil which is extracted from the eucalyptus is used as an anti-septic and anti-spasmodic stimulant agent in bronchitis,asthma and minor complaints. For the therapy of diabetes mellitus the species ofeucalyptus apply as long as the traditional times(Nakhaee et al., 2009). It has also seen that the increasing effect on the blood flow and skin temperature. Semi-solid dosage antiquated used for the treatment of various type of cold, burn scars, injuries, and also for an anti-rheumatic agent(Saileret al (1998).

Anti-microbial Activity

In eucalyptus globulus the oil which is extracted is seems to be more effective against many micro-organismswhich are first developed in the then these suspensions and then these biofilms contrast with 1,8-oxido-p-menthane. On the gram-positive bacteria this 1,8-cineole compound was an active on the other side on gram negative bacteria this compound was inactive Escherichia coli and pseudomonas aeruginosa also showed a positive effect against this compound.This species of eucalyptus is popularly used as an anti-malarial plant in Brazil(Shah,et al 2016)

Anti-oxidative Activities

Free radical which are release from the phagocytes through the process of infection which frequently induces inflammation. The essential oil which is extracted are well known in order to prove the various component preserve cells from the destruction and dying such as free radicle or Reactive oxyden species, antioxidant. And these free radicle plays an mone of the important role in the rproduction of the exergy as of the physiological point of view, in the living cell there are some biomolecule synthesize, phagocytosis as well ascell growth(Packer L, Cadenas E, DaviesKJ.2008). The extract mechanism that how the essential oil extract his function on inflammatory cells are still not known⁶(Hayat, Jilani, et al 2015). From the various part of the eucalyptus globulus methanol iis extracts and it showed the efficiency in the preventing oxidation process(Shah, Bajaj, et al 2016).

Anti- inflammatory Activity

One of the major constituent of Eucalyptol are used as a 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 senestive disorder. The essential oil which is extracted from the various parts of the eucalyptus globulus which produced anti-inflamatoryeffectsas 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. 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.

Anti-viral Activities

Twenty-two eucalyptol derivatives along with twenty-six related compounds which are extracted from the *eucalyptus globulus* were inspected for their contribution to the activation of the Epstein-Barr virus by a short term in vitro assay (Kumar and Laxmidhar 2011). The potential anti-viral effect on the sp. *Eucalyptus globulus* the oil was tested against the Herpes simplex virus type I (HSV-1). Herpes simplex virus type-1 was produced with the diversified concentrations of the *Eucalyptus globulus* oil for 1 hr at room temperature (Hayat, Jilani, et al 2015).

Anti-Diabetic and Repellent Effects

The oil which is extracted from the plant has been reported for the Anti-diabetic effects and repellent.

Antimalarial

It cannot take place of cinchona because it confers some of the antimalarial action¹ (Kesharwani et al., 2018).

Stimulant

Eucalyptus oil which is extracted from its various parts is used as a stimulant and antiseptic gargle. In terms of locally applied, it diminishes sensitivity. It also expands the cardiac action (Kesharwani et al., 2018).

Larvicidal

The leaves of *Eucalyptus globulus* has influential activity against *Culex quinquefasciatus* and *Culex tritaeniorhynchus* (Kumar and Laxmidhar 2011)

Respiratory Disease

Since Ancient times *eucalyptus globulus* is used as a medicine and treats many diseases it is used in the treatment of bronchitis, asthma and many more (Kumar and Laxmidhar 2011).

Anti-plaque

Eucalyptus globulus which is very useful in inhibiting dental plaque formation (Kesharwani et al., 2018).

Antihistaminic

From the leaves of the plant hexane gas is extracted, meanwhile ethanol is extracted from the fruit and leaves of the plant diffident Immunoglobulin E which depending upon the histamine and freeing from Rat Basophilic Leukemia-2H3 (Kumar and Laxmidhar 2011)

Ayurvedic products of Eucalyptus

As we can see that ayurvedic is growing day by day because of its valuable oil which is extracted such as tea tree oil, prokapha massage oil, black pepper and the other body massage oil is cold pressed etc.

Conclusion

In conclusion, Eucalyptus is one of the largest genera of the family myrtle (Myrtaceae) indigenous to Australia, Tasmania and its immediate island, and it has been known since decades because of its pharmacological activities. Eucalyptus plant is studied worldwide for their various therapeutic activities. Eucalyptus plant put forward its biological activities which exhibit in the leaves, stem and roots due to the multitude of compounds. In general we say this tree has been used for the treatment of various fungal as well as bacterial disease. Our ancestor used this plant for treatment of respiratory system, each and every part of this tree has some compound for example terpenoids, tannins etc. These compounds show their effect against anti-bacterial and anti-viral etc. There are many species of *eucalyptus globulus* which is cultivated worldwide in the Mediterranean and the subtropical region. The *eucalyptus globulus* has been known for the healthy effect of the therapeutic properties on our body. In my review paper I put forward various points of *eucalyptus* like its general appearance, pharmacological activity and therapeutic properties.

NOTE:

The study highlights the efficacy of "Ayurved" which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

References

1. Kesharwani, Gupta, Kushwaha, Kesharwani, KM Patel., // A review on therapeutic application of eucalyptus oil., (2018).
2. Anonymous. The Wealth of India Raw materials CSIR, New Delhi. 2003.
3. Vecchio, Loganes, Minto., // Beneficial and Healthy Properties of Eucalyptus Plants: A Great Potential Use., (2016)
4. Kumar, Laxmidhar., // A review on phytochemical and pharmacological of *eucalyptus globulus*: a multipurpose tree., (2011)
5. L. Mbuya, H. Msanga, C. Ruffo, // Useful trees and shrubs for Tanzania., (1994)
6. Hayat, Jilani, Rehman, Nadeem., // A new perspective in therapeutics. IJCBS., (2015)
7. Dixit A, Rohilla A, Singh V., // *Eucalyptus globulus*: A new perspective in therapeutics., (2012).

8. Boulekbache -Makhlouf L, Meudec E, Chibane M, et al.,//Analysis by high-performance liquid chromatography diode array detection mass spectrometry of phenolic compounds in fruit of Eucalyptus globulus cultivated in Algeria, (2010).
9. <http://plants.usda.gov/java/classificationServlet>
10. Nakhaee, Bokaeian, Saravani, Farhangi, Akbarzadeh.,// Attenuation of oxidative stress in streptozotocin-induced diabetic rats by eucalyptus globulus.Indian Journal of Clinical Biochemistry., (2009).
11. Sailer, Berger, et al.,. //Pharmaceutical and medicinal aspects of Australian tea tree oil. Phytomedicine.,(1998).
12. Shah, Bajaj, R.K Dhawan.,//Eucalyptus genus: a review.,(2016).
13. Packer L, Cadenas E, Davies KJ.,. //Free radicals and exercise: an introduction. Free RadicBiolMed.,(2008).
14. Williams, Stockley, Yan W, Home VN.,//Essential oils with high antimicrobial activity for therapeutic use.,(1998).
15. Akolade, Olajide, Afolayan MO, Akande, Idowu DI, Orishadipe AT.,// Chemical composition, antioxidant and cytotoxic effects of Eucalyptus globulus grown in north-central Nigeria.,(2012).
16. Gilles , Zhao , An M, Agboola .,// Chemical composition and antimicrobial properties of essential oils of three Australian Eucalyptus species.,(2010).
17. Vijaykumar, Muthukumar,kumar, saravanamuthu.,//Characterization of Malassezia furfur and its control by using plant extracts.,(2006).
18. Villasenor, Lamadrid.,//Comparative anti-hyperglycemic potential of medicinal plants.,(2006).
19. Zhou JY, Tang FD, Mao GG, Shao J, Wang Y, Bian RL.,//Effect of Eucalyptus globulus oil on activation of nuclear factor-kappa B in THP-1 cells.,(2003)
20. Gray AM, Flatt PR.,//Anti-hyperglycemic actions of Eucalyptus globulus are associated with pancreatic and extra-pancreatic effects in mice.,1998).