A systematic review on Ficus recemosa Linn

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***Abstract*- Ficus glomerata Roxb. (Family: Moraceae) is known as the cluster fig tree or Gular. A moderate-sized tree found throughout India either wild or cultivated for its fruits eaten by villagers. Ayurveda and Unani, the traditional Indian medical system, has employed the popular medicinal plant Ficus racemosa for many years to treat a variety of illnesses and disorders, including skeleton diseases, diabetes, inflammatory, hyperlipidemia, hemorrhoids, respiratory, liver dysfunction, antitussive, hepatoprotective, antimicrobial, and various GIT disorders. Numerous phytoconstituent components have been different parts of extracts and phytochemical screening of the Ficus racemosa. In light of the numerous recent results on this plant, that is much more significant. A thorough explanation of this plant is traditionally beneficial, phytoconstituents, and biological effects on this review. Ficus glomerata is a large deciduous tree dispersed all over India which is generally known as Gular, fig, cluster fig or country fig. It is a sacred tree of Hindus and Buddhists.**

Keywords: **Ficus racemosa, phytochemicals composition, phytochemistry, pharmacological activities.**

INTRODUCTION

Medicinal plants, since times immemorial, have been used in virtually all cultures as a source of medicine. The widespread use of herbal remedies and healthcare preparations, as those described in ancient texts such as the Vedas and the Bible, and obtained from commonly used traditional herbs and medicinal plants, has been traced to the occurrence of natural products with medicinal properties . The use of traditional medicine and medicinal plants in most developing countries, as a normative basis for the maintenance of good health, has also been widely observed . Furthermore, an increasing reliance on the use of medicinal plants in industrialized societies has been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies . The World Health Organization has estimated that 80% of the world's population use botanical medicine for their primary health care needs . (1)

Ficus racemosa (Linn) is a moderate sized avenue plant, belongs to family- Moraceae which is usually known as the Cluster Fig Tree, Indian Fig Tree or Goolar (Gular). This plant is native to Australia, Malaysia, South-East Asia and the Indian Subcontinent (2).

Ficus racemosa grows all over India in several forests and hilly areas. It is frequently available around the water streams and is also cultivated. Found along the river banks and inland forests from plains to 1500 m most frequently in India, Sri Lanka, Pakistan, Queensland and South China to New Guinea. The plant can be grown by vegetative as well as sexual propagation (using seeds) [3].

It is unusual in that its figs grow on or close to the tree trunk, termed cauliflory (4)

In India the tree and its fruit are called 'gular' in the north and 'atti' in the south. The fruits are a favourite staple of the common Indian macaque. In Kerala it is consider as one among nalpamara. It serves as a food plant for the caterpillars of the butterfly the Two-brand Crow (Euploea sylvester) of northern Australia [5].

The Ovambo people call the fruit of the Cluster Fig 'eenghwiyu' and use it to distill 'Ombike', their traditional liquor [6].

Ficus racemosa Linn (Moraceae) is an evergreen, moderate to large sized spreading, lactiferous, deciduous tree, without much prominent aerial roots. Tree about 20 m tall often with aerial roots, bark whitish-brown, smooth, Leaves grooved minutely hairy, lamina ovate-lanceolate to elliptic-lanceolate, tri-ribbed, 8-10 pairs of lateral pairs from broad to narrowly cuneate, oblique base, margin entire, acuminate at apex, glabrous on both sides, stipules triangular-ovate, brown, sub-persistent, cystoliths present only on lower side. Hypanthodia on long peduncles, borne in large clusters from tubercles on the main trunk and main leafless branches, subpyriform-globose, green, subtended by, broadly triangular-ovate brownish brads, bracts, apical orifice sunken, closed by brown bracts without internal bristles. Male flowers are sessile, ostiolar in 2-3 whorls, united, lobes dentate and stamens. Gall flowers pedicellate, dispersed among female. Female flowers are sessile or subsessile, ovary substipitate, glabrous style, stigma simple. Figs depressed subglobose or pyriform, red when ripe usually streaked. Seeds are lenticular 1 mm. Syconus fruit [7, 8]

Udumbara is considered scared to god Dattaguru. All ficus species possess latex-like material within their

vasculatatures that provide defense and self healing from physical assaults [9].
This plant is universally used in traditional system of medicine for the treatment of numerous disorders. It is one of the herbs mentioned in all ancient scriptures of Ayurveda, Siddha, Unani and Homeopathy. Various plant parts such as bark, root, leaf, fruits and latex are used as astringent, vermifuge, carminative and anti-dysentery. It is a good medication for excessive appetite. The extract of fruit is used in leucoderma, menorrhagia and diabetes. It is used locally to relieve inflammation of lymphadenitis, fibrositis, skin wounds and in sprains. (10)
Tablet is defined as a compressed solid dosage form containing medicaments with or without Excipients. Pharmaceutical tablets are solid, flat or biconvex dishes, unit dosage form, prepared by compressing a drug or a mixture of drugs, with or without diluents.(11)

Properties

1. The appearance of the tablet should be elegant and its weight, size and appearance should be consistent.
2. The drug should be released from the tablet in a controlled and reproducible way.
3. The tablet should be biocompatible, i.e. not include excipients, contaminants and microorganisms that could cause harm to patients.
4. The tablet should be of sufficient mechanical strength to withstand fracture and erosion during handling.
5. The tablet should be chemically, physically and microbiologically stable during the lifetime of the product.(11)

Advantages

1. They are easy to carry, easy to swallow and they are attractive in appearance.
2. Unpleasant taste can be masked by sugar coating and they do not require any measurement of dose.
3. Some of the tablets are divided into halves and quarters by drawing lines during manufacturing to facilitate breakage whenever a fractional dose is required.
4. An accurate amount of medicament, even if very small, can be incorporated.
5. Tablets provide best combined properties of chemical, mechanical and microbiological stability of all the oral dosage forms.
6. Since they are generally produced on a large scale, therefore, their cost of production is relatively low, hence economical.
7. They are in general the easiest and cheapest to package and ship among all oral dosage forms. Some specialized tablets may be prepared for modified release profile of the drug.
8. Product identification is potentially the simplest and cheapest requiring no additional processing steps when employing an embossed or monogrammed punch face.(11)

Disadvantages

1. Difficult to swallow in case of children and unconscious patients.
2. Drugs with poor wetting, slow dissolution properties, optimum absorption high in GIT may be difficult to formulate or manufacture as a tablet that will still provide adequate or full drug bioavailability.
3. Bitter testing drugs, drugs with an objectionable odor or drugs that are sensitive to oxygen may require encapsulation or coating.
4. In such cases, capsule may offer the best and lowest cost. Some drugs resist compression into dense compacts, owing to amorphous nature, low density character.(11)

Plant profile

Ficus racemosa is a beautiful cluster-fig tree with a curved trunk and a spreading crown. It is not a banyan tree; it does not have aerial roots. The red, stubbly figs in little bunches that grow immediately out of the tree's trunk are the most eye-catching feature of this tree. Those hunting for Ficus racemosa blooms should know that the fig is a component of a tree with hundreds of blossoms. The blossoms are pollinated by extremely little wasps that go through the aperture, looking for a suitable spot to reproduce. Without these pollinators, fig-trees never reproduce by seed.
In response, the blooms provide a safe home and nutrition for the wasps' offspring. *Ficus racemosa* is a ubiquitous tree in villages, cities, and towns.(12)

Fig No. 01: *Ficus recemosa Linn*. (12)

Taxonomic classification

The taxonomical classification has been represented in Fig.2

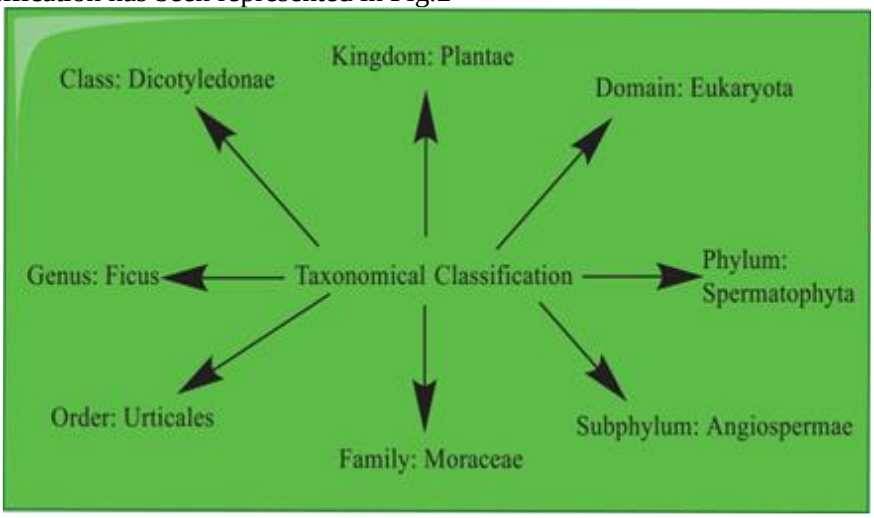

Fig No. 02: Taxonomical classification of *Ficus racemosa*.(12)

Ficus racemosa (syn. *Ficus glomerata Roxb*.) is a species of plant in the family Moraceae. Popularly known as the cluster fig tree, Indian fig tree or gular fig, Udumbara, this is native to Australia, Malaysia, Indo-china and the Indian subcontinent.

Vernacular names:

Hindi : Gular, Umar
Beng : Dumar, Jagya domar
Mar : Umbar
Guj : Umar, Gular
Tel : Atti bodda, paidi, udumbara
Tamil: Athi
Oriya : Dimpri(13)
Sans : Udumbarah, Sadaphakh
Assam : Janyedumuru, Yagyadimru
English : Cluster Fig, Country fig(14)

Climate and soil

It is naturally coming up in waste lands and forests. This requires well drained, medium to heavy soil for its successful cultivation. It is also found to be tolerate to lime sulphates and chlorides and can be thus used for planning in industrially polluted sites. However, it is not resistant to carbonates of sodium, potassium. It comes up in all kinds of soil except in water logged and clay types.(15)

Habits and features

Moderate to large sized spreading laticiferous, deciduous tree without much prominent aerial roots. It is an evergreen tree, 15-18 m high, young shoots glabrous.(15)

Leaves

Dark green leaves 7.5-15×3.2-6.3 cm, ovate – oblong or elliptic, lanceolate, tapering to a blunt point at the apex, with entire margins glabrous on both surfaces, base acute and rounded 3 nerved, lateral main nerves 4-6 pairs, petioles 1.3-3.8 cm long, glabrous stipules 2 cm long, ovate – lanceolate, scarious, pubescent. Leaves shed by December, replenished by January and April when the tree becomes bare for a short period.(15)

Inflorescence

Hypanthodium- Three kinds of flowers are borne, sterile, male and female flowers together in one receptacle of hypanthodium. The male flowers forming a zone near the mouth, the fertile female flowers forming a layer in the walls of the receptacle and the gall flowers an internal layer. Receptacle short pedunculate on short leafless warted branches which issue from the stem and later branches much contracted at the base when young.(16)

Flowers

Basal bracts 3, ovate-triangular, Male flower sessile, sepals 3-4 membranous, inflated enveloping the 2 elongate ovate anthers, filaments connate. Fertile female flowers sub-sessile, perianth gamophyllous with 4 or 5 long lanceolate teeth enveloping the small minutely tuberculate achene, style sub-terminal, stigma clavate. Gall flowers pedicellate, perianth gamophyllous, irregularly toothed covering only the base of the rough ovoid style, lateral elongate, stigma clavate.(17)

Fruits (syconium)

Fruits are sub-globose, pyriform 1-2 inches in diameter, beautiful when ripe red in colour with depressed umbilicus. Smooth or pubescent, edible but usually full of worms. They are seen clustered on leafless branches from the trunk and larger branches but very rarely axillary. Fruits borne in great perfusion, mature generally from March to July. When fully ripe, they have a pleasant odour, resembling that of cider apples. The syconns develops from a hollow, pear-shaped fleshy receptacle which encloses a number of minute male and female flowers. The receptacle grows and becomes fleshy encloses a number of fruits or achene which develop from the female flowers lying within the receptacle.(17)

Bark

The bark is astringent, rusty brown with a firmly smooth and soft surface, thickness from 0.5-2 cm according to the age of the trunk or bark surface with minute separating flakes of whitish tissue, texture homogenous leathery.(17)

Parts used - Root, bark, leaves, fruits, milky juice(17)

Action

Fruits – Laxative, Improves blood, cooling

Bark leaves and unripe fruits – Astringent, Carminative, Stomachic, Vermicide.(18)

Medicinal uses

Seed - Powder of the seed mixed with honey is regarded a specific in diabetes, reducing sugar in the urine, thirst and polyuria of diabetes.(18)

Leaves - Young leaves crushed or reduced to powder or ripe figs mixed with honey or sugar are administered in bilious affections. Decoction prepared with a handful of leaves boiled in four pints of water is given with benefit every morning as a douche in dysmenorrhea.(18)

Milky Juice - Milky juice is administered in piles and diarrhoea. Fruit is edible, it is given on aphthous complaints, menorrhagia, haemoptysis with sugar and honey. Fruit when boiled in milk, it is a good remedy for visceral obstructions. In the diarrhoea of the pregnant women, the fruit with honey is given. Fruit and sap extracted from the trunk of the tree are efficacious in diabetes. Fruits are suppressor of pitta and effective in removing srama and sopha. The powder from the roasted fruits form a valuable breakfast food, almost similar to imported grape nuts. Fruits may be dehydrated ground into flour and taken with milk and sugar or used for preparing cold jelly. Fresh juice of ripe fruit is given as an adjunct or vehicle to a metallic medicine for diabetes and other urinary complaints. Dried fruit one tola with sugar and honey is given in cases of menorrhagia and haemoptysis.(18)

LITERATURE REVIEW

ETHANOBOTANICAL ASPECTS

S. Vedavathy et.al(1995), C.H. Chandrashekhar et.al (2008), V.V. Patil et.al (2009), S. Prabhakar et.al (1990), S.Prabhakar et.al (1990), S. Sharma et.al (2008), P.K.Mukherjee et.al (1998), J.A. Parrotta et.al (2001), Gorwadiya HC et.al (2010) was studied that, *Ficus racemosa linn*. also has been widely utilized in traditional medicine to treat various diseases. Its bark, fruits, leaves, roots, latex, and seeds are used medicinally in various forms, often in conjunction with other plants.(19),(20), (21), (22), (23),(24),(25)

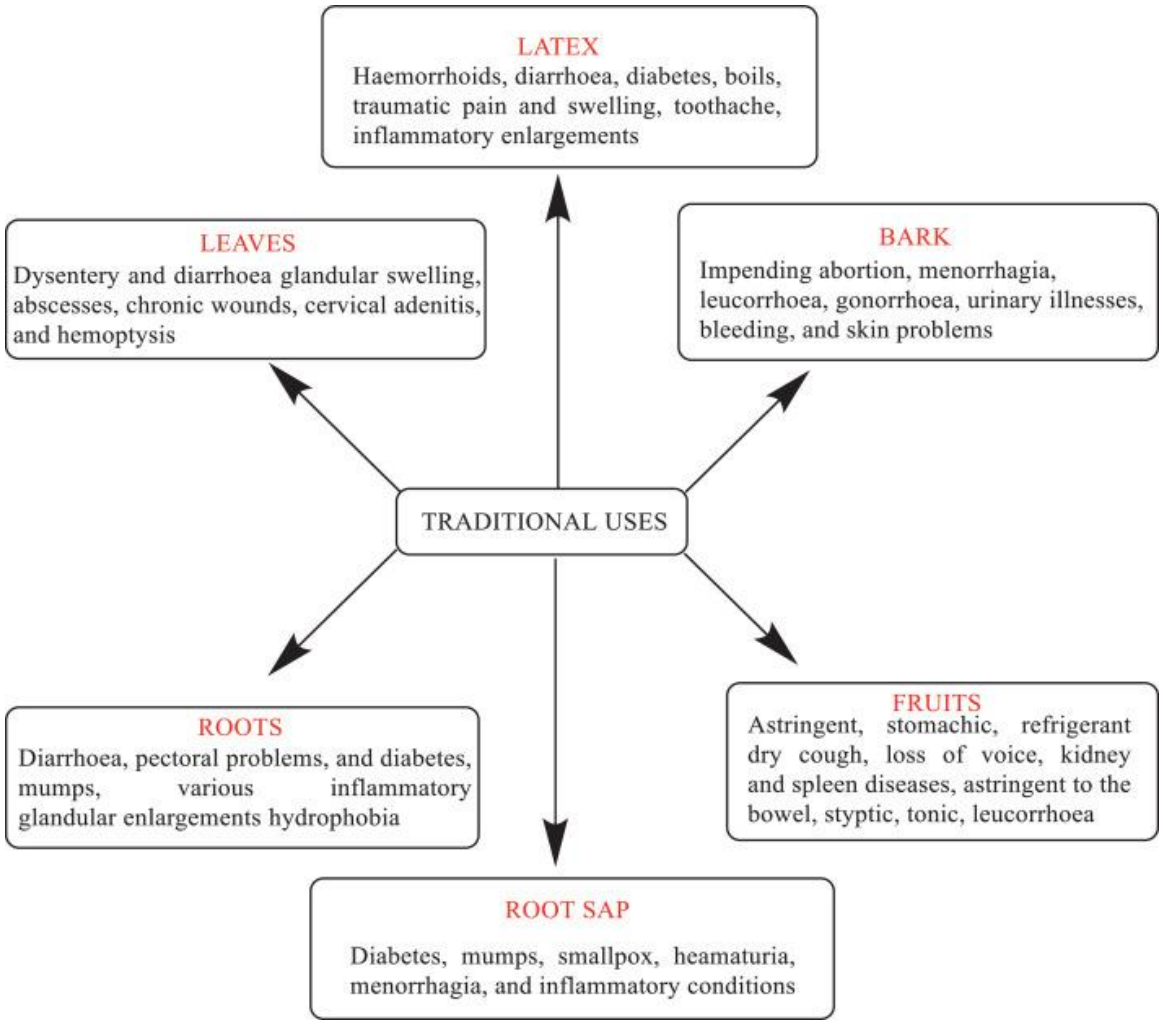

Fig No. 03: Traditional uses of *Ficus racemosa Linn* (21-26)

Pharmacognostic Aspects:

Macroscopical characteristics

Husain O.P. Virmani et. al (1992) was studied that, Leaves are simple, 7.5-15 cm × 3.2-6.3 cm, ovate-oblong or elliptic-lanceolate, apex acute, margin wavy, surface glabrous, texture membranous, base symmetric, venation reticulate, color of upper surface dark green and lower surface light green. Three prominent veins seem to be arising from the base of the lamina. Petiole is angular and reddish-brown.(27)

Microscopy: Transverse section Lamina of the transverse section shows a prominent hypodermis beneath the upper epidermis. Underlying the hypodermis are bi-layered, compact, radially elongated palisade cells followed by spongy mesophyll composed of 3-4 layers of loosely arranged parenchymatous cells with scattered calcium oxalate cluster crystals. Midrib consists of a well-developed collenchyma below upper epidermis and above lower epidermis. Ground tissue consists of loosely arranged polygonal parenchymatous cells having calcium oxalate prisms and cluster crystals.(27)

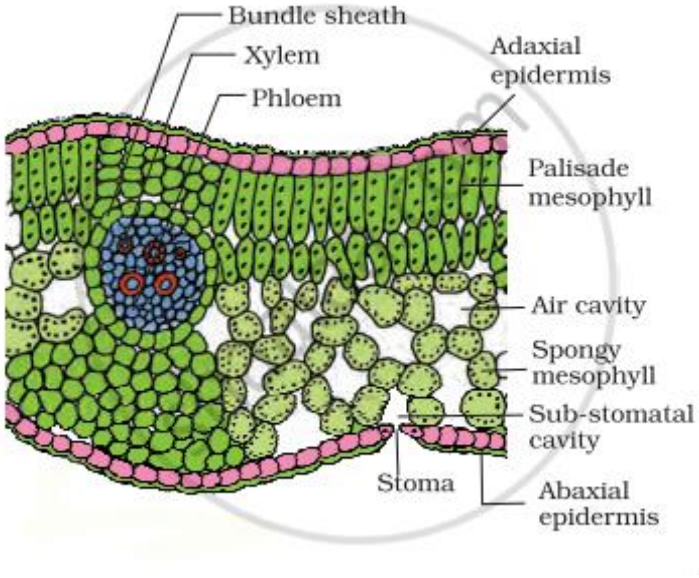

Fig No. 04: T.S of Ficus recemosa (27)

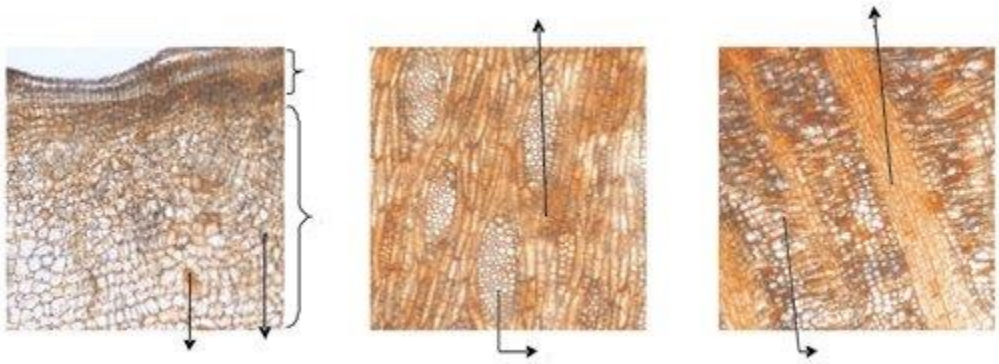

Fig No. 05: Microscopy of Ficus Glomerata Roxb.(27)

Powder characteristics

It is a dark green powder with no distinct odor or taste. The important diagnostic features of the powder include parts of epidermis in surface view showing straight walled epidermal cells and anomocytic stomata, xylem vessels with reticulate or annular thickening, calcium oxalate cluster crystal sheath, calcium oxalate prisms, starch grains and numerous covering trichomes, unicellular or bicellular, narrow, conical, pointed, few having a hooked-top.(27)

Phytochemicals Aspects

Nilanjan pahari et al. (2022) was studied that, The active phytochemical constituents of *Ficus racemosa* have been described in Table No.1. The structures with their stereochemistry have been noted in Fig No.06:

Table No. 1

Part of the Plant	**Phytochemical constituents**	References
Leaf	sterols, triterpenoids (Lanosterol), tetracyclic triterpene-glauanol acetate alkaloids, tannins, and flavonoids.	28
Stem-Bark	gluanol acetate, β-sitosterol, leucocyanidin-3-O-D-glucopyrancoside, leucopelargonidin-3-O-D-glucopyranoside, leucopelargonidin-3-O-L-rhamnopyranoside, lupeol, ceryl behenate, lupeol acetate, and α-amy Lupenol, β-sistosterol, and stigmasterol.	29
Trunk-Bark	Upenol, β-sistosterol and stigmasterol.	29
Fruit	Glauanol, glauanol acetate, hentriacontane, sitosterol, glauanol acetate, glucose, tiglic acid, taraxasterol, lupeolacetate, friedelin, higher hydrocarbons.	30

Root	Cycloartenol, euphorbol and its hexacosanoate, taraxerone, and tinyatoxin.	31
Latex	Cycloartenol, euphorbol and its hexacosanoate, taraxerone, and tinyatoxin.	32

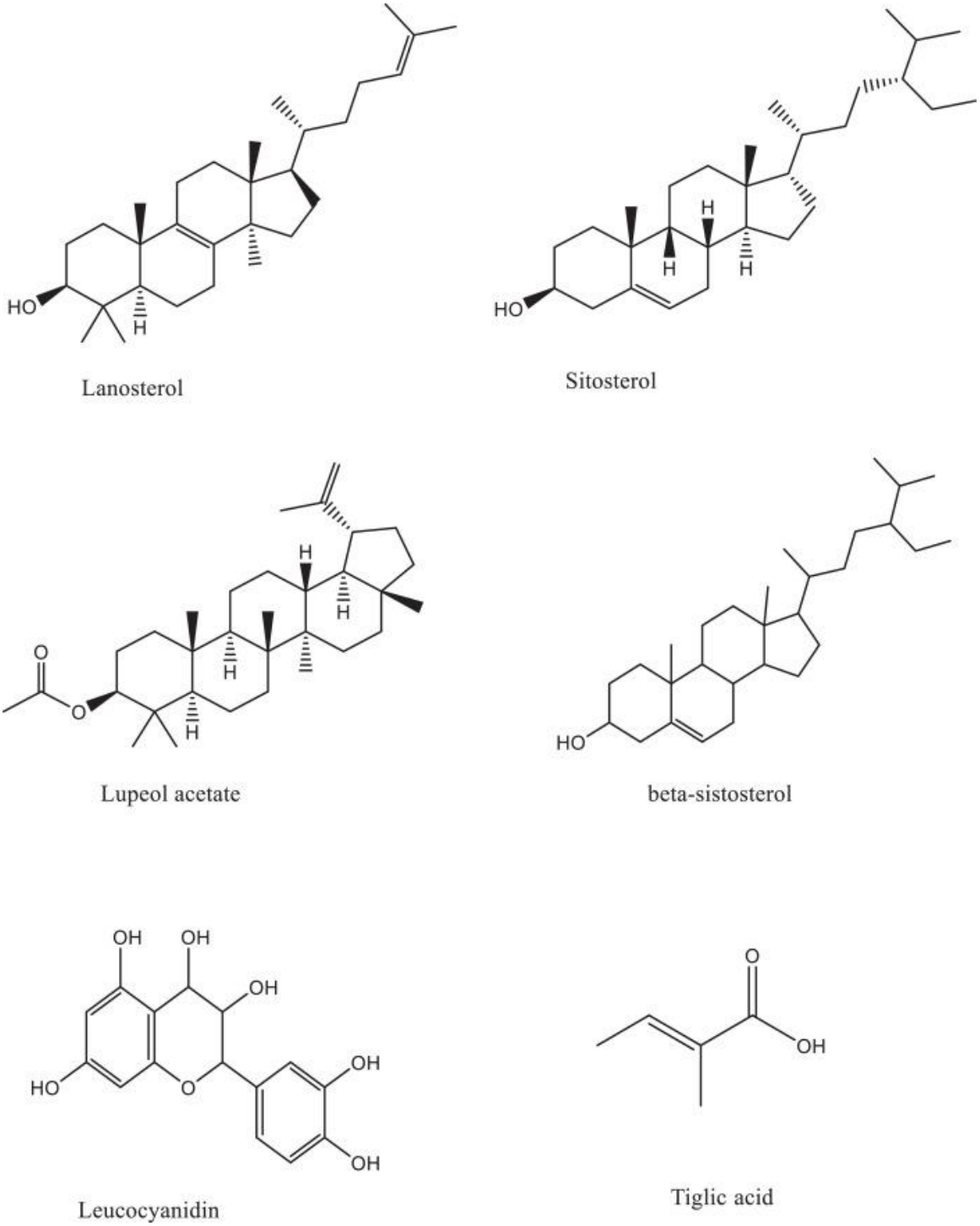

Fig No.6: Chemical structure of the active constituents of *Ficus. racemosa*.(32)

The chemicals are classified according to their chemical class in Table No. 2 (32)

Sr NO.	Chemical Class	Chemical Components
1	Alcoholic	Glauanol, Euphorbinol, Upenol
2	Ester	Glauanol acetate, Ceryl behenate, Lupeol acetate
3	Steroidal	Lanosterol, sitosterol, stigmasterol
4	Acidic	Palmitic acid, Tiglic acid

Fig No. 07 *Ficus racemosa Linn.* (Leafs and Fruits).(32)

Pharmacological aspects:

Antibacterial

Shaikh T et. al (2010) studied that, The hydro alcoholic extract of leaves was found effective against Actinomyces vicosus. The minimum inhibitory concentration was found to be 0.08mg/ml.(33)

Antihelmintic

Chandrashekhar C.H. et al. (2008) studied that, The crude extracts of bark were evaluated for anthelmintic activity using adult earthworms; they exhibited a dose-dependent inhibition of spontaneous motility (paralysis) and evoked responses to pin-prick which was comparable with that of 3% piperazine citrate. However, there was no final recovery in the case of worms treated with aqueous extract suggesting wormicidal activity.(34)

Anti-ulcer/gastro-protective

Rao CHV et. al (2008) studied that, The 50% ethanol extract of fruits was studied in different gastric ulcer models, viz pylorus ligation, ethanol and cold restraint stress induced ulcers in rats at a dose of 50, 100 and 200 mg/kg body weight p.o. for 5 days twice daily. The extract showed dose dependent inhibition of ulcer index in all three models of ulcer.(35)

Analgesic

Malairajan P. et. al (2008) studied that, The ethanol extract of bark and leaves showed dose dependent analgesic activity when evaluated for analgesic activity by analgesiometer at 100, 300 and 500 mg/kg and was found to possess.(36)

Antifilarial

Mishra V. et. al (2006) focused on, Alcoholic as well as aqueous extracts caused inhibition of spontaneous motility of whole worm and nerve muscle preparation of Setaria cervi characterized by increase in amplitude and tone of contractions. Both extracts caused death of microfilariae in vitro. LC50 and LC90 were 21 and 35 ng/ml, respectively for alcoholic, which were 27 and 42 ng/ml for aqueous extracts.(37)

Larvicidal

Khan N. et. al (2005) studied that, The larvicidal activity of crude hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of the leaf and bark were assayed for their toxicity against the early fourth-instar larvae of Culex quinquefasciatus (Diptera: Culicidae). The larval mortality was observed after 24-h exposure. All extracts showed moderate larvicidal effects; however, the highest larval mortality was found in acetone extract of bark.(38)

Anti-inflammatory
Li RW et. al (2003) studied that, Ethanol extract of stem bark also inhibited COX-1 with IC50 value of 100 mg/ml proves that the drug is used in the treatment of inflammatory conditions.(39)

Antitussive
Bhaskara RR et. al (2003) studied that, The methanol extract of stem bark was tested for its antitussive potential against a cough induced model by sulphur dioxide gas in mice. The extract exhibited maximum inhibition of 56.9% at a dose of 200 mg/kg (p.o.) 90 min after administration.(40)

Antidiuretic
Ratnasooriya WD et. al (2003) studied that, The decoction of F. racemosa bark has shown antidiuretic effect at doses of 250, 500 or 1000 mg/kg body weight. It had a rapid onset within 1 hr, peaked at 3 hr and lasted throughout the study period 5 hr. It also caused a reduction in urinary Na+ level and Na+/K+ ratio and an increase in urinary osmolarity indicating multiple mechanisms of action.(41)

Wound healings
Biswas TK et. al (2003) studied that, Ethanol extract of stem bark showed wound healing in excised and incised wound model in rats.(42)

Antipyrectic
Rao RB et. al (2002) studied that, Methanol extract of stem bark showed significant dose-dependent reduction in normal body temperature and in yeast-induced pyrexia in albino rats up to 5 h after drug administration, at doses of 100, 200 and 300 mg/kg body wt. p.o. The anti-pyretic effect was comparable to that of paracetamol. (43)

Antidiarrhoeal
Mukherjee PK et. al (1998) studied that, Ethanol extract of stem bark was evaluated for antidiarrhoeal activity against different experimental models of diarrhoea in rats. It showed significant inhibitory activity against castor oil induced diarrhoea and PGE2 induced enteropooling in rats. These extracts also showed a significant reduction in gastrointestinal motility in charcoal meal tests in rats. The results obtained established its efficacy as anti-diarrhoeal agent.(44)

Pharmaceutical Aspects:
Foot cream
Dr.Nibha 2018 was studied about Human feet have to maintain the weight of the body but they are often neglected. The skin on our feet is dry as compared to skin on the rest of the body because it has no oil glands and it relies on hundreds of thousands of sweat glands to keep the feet moisturized, therefore, feet need special care for protection, beautification and comfort. Different types of foot care products available in the market are, viz.., Foot powder, Foot spray, Foot Creams, Corn and callus Preparation, etc. Foot cream has the refreshing, anti-pruritic, deodorizing and antiperspirant, cleansing, antiseptic and an antifungal property which prevents foot from the various ailments such as toenail fungus, athlete's foot, bunions, corns, calluses, cracked heels and pressures. Since the times of Vedas different herbs are used to treat various diseases and for treating skin conditions such as eczema, dermatitis. etc(45)

Tablet
Chitta suresh kumar (2011) was studied about, The main aim of present investigation was to develop sustained release matrix tablets of Gliclazide using fruit mucilage from the plant *Ficus glomerata*. Varying ratios of drug and polymer viz. 1:0.25, 1:0.5, 1:0.75, 1:1.0 and 1:1.25 were selected for the study. The flow proper ties of powdered mucilage and physical properties of matrix tablets were performed. The swelling behavior and release rate characteristics were studied. The in vitro drug release data was analyzed by zero order, first order, Higuchi plot, Peppas plot and Hixon-Crowell Models. It was observed that as the proportion of mucilage increased the release of drug from the matrix tablets was retarded. Stability studies were conducted at 40[+ or -]2[degrees]C and RH 75[+ or -]5% for 3 months indicates that Gliclazide was stable in the matrix tablets. The Differential Scanning Calorimetric (DSC) and Fourier Transform Infrared (FTIR) study revealed that there was no negative chemical interaction between drug and the mucilage used. From the dissolution study, it was concluded that dried *Ficus glomerata* mucilage can be used as an excipient for making sustained release matrix tablets.(46)

CONCLUSION
The literature survey reveals that the leaves of *Ficus recemosa* shows potent antibacterial. Further Antihelmintic also studied from bark extract. Again Antifilarial activity shows both alcoholic and aqueous extracts of stem bark. Wound

healing activity shows ethanolic extracts of ficus recemosa stem bark promoted wound healing in excision and incision. Also antipyretic activity shows that methanol extracts of *Ficus recemosa* stem bark significantly reduced normal body temperature. Again Anticholinesterase activity shows aqueous extracts of *Ficus recemosa* stem bark. Larvicidal activity shows crude hexane, ethyl acetate, petroleum ether, acetone and methanol extracts of the leaf and bark.This review article give an idea regarding various pharmacology activity and phytochemical knowledge of the selected species. The phytochemical screening helpful in extraction of plant and quantitative estimation of plant because of this phytochemical screening there is enough scope for the development of an effective formulation.

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