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THE MEDICAL ATTRIBUTES OF *FICUS BENGHALENSIS*

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ABSTRACT

The enormous, evergreen tree Ficus benghalensis, also called the Indian banyan, belongs to the Moraceae family. One of the biggest genera of angiosperms is Ficus. India's National Tree, Ficus benghalensis, has great religious importance. Its aerial prop roots, which grow downward and become woody trunks, are what define it. Strong antidiabetic, anti-inflammatory, immunomodulatory, analgesic, and antibacterial qualities are thought to exist in Ficus benghalensis. Dysentery, diarrhea, diabetes, leucorrhea, gum disease, and skin conditions have all been treated using different components of the tree in ancient medical systems such as Ayurveda, Unani, and Siddha. While the bark decoction is a well-known treatment for controlling blood sugar, the milky latex is traditionally used to treat bruises and broken heels.

Keywords : *Ficus benghalensis*, Antidiabetic, Immunomodulatory, Aerial roots, Hypoglycemic.

Introduction :

The Moraceae family, commonly referred to as the Mulberry family, includes the blooming plants that comprise Ficus benghalensis. This tree is native to the Indian subcontinent. This long-lived, epiphytic tree can grow indefinitely because to its prop roots. Ficus benghalensis has antibacterial, antioxidant, anti-arthritic, wound-healing, anti-inflammatory, and significant hypoglycemic properties. The name "Banyan" comes from the "Banias" (Indian traders) who used to sleep under the shade of these trees [1]. Mammals and birds eat the fig fruits that the tree bears. The leaves are large, leathery, oval, and bright green.

The distinguishing characteristic is the aerial roots that hang from the branches and eventually take root in the ground to offer structural support [2]. The bark is grey and smooth. The little flowers are contained in the container (syconium) [3, 4]. Tanning, glycosides (bengalenoside), flavonoids, leucopelargonidin, phytosterols, ketones, polysaccharides, tiglic acid, and esters are some of the important bioactive elements present in Ficus benghalensis [6,7].

Plant profile:-

- **Biological Source:-[**5]

The Moraceae family includes the flowering plant species Ficus benghalensis L. It is often grown near temples and is regarded as a sacred tree in India.
Synonyms: Nyagrodha (Sanskrit), Vata (Ayurveda), and Bargad (Hindi).
Common name: Indian Banyan Tree.

Images:- *Ficus benghalensis*

Fig no.1. OF FICUS BENGHALENSIS

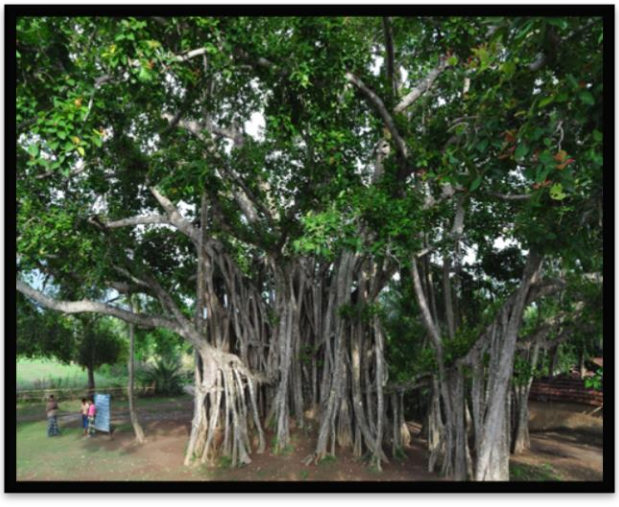

Fig no. 2 fruits

Fig no .3 leafs Parts of the plants

Chemical Constituents :

Among the important minerals and bioactive elements found in F. benghalensis are tannins, flavonoids, saponins, terpenoids, cardiac glycosides (especially bengalenoside), ketones, pentacyclic triterpenes, stigmasterol, sitosterol, and polysaccharides. The bark contains significant amounts of tannins and derivatives of leucocyanidin. [6, 7]

Therapeutic Uses :

- Its bark extract has been thoroughly researched for its strong antidiabetic (hypoglycemic) qualities and is used in traditional diabetes management formulations. [8,9]
  2. Latex is used to treat skin diseases, rheumatism, and lumbago in addition to being applied on broken heels. [10, 11]
  3. The aerial roots fortify teeth and gums and act as a natural polymer in sustained-release treatments. [10, 11]
  4. Leaf buds can be used to treat diarrhea and dysentery since they are astringent. [12]
  5. To cure skin blemishes and lessen inflammation, leaf extracts are administered topically. [13]
  6. Gynecological conditions including menorrhagia and leucorrhea are treated with the bark decoction of Ficus benghalensis. [14]

Advantages :

1. Ecological Keystone: By providing food (figs) and shelter to a diverse range of birds, insects, and primates, the tree maintains the ecosystem's equilibrium.
2. Antidiabetic Potency: Research has demonstrated that the bark of the banyan tree is a great natural blood glucose-lowering medication, offering a cost-effective alternative or supplement to synthetic antidiabetics.
3. Therapeutic Versatility: It has a wide range of actions, including wound-healing, immunomodulatory, antibacterial, antifungal, analgesic, and antipyretic.
4. Soil Conservation: Its vast root system prevents soil erosion, and once established, it is incredibly resistant to drought and mild cold.

- **Taxonomical Classification:[15]**
  - Kingdom : Plantae
  - Division :Magnoliophyta
  - Class : Magnoliopsida
  - Order : Rosales
  - Family : Moraceae
  - Genus : Ficus
  - Species : Ficus benghalensis

Morphology :

The enormous, evergreen Ficus benghalensis tree grows thanks to aerial roots that provide support and allow the crown to grow to enormous heights. The tree may reach a height of 20 to 30 meters. The smooth, pale grey-white bark exfoliates in little, irregular flakes. The coriaceous (leathery) leaves are 10 to 20 cm long, with an oblong to elliptic shape, a cordate base, and a glossy surface. Growing in pairs on the leaf axils, the fruit is a sessile syconium (fig). When ripe, it turns scarlet red and is globose, with a diameter of 1.5 to 2 cm. [16]

Botanical and Geographical Distribution:-[17,18]

The Indian subcontinent is home to Ficus benghalensis. It is found all over India's forest regions, from the sub-Himalayan region to the Deccan's deciduous forests. Pakistan and Sri Lanka are also home to it. In tropical regions of the world, it is frequently planted as a shade tree in parks, by the sides of roads, and in villages. Although it prefers humid environments, it is resilient enough to endure in semi-arid areas.

Review of Literature:-

1.Antidiabetic activity:
Blood sugar levels can be regulated by Benghalensis ficus bark. In rats with diabetes brought on by streptozotocin and alloxan, the ethanolic and aqueous extracts of the bark have shown significant hypoglycemic effects. The procedure involves inducing the islets of Langerhans' beta cells to release insulin. [19] In traditional contexts, the bark's water decoctions are utilized as a dietary supplement to help control diabetes. [20]

2. Anti-Diarrheal Activity:
The anti-diarrheal effects of ethanolic extracts of Ficus benghalensis leaf buds were tested in rats with castor oil-induced diarrhea. The extract significantly reduced the frequency of defecation and the moisture content of fecal droppings as compared to the control group. This validates its traditional use in the treatment of dysentery. [21] Tannins and flavonoids are thought to be responsible for increased intestinal water absorption. [22]

3. Antioxidant activity:
Wistar albino rats and in vitro models were used to study the antioxidant activities of the aerial roots and bark. The extracts demonstrated a notable capacity to scavenge free radicals, including hydroxyl and DPPH radicals. The high phenolic and flavonoid content aids in this function by preventing oxidative stress-induced cell damage. [23] The methanolic extract fared better than the aqueous extracts in reducing lipid peroxidation. [24]

4. Immunomodulatory activity:
It was examined how Ficus benghalensis aerial root extracts affected the immune system. In neutrophil adhesion tests and hemagglutination antibody titer models, the extract greatly increased the immune response. This suggests that the plant might contain immunostimulant qualities that strengthen the body's defenses against infections. [25, 26]

5. Antiarthritic activity:
Adult Wistar Strain rats were used to investigate the anti-arthritic effects of the bark extract. In rats with arthritis caused by Freund's adjuvant, the extract significantly reduced paw edema and boosted body weight. The activity is attributed to the integrity of lysosomal membranes and the inhibition of inflammatory mediators like cytokines. Its application to rheumatic conditions is validated by this. [28, 29]

6. Wound healing activity:
The impact on wound healing was investigated using rats with excision and incision wound models. Applying Ficus benghalensis root and bark extracts improved the pace of wound contraction and skin-breaking strength. The inclusion of phytosterols and flavonoids accelerates collagen synthesis and epithelialization, leading to quicker healing as compared to control groups treated with simple ointment bases. [30]

7. Antimicrobial activity:
Ficus benghalensis extracts have demonstrated broad-spectrum antibacterial activity. The fruit and bark extracts showed notable zones of inhibition against Escherichia coli, Pseudomonas aeruginosa, and Staphylococcus aureus. The bioactive compounds degrade the bacterial cell wall and stop proteins from forming. [31] Fungal strains such as Candida albicans were also successfully combatted by the methanolic extracts of the aerial roots. [32]

8. Analgesic and Anti-inflammatory activity:
The analgesic activity of F. benghalensis leaves and bark was assessed using the acetic acid-induced writhing test in mice. The extracts demonstrated a significant reduction in the amount of writhes, much like popular drugs like aspirin. This confirms the analgesic properties of the herb, both central and peripheral. [33]

Phytochemical Evaluation of *Ficus benghalensis*:[34]

Sr. no	Phytochemical /solvent extract	Pet.Ether	Chloroform	Ethyl acetate	Acetone	Ethanol	Methanol	Water
1	Alkaloids	-	-	-	-	+	+	-
2	Cardiac glycosides	-	+	-	+	+	+	-
3	Carbohydrates	+	+	+	+	+	+	+
4	Flavonoids	-	+	+	+	+	+	+
5	Phenols	-	+	+	+	+	+	+
6	Phlobatannins	-	-	+	-	+	+	-
7	Proteins	-	-	-	-	+	+	-

8	Saponins	+	+	-	-	+	+	+
9	Sterols	+	+	+	-	-	-	-
10	Tannins	-	-	-	+	+	+	+
11	Terpenoids	+	+	+	+	+	+	-
12	Quinones	+	+	+	+	+	+	+
13	Anthraquinones	-	-	-	-	-	-	-

Table no.1: Phytochemical evaluation of bark/roots of *Ficus benghalensis*

Conclusion:

The majestic Ficus benghalensis tree holds great religious, historical, and medicinal significance. The traditional uses of its many parts, including bark, leaves, latex, and aerial roots, have been validated by contemporary pharmacological study. The herb has potent antidiabetic, anti-inflammatory, analgesic, immunomodulatory, antibacterial, and wound-healing qualities. Important phytochemicals include flavonoids, tannins, glycosides (bengalenoside), and phytosterols are responsible for these diverse biological effects.Because it is a common species, it has a lot of potential as a source of low-cost herbal treatment. The specific bioactive substances that provide Ficus benghalensis its immunomodulatory and antidiabetic qualities will be the subject of future research. Bioavailability could be increased by using the mucilage or gum of the tree to make standardized nano-formulations or sustained-release drug delivery systems. Clinical trials are necessary to establish safe dosage schedules for human use, particularly for the treatment of diabetes, in order to integrate this ancient remedy into mainstream healthcare.

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