

A Review on Anti Diabetic Activity of Herbal Drugs (Eucalyptus Globules and Jamun)

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Abstract

Eucalyptus globulus is a plant that is frequently seen. Blue gum, or Eucalyptus globulus, is a species of flowering plant belonging to the Myrtaceae family. This plant thrives on the Nilgiri Hills. that seek to investigate the anti-diabetic properties of eucalyptus globulus. which are found in the plant's roots, leaves, and steam. globulus eucalyptus using water as a solvent. Saponins, tannins, flavonoids, and propanoids were among the plant parts found in the dried fresh leaves used to test the extracts for phytochemical screening and antibacterial activity. Numerous reviews and research articles have reported on their diverse properties, which include anti-inflammatory, anti-diabetic, antibacterial, astringent, antiseptic, anti-oxidative, and antiviral properties. In India, Syzygium cumini is a common traditional treatment for diabetes. The Unani system of medicine (USM) uses jamun (Syzygium Cumini Linn.) as a medicinal plant to treat diabetes mellitus and other illnesses. Its pharmacological activity is antidiabetic, astringent, haemostatic, antioxidant, and anti-ulcerogenic. Jambolin is found in jamun seeds. It is a crucial glycoside because it keeps starch from turning into sugar, which helps to keep blood sugar levels stable. This review provides an overview of the herbal medications' pharmacological activity and antidiabetic impact, as well as advice on how to best use them in the treatment of diabetes mellitus.

Keyword: *Eucalyptus Globulus, Phytochemical, Antibacterial, Essential Oil, Diabetic Mellitus, Syzygium Cumini, USM - Unani System of Medicine.*

I. INTRODUCTION

French explorers discovered Eucalyptus globulus, one of the earliest eucalyptus species to be depicted, on the island of Tasmania in 1792. There are eucalyptus globulus trees up to 101 meters tall in the Tasmanian Eucalyptus Forest, which is one of the tallest forests in the world. By the late 1800s, South Eastern Tasmania was a common source of trees 60–90 m high, which were then sent all over the world for use in wharf piles [1]. A tall tree or shrub that belongs to the Myrtaceae family, eucalyptus is an evergreen. Despite being native to Tasmania and Australia, it has widely spread to other nations. There are about 700 species in the genus Eucalyptus; on average, about 300 of these have volatile or unstable oil in their leaves [2]. In addition to rutin, terpineol, sesquiterpene, alcohols, aliphatic aldehydes, isoamyl alcohol, ethanol, terpenes, and tannins, Eucalyptus globulus leaves are known to have a high concentration of eucalyptol (cineol) [3]. The leaves have a rough surface and can hang vertically or slant. Eucalyptus leaf extract has been used to treat skin rashes, chest issues, the flu, and respiratory tract irritation when inhaled [4]. In 1843, Eucalyptus globulus, popularly referred to as fever tree or blue gum, was brought to India as a fuel tree. The Nilgiris (5,000–8,300 feet) are ideal for the plant's

development. India's Himachal Pradesh and Shilong are home to the Annamalai and Palni slopes [5]. Diabetes is historically treated with eucalyptus globulus in Iran, south America [4], [6].

The evergreen Eucalyptus Globulus tree, sometimes referred to as Tasmanian Blue Gum, Southern Blue Gum, or Blue Gum, is one of the most widely distributed native trees in Australia. The tallest specimen in Tasmania that is currently known to exist is 90.7 meters tall. Their average height is between 30 and 55 meters [7]. The term "diabetes mellitus" describes a group of illnesses that affect how the body uses glucose, or blood sugar. Glucose is a vital source of energy for the cells that make up the muscles and tissues. It's too the brain's principal source of fuel. Diabetes has a variety of primary causes. Chronic hyperglycemia and impaired insulin insufficiency, as well as disruptions in the metabolism of carbohydrates, lipids, and proteins, are hallmarks of diabetes mellitus. Diabetes can harm blood vessels in the kidneys, heart, eyes, and nerves. Diabetes increases the risk of heart attacks, strokes, and kidney failure, among other health issues. [8] Syzygium Cumini Linn., a member of the myrtaceae family, is also referred to as Java plum, Malabar plum, Black plum, Indian blackberry, Jamun,

Jambu, and jambool. It is an indigenous, evergreen tree found in India. In India, jamun is regarded as one of the most significant fruits.

The parts of jamun treesuch as fruit , seed , bark, leaf and pulp used in treatment of diabetics mellitus , allergic condition , infection and inflammation.[9] Fresh jamun are used for dessert ,production of breveges of fermented one and natural food colourants. Jamun shows highly effective curative function against diabetics mellitus. Seeds of jamun contain jamunin (an alkaloid and trioxide jambolia) which stop or diminish the change of starch into sugar. The seeds of jamun also contains albumin , fat , resin , zinc, gallic acid, etc . [10]

II. BIOLOGICAL DESCRIPTIONS



Fig 1: Eucalyptus Globulus

A. *Eucalyptus Globulus*:

Eucalyptus globulus may be used as a medicinal antiseptic and antiperspant, to treat tuberculosis, rhinitis, malaria, loose bowels, diabetes, coughs, whooping coughs, roughness, coughs, and bronchitis, as well as to wash and heal wounds [11]. Because of their economic worth, a variety of eucalyptus species are grown, especially in sub-tropical and warm climates. In India, around 100 species have been tested at various points in time, and some are now being cultivated [12]. Diabetes mellitus may be a long-term metabolic disease marked by elevated blood sugar levels. Type 1 diabetes is caused by a decrease in insulin synthesis, while Type 2 diabetes is caused by a decrease in insulin production from beta-cells of the pancreatic islets [13]. By raising the amount of reactive oxygen species, the elevated glucose level causes glucose auto-oxidation and auto-oxidative glycosylation of proteins, which in turn causes oxidative stress [14]. Diabetes mellitus causes a number of bodily dysfunctions, such as peripheral neuropathy, vascular disorders, retinopathy, cardiomyopathy, altered immunological responses, alterations in intestinal function, and central nervous system dysfunction [13]. In order to avoid or at least postpone the beginning of these consequences, diabetes therapy is crucial. Figure No. 01.



Fig 2: Leaves of Eucalyptus

➤ *Leaves*

The eucalyptus leaves are evergreen but some tropical species their leaves at the end of the dry season. Although all mature eucalyptus trees are usually towering and fully leafed their shade is characteristically patchy .[15] Fig. No.02.

➤ *Leaf*

Colour Dark green and dull green

➤ *Size And Shape*

The leaf's dimensions are 12.5 cm in length, 3.5 cm in width, and it is lanceolate and oblong (oval in shape).

➤ *Flowers*

Rarely, there are two to three flowers at the base of the leaf, which are quite small, more than 5 cm across, and with spreading, white stamens that are 12 to 15 mm long. The camphor smell; the top-shaped buds are 12 to 15 mm in length and 12 to 25 mm in width. Figure No. 04.

➤ *Seeds*

The fruits or seed capsules are single at the base of the leaf and are 1.5–2.5 mm rounded or shaped at the top. The seeds are dull black, 2-3 mm long, and irregularly elliptical. Figure No. 03.



Fig 3: Seeds of Eucalyptus



Fig 4: Flowers Eucalyptus

B. *Syzygium Cumini*:



Fig 5: Syzygium Cumini

In addition to having a rich legacy of traditional medical systems, India also has a rich biodiversity that supports the herbal remedies used in these systems. Ayurveda is one of the recognised Indian pharmacological systems. [16] In the Unani medical systems, jamun is one of the most significant medicinal plants. Jamun is effective in lowering blood sugar levels in people with diabetes. [8] Ayurveda uses jamun seed powder, which has several health benefits, including regulating blood pressure, promoting cardiovascular health, and being rich in essential vitamins. Fig. No.05.

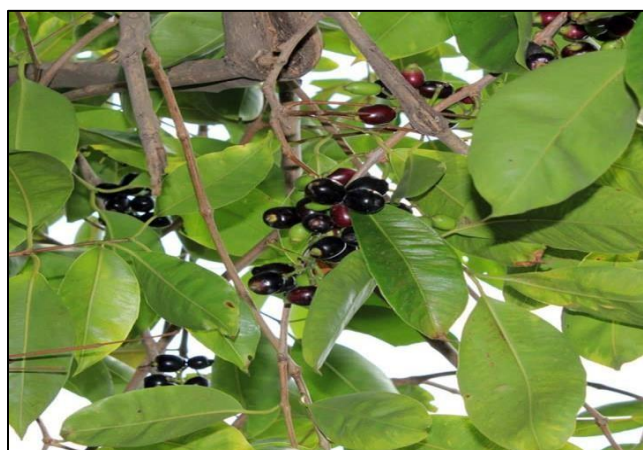


Fig 6: Leaves of Jamun

➤ Leaves

Leaves are oblong ovate to elliptical and 6-12 cm long, tip broad and shortly pointed and Deep green in colour [16]. Fig. No.06.

➤ Seeds

The seed is 2.5 to 3.5 cm in length and 1.5 to 2 cm in diameter.

➤ Fruit

The fruit has black and purple hues.

➤ Bark

The tree's bark is half an inch thick and shades brown.

III. SCIENTIFIC CLASSIFICATION

The classification of both Eucalyptus and Syzygium cumini are follow:[17].

Table 1: Eucalyptus Globulus

Kingdom : Plantae
Division : Magnoliophyta
Super division : Spermatophyta
Class : Dicotyledons
Order : Myrtales
Family : Myrtaceae
Genus : Eucalyptus
Species : Eucalyptus globulus Labill

Table 2: Syzygium Cumini

Kingdom : Plantae
Order : Myrtales
Species : S. cumini
Family : Myrtaceae
Genus : Syzygium

IV. BOTANICAL SPECIFICATIONS

A. *Eucalyptus Globulus*

According to European evidence, Eucalyptus globulus is a broadleaf evergreen shrub that may grow up to 70 meters in height [18]. This fragrant plant has a straight trunk and a well-developed crown with tap roots that reach a depth of more than ten feet [19]. Trees have hard, rough, and deeply furrowed bark. "Southern blue gum," "Tasmanian blue gum," and "Maiden gum" are aliases for this category, which is a potent nervine and anxiolytic. Its dark crimson or black colour comes from the dried sap that the tree exudes. Every mature tree grows a layer of bark every year, which helps the stems get bigger. Bark is made up of lengthy strands and

Bark can be taken off in lengthy sections and is made up of long strands. Eucalyptus globule seeds have distinct shapes, sizes, colours, and surface decoration, all of which are highly acquired traits and suggestive of a taxonomic group. Although eucalyptus globules cannot survive below -5°C, they do grow in mild, warm, tropical climates with yearly temperatures between 22 and 21 to 40 °C and rainfall between 250 and 2500 mm. Younger plants are typically planted in the spring or late summer. Growing eucalyptus globulus requires a high humidity atmosphere; otherwise, the leaf border will burn.

The ideal pH range for a soil is between 5.5 and 6.5, and it is one of the components that must be tolerated in acidic soils [20].

B. *Syzygium Cumini*

Syzygium cumini is the jamun's botanical name. The jamun tree, or *Syzygium cumini*, is a member of the Myrtaceae family. The jamun tree grows quickly, reaching a height of 30 meters and having a lifespan of over 100 years. There are numerous common names for this tree, including jambul, Java plum, and black plum.[21] In March or April, this jamun tree begins to bloom. Produced by May or June, the jamun is a highly nutritious summer fruit. Its seeds are used to make churna or ayurvedic medicinal powder. The

➤ Vernacular Names:

Depending on the language or geographic area, it goes by a variety of Indian names, which include:[16]

Vernacular Name of Eucalyptus

Hindi : Neelgir

English : Gum Eucalypt

Latin : *Eucalyptus globulus*

Gujarati : Harit pam

Sanskrit : Tail parn, sugandh patra

Kannada : Nilgiri

Vernacular Name of Jamun.

Hindi : Jamun

English : Java plum

Tamil : Naval

Marathi : Jambul

Sanskrit : Meghamodini, jambu

Kannada : Nerale hannu.

V. OIL OF EUCALYPTUS

Eucalyptus oil: Originally native to Australia, eucalyptus trees are now planted all over the world and used for their therapeutic qualities. Eucalyptus oil is the generic name for a refined oil from the leaves of Eucalyptus, which may belong to the Myrtaceae family of plants. Eucalyptus oil is the source of their therapeutic properties. It has many functions, including as an industrial scent, flavouring, repellent, pharmaceutical antiseptic, and more [22]. Native Australians utilised eucalyptus globulus as a fever reducer, fungus cure, and wound healer. Figure No. 07.



Fig 7: Eucalyptus Oil

➤ Traditional Uses:

Cystitis, diabetes, gastritis, kidney illness, laryngitis, leucorrhea, pimples, ringworm, wounds, skin ulcers, urethritis, and vaginitis were among the traditional ailments for which the oil was used. Additionally, it was used as an expectorant to alleviate the symptoms of bronchitis, asthma, throat irritation, and minor respiratory tract inflammation. This oil was used as an antiseptic and to treat lung tuberculosis, fever, and neurological pain in South European countries. It is applied externally to treat rheumatism, wounds, acne, stomatitis, and bleeding gums. Nonetheless,

states that produce the most jamun in India are Maharashtra, Tamil Nadu, Uttar Pradesh, Gujarat, and others.

In addition to having fewer calories than other berries, black plums are the best source of vitamin C, protein, carbs, iron, and magnesium. This berry is highly recommended by Ayurveda in India to treat a variety of conditions, including heart problems, stomachaches, and asthma. Jamun's leaves and bark can help lower the body's elevated blood sugar levels [9, 8].

there were three main applications for eucalyptus oil: industrial, therapeutic, and fragrance/perfumery. [31]

➤ Uses:

• Antiseptic and Medicinal:

The oil derived from cineole is a part of a pharmaceutical propellant that relieves. It has been used in semi-solid dosages to cure coughs, encourage the production of scars from burns and injuries, and act as an anti-rheumatism agent. When inhaled, eucalyptus oil vapour acts as a decongestant and treats mild respiratory ailments such as bronchitis and asthma. For its antimicrobial qualities in soaps and dental care products, eucalyptus oil is also utilised in personal hygiene products [23].

• Scent:

In soaps, detergents, lotions, and fragrances, eucalyptus oil is also utilised as a fragrance ingredient to create a clean, fresh scent [1].

• Industrial

In the industrial sector, eucalyptus oil is also utilised as a fuel. At the moment, the oil's production costs are too high to make it a viable fuel.[24]

• Safety :

Adults can safely ingest cineole-based eucalyptus oil when taken internally in small doses as a flavouring ingredient or in pharmaceutical goods at the recommended rate. Children have experienced multiple cases of poisoning following the consumption of 4–5 millilitres of eucalyptus oil [1].

VI. TRADITIONAL AND MEDICINAL USES JAMUN

Diabetes is treated using traditional Ayurvedic medicine in Indian culture. In the conventional method, jamun is a good blood purifier. Jamun seed power is frequently used to treat

diabetes by regulating blood sugar levels. The inherent antibacterial properties of jamun leaves aid in the quick healing of wounds. The jamun tree is utilised to keep teeth healthy and has antimicrobial qualities. In the summer, jamun juice is a cool beverage. There are medicinal uses for the jamun seed, leaves, bark, fruit, and flower. Jamun, often called Unani medication, is used in Ayurvedic medicine to strengthen teeth and gums. Diabetes, intestinal, liver, dental, and skin conditions are the conditions for which jamun is most frequently utilised. [25]

A. Industrial uses

The Jamun fruit can be used for making wine.

B. Medicinal uses

Diabetes Management. 2. Digestive Health. 3. Oral Health. 4. Respiratory Health. 5. Skin Health Etc.

C. Food Products

- Jamun Juice
- Jamun Jam
- Jamun Jelly
- Jamun Cheese
- Jamun Toffee

VII. PHYTOCHEMISTRY

Numerous extremely significant chemical components are present in the essential oil that is extracted from the ripe fruits, buds, and bare branches of Eucalyptus globules. Depending on the maturity and place of collection, the amount of 1,8-cineole in the leaf oil ranged from 4.10 to 50.3% [16]. Non-nutritive plant compounds with disease-preventive qualities are called phytochemicals. Only phenols and flavonoids were found in the ethanol extract of jamun leaves, fruit, seeds, and watery stem bark, according to phytochemical examination. Alkaloids, flavonoids, saponins, anthroquinone glycosides, steroids, and tannins were discovered to be present in the methanol and ethyl acetate extracts of jamun seeds [25]. Figure No. 08.

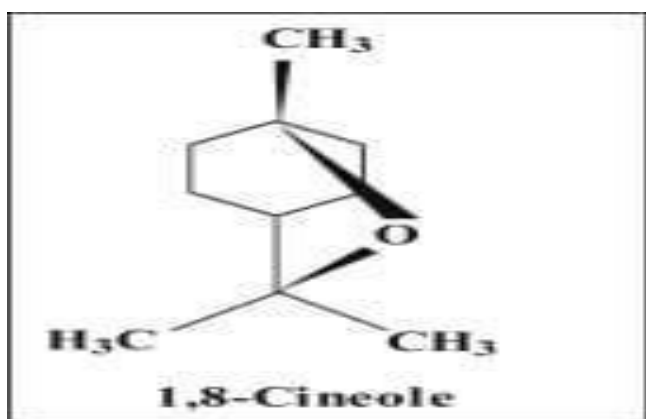


Fig 8: Chemical Structure of Eucalyptol
1,8-Cineole (Eucalyptol)

VIII. ANTI DIABETIC ACTIVITIES OF EUCALYPTUS AND JAMUN EXTRACTS

The α -glucosidase that inhibition activity of a plant extract was determined using 5 mM p-nitrophenyl- β -D-glycopyranoside (PNPG) as a slightly modified substrate. The purpose of this study was to evaluate the effects of eucalyptus

on streptozotocin-induced damage in a pancreas is islands by stereological method [26]. The study that suggests a beneficial effect of eucalyptus globules as a dietary aid for the treatment of hyperglycemia and as a potential source for the discovery of a new orally active agent for therapy.

Even insulin therapy has a number of disadvantages, such as insulin resistance, brain atrophy, anorexia nervosa, and a fatty liver following long-term treatment. The control diet was prepared using the same technique to make sure that our diet preparation method did not alter the vitamins and minerals in the diet. According to modern medicine, there is currently no satisfactory, effective therapy for managing diabetes mellitus [28]. The botanical also prevents complications from diabetes, such as lipid peroxidation and ketoacidosis, by virtue of its antioxidant properties [29].

The antidiabetic effect of jamun has used in ayurvedic pharmacopeia, seed powder is used this is effective to control blood glucose level. The high blood glucose level is also called as hyperglycemia, that opposite hypoglycemia occurs when blood sugar level are too low. The diabetic patients are used the jamun powder or churn therapy that response to reduce blood sugar level. Diabetes is very serious chronic disease that pancreas does not produce enough insulin. Jamun is work for managing diabetes but also boost insulin production and that have highly health benefits. [30]

IX. CONCLUSION

The globules of eucalyptus are employed as a medical remedy. Because of their many pharmacological activities, including analgesic, antifungal, antibacterial, anti-diabetic, anti-tumor, antiviral, antioxidant, and anti-cancer qualities, some eucalyptus species are also commonly employed. The primary chemical, 1,8 cineole, is in charge of a number of activities. Additionally, the jamun fruit possesses antiviral and anticancer qualities. Jamun seed powder has been used in a natural approach to help with gastrointestinal issues and blood sugar regulation. Jamun is traditionally used in Ayurveda to manage diabetes, which has health advantages for a number of ailments.

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