Phytopharmacological study of *Ficus glomerata* – Review

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ABSTRACT

Plants used as a source of medicine throughout the world. The present review covers the taxonomy, tribution and pharmacological activities of *Ficus glomerata. Ficus glomerata* commonly known as Gular bara, found all parts of India. Atharvaveda considers this as a divine plant and much used in religious Whole parts of the plant are rich source of bioactive component, which provide miraculous medicinal plant. Bark, leaves and unripe fruits etc are used externally and internally to cure many diseases like menorrhagia, haemoptysis etc. Moreover, it is also useful in treatment of asthma, piles and skin tract of the different plant part showed antioxidant, hepatoprotective, hypoglycaemic, anti-nomodulatory, antimicrobial, analgesic, anti-ulcer, anti-diarrheal and anti - HIV-1 integrase activities.

Keywords: *Ficus glomerata*; pharmacological; phytochemical

INTRODUCTION

Plants that having curing properties are known as me-dicinal plants or herbs. Herbs have been used in treat-ing human diseases for thousands of years by tribal communities and ancient civilizations. They may be used directly as such, or in other extracted forms for their natural chemical constituents. They may also be used as constituents in different forms of medicines. Medicinal plants are not only a major source for the traditional medicine & herbal industry but also provide livelihood and health security to a large segment of Indian population.

According to the World Health Organization (WHO), approximately 80% of the world's population currently uses herbal medicines in healing different ailments. Among the estimated 400,000 plant species, only 6% have been studied for biological activity, and about 15% have been investigated phytochemically (Pushpa Latha et al., 2010; Balandrin et al., 1985; Cragg et al., 1997). This shows a need for planned activity guided phyto-pharmacological evaluation of herbal drugs. This article is aimed to provide an overview of research work done on this plant which is helpful for further investigations and forms an important aspect of drug studies.

Ficus glomerata belongs to the family Moraceae (Mul-berry family), and is commonly known as Gular, Umar, Umber, and Udumbara. It is an herb found all parts of India. It is an evergreen tree; common throughout the State near villages and along streams and rivers; also planted along road-side. Phytochemical investigated on *Ficus glomerata* have reported the presence of cycloar-tenol, euphorbol, hexacosanate, triacetate, taraxerone, tetratriterpene, glauanolacetate, racemosic acid, glau-anol, glucose, hentriacontane (Suresh et al., 1979; Merchant et al., 1979; Sen and Chowdhary, 1971). Plant is commonly used in antihyperlipidemic, diabetic, hepatoprotective, analgesic and wound healing (Baslas and Agha, 1985).

GEOGRAPHICAL SOURCE

Ficus glomerata, is native to Australia, South East Asia and the Indian sub continent. It is a moderate to large-sized spreading tree widespread in moist areas, beside rivers and streams, occasionally in streams; 100-1700 m of India (http://ayurvedicmedicinalplants; Anonym-ous, 1952).

BOTANICAL DESCRIPTION

Ficus glomerata is evergreen tree can grow over 20 -40 feet tall and 20 to 40 feet wide with spreading crown and white latex (http://www.ehow.com).Leaves are 7.5-15 cm long, stipules are ovate-oblong or ellip-tic-lanceolate, entire, tapering to a bluntish point at the apex, base cuneate to obtuse and in large clusters from old nodes of main trunk. Branchlets are brown with young leaf blade, and figs with bent hairs. Bark is grayish brown in color and smooth, outer surface of the bark consists of easily removable translucent flakes grayish to rusty brown, uniformly hard and non-

brittle (Joseph and Raj, 2010; Nayar and Bisht, 1959). Recep-tacle shortly pedunculate, on short leafless warted branches which issue from the stem and larger branches, subglobose, pyriform or subturbinate, 3.2

cm across, red when ripe. The fruits resemble the figs and are green when raw, turning orange, dull reddish or dark crimson on ripening. Figs in a tumor like aggre-gate on short branchlets of old stem, occasionally axil-lary on leafy shoot or on older leafless branchlets, paired , reddish orange when mature , pear-shaped, 2-2.5 cm in diam., basally attenuated into a stalk. The fig is actually a compartment carrying hundreds of flow-ers. The seeds are tiny, innumerable and grain-like. Male flower called gall and female flowers within same fig or receptacle and calyx lobes is linear; style is lateral with clavate stigma. Male flower are present near apical pore, sessile having 3 or 4 calyx lobes and 2 ste-mens. The roots are long, brownish in colour. It's hav-ing characteristic odour and slightly bitter in taste. Roots are irregular in shape (Paarakh PM, 2009).

CHEMICAL CONSTITUENTS

Leaves contain glycosides, gluanol acetate, β-amyrin and β-sitosterol. Bark contains ceryl behanate, lupeol, lupeol acetate, α & β-amyrin, gluanol acetate, β-sitosterol, stigmasterol and a ketone. Gluanol acetate and β-sitosterol, cycloartenol, euphorbol, hexacosa-nate, triacetate, taraxerone, tetratriterpene, glauano-lacetate, racemosic acid, glauanol, glucose, hentriacon-tane have also been isolatated (Sati et al., 1989). An alkaloid, dumurin has been isolated from the stem bark. Fruits contain lupeol acetate, β-sitosterol, hen-triacontane, gluanol acetate and tiglic acid ester of taraxasterol and glucose (Ghani A., 2003). New tetra-cyclic triterpene-glauanol acetate has been isolated from leaves, bark and heartwood (Rastogi and Mehro-tra, 1993).

PHARMACOLOGICAL REVIEW

Akhtar et al (1988) studied effects of *Ficus glomerata* fruits on blood glucose levels in groups of normal and alloxan-diabetic rabbits. They found that the indigen-ous plant contains more than one type of hypoglycae-mic principles which seem to act by producing an orga-notropic effect on the B-cells resulting in an increased secretion of insulin. In addition, it is also possible that the drug acts by providing certain necessary elements to the beta cells, especially in the alloxan-diabetic rab-bits. Furthermore, it may be assumed that the indigen-ous plant pulp would also help the diabetics by provid-ing certain essential minerals like calcium, phosphorus, zinc, magnesium, manganese, copper and others.

Rahman et al (1994) were extracted bark of *F. glomera-ta* with water and organic solvents and studied on blood sugar level of streptozotocin induced diabetic rats. Extracts from fruit and latex of the plant did not have any significant effect while ether extract of the stem bark completely inhibited the enzymes glucose-6-phosphatase and arginase and activated the enzyme glucose-6-phosphate dehydrogenase from rat liver. A number of components from petroleum ether extract of the stem bark were isolated and purified. The effects

of these purified components on pure enzyme glucose-6-phosphate dehydrogenase were investigated.

Balaji et al (1996) were screened hypoglycaemic activi-ty in normal and fasted rabbits fed by using petroleum ether and chloroform methanolic extracts of leaves and root bark of *Ficus glomerata*. Result reveled that the chloroform and methanolic extracts of leaves and chloroform extract of root bark of *F. glomerata* exhi-bited significant hypoglycaemic activity.

Subhaktha et al (2007) were presented complete de-tails and medico-historical importance of *F. glomerata*.

Joshi et al (2008) were evaluated the dose dependent antioxidant activity of aqueous extract of dried bark of *Ficus glomerata.* The extract was found to possess ex-cellent antioxidant activity and no pro-oxidant activity. The extract showed presence of flavonoids, phenolics, terpenoids, carbohydrates and alkaloids.

Channabasavaraj et al (2008) were evaluated antioxi-dant and hepatoprotective activities of methanol ex-tract of the bark *Ficus glomerata* compared to the root methanol extract. The methanol extract of the bark given orally along with CCl_4 showed a significant rever-sal of the biochemical changes towards the normal. The results indicated the potent hepatoprotective and antioxidant nature of the bark extract.

Saneja et al (2008) were determined anti-inflammatory and analgesic activities of fruits of *Ficus glomerata* by methanol extract. The analgesic activity was evaluated using writhing and hot-plate test in mice and anti-inflammatory activity was evaluated using carragee-nan-induced paw oedema in rats. The extract at the doses of 500 mg/kg shows a significant analgesic and dose dependent anti-inflammatory activity.

Rao et al (2008) were studied gastroprotective effect of 50% ethanolic extract of *F. glomerata* fruit was in dif-ferent gastric ulcer models in rats. Fruit extract showed dose dependent inhibition of ulcer index in pylorus ligation and ethanol and cold restraint stress – induced ulcers. Fruit extract also prevents the oxidative damage of gastric mucosa by blocking lipid peroxidation and by significant decrease in superoxidedismutase, H^+K^+ATPase and increase in catalase activity. High per-formance thin layer chromatography (HPTLC) analysis showed the presence of 0.57% and 0.36% w/w ofgallic acid and ellagic acid in fruit extract.

Kingkan et al (2009) discovered anti-HIV-1 agents from natural sources, the aqueous and ethanol extracts of eight Thai plants including *Clerodendron indicum* (whole plant), *Tiliacora triandra* (stem), *Capparis mi-cracantha* (wood), *Harrissonia perforata* (wood), *Ficus glomerata* (wood), *Diospyros decandra* (wood), *Dra-caena loureiri* (heartwood), and *Tinospora crispa* (stem) were screened for their inhibitory activities against HIV-1 integrase (IN) using the multiplate inte-gration assay (MIA). *Ficus glomerata* (wood) was the

most potent with an IC_{50} value of 7.8 µg/ml as compare to other.

Verma et al (2010) evaluated the antioxidant proper-ties of *Ficus glomerata* fruits using *In vitro* and *In vivo* assay. Fruit extract shown potent antioxidant activity and was also found effective in protecting oxidative DNA damage. Based on these results, it is concluded that *F.glomerata* protects tissues from oxidative stress and these effects are probably related to the antioxi-dant properties.

Rifaqat et al (2010) was studied the effect of tempera-ture, pH, initial Cr(VI) concentration and time adsorp-tion of Cr(VI) in batch system using fruits of *Ficus glo-merata* as adsorbent. Scanning electron microscopy and Fourier transform infrared spectroscopy was used to investigate surface morphology and active function-al groups present on the adsorbent surface. The break-through and exhaustive capacities were found to be 5 and 23.1mgg^{-1} respectively. The applicability of the adsorbent has been demonstrated by removing Cr(VI) from electroplating wastewater.

Gulecha et al (2010) was studied the antiinflammatory activity of different extracts of *Ficus religiosa* and *Ficus glomerata* leaves using carrageenan induced inflamma-tion in the rat by Dunnett's test. The Oral administra-tion of *Ficus religiosa* and *Ficus glomerata* extracts in-hibited paw swelling dose-dependently. They con-cluded that *Ficus religiosa* and *Ficus glomerata* extracts exert an excellent antiinflammatory effect in rats.

Hassan et al (2011) were micropropagated *Ficus glo-merata*, by using shoot tips and nodal explants from *in vitro* growing seedlings of *Ficus glomerata.* Best shoot induction (88%) on MS medium supplemented with 0.5 mg/l BAP, where maximum number of shoots was pro-duced per culture. *In vitro* raised shoots rooted well on half strength of MS medium with 2.0 mg/l IBA + 0.1 mg/l NAA. The survival rate of regenerated plantlets was 82%.

Heroor et al (2011) evaluated the immunomodulatory activity of methanolic extracts of *Ficus glomerata* Roxb. leaves, fruits and bark on cyclophosphamide induced immunosuppression in mice. The activity was eva-luated by determining the RBC, Hb%, Platelet, total WBC and differential counts. The significant inmmu-nostimulant effect attributed towards the collective presence of saponins, sterols and tannins in the ex-tracts, which suggest the immunomodulatory activities of the methanolic extracts of *F. glomerata*.

Pampattiwar et al (2011) were evaluated anti-diarrhoeal effects of methanolic extract of leaves of *Ficus glomerata* against castor oil-induced-diarrhoea model in rats by enteropooling method. *Ficus glomera-ta* at the doses of 100 and 200 mg/kg significantly inhi-bited ($P<0.001$) weight and volume of intestinal con-tent. The results obtained establish the efficacy and

substantiate the folklore claim as an anti-diarrheal agent.

Shukla et al (2011) has been studied lipid lowering ac-tion of hydroethanolic fruit extract of *Ficus glomerata* in triton induced hyperlipidemic rats. Serum lipids were found to be lowered by *Ficus glomerata* in triton in-duced hyperlipidemia *in vivo*. The hypolipidemic activi-ty of the extract is compared with gemfibrozil a known lipid lowering drug and *in vitro* antioxidant activity of this extract shown potent inhibition of superoxide anions, hydroxyl redicals and microsomal lipid peroxi-dation and scavenger of oxygen free redicals.

Yusufuddin et al (2011) were evaluate the antioxidants activities of unripe fruits of *Ficus glomerata* by using three test systems, namely superoxide anion scaveng-ing activity, reducing power, hydroxyl radical scaveng-ing activity. The results obtained showed *Ficus glome-rata* exhibited strong antioxidant activity.

Irfan et al (2011) were studied on hepatoprotective activity of the 70% ethanolic extract of unripe fruit of *Ficus glomerata* on paracetamol and CCL_4 treated albi-no rats. Treatment with unripe fruit of *Ficus glomerata* extract had shown significant hepatoprotective effect also supported by histopathological studies on liver, the result was in comparison with the standard drug silymarin.

Menezes et al (2011) were evaluated anti-inflammatory and analgesic activity of various extracts of the dried fruits of *Ficus glomerata*. The extracts were studied for their anti-inflammatory activity in carageenan induced hind paw edema in rats and the paw volume and for analgesic activity using eddy's hot plate method in mice. The results indicated that the ethanolic extract of *Ficus glomerata* exhibited signifi-cantly more activity than other extracts in reducing the pain and inflammation in experimental models.

Hindustan et al (2012) was developed sustained re-lease matrix tablets of gliclazide using fruit mucilage from the plant *Ficus glomerata.* The *in vitro* drug re-lease data was analyzed by zero order, first order, Hi-guchi plot, Peppas plot and Hixon-Crowell Models. It was observed that as the proportion of mucilage in-creased the release of drug from the matrix tablets was retarded. So was concluded that dried *Ficus glomerata* mucilage can be used as an excipient for making sus-tained release matrix tablets.

Sandhya et al (2012) were selected *Ficus glomerata* for screening of anti ulcer activity. The ulcer induced expe-rimental animals were given the extract of *Ficus glome-rata* and then the results compared with the standard group. The ethanol extract of *Ficus glomerata* exhi-bited anti-ulcer properties.

Ghawate et al (2012) was investigated acute analgesic of ethanolic extract of the leaves of *Ficus bengalensis* and *Ficus glomerata* in animals. Analgesic activity de-termined by acetic acid induced writhing and formalin

induced paw biting and licking method. *Ficus glomera-ta* shows more reduction in pain than *Ficus bengalensis* as compared to reference standard Diclofenac. The leaves extract of *Ficus bengalensis* and *Ficus glomerata* contains alkaloids, carbohydrates, proteins, cardiac glycosides, steroids, flavonoids and tannins alkaloids, and phenolic compounds. It is revealed from the screening models used that the ethanolic extract of this plant shows the analgesic activity.

Jagtap et al (2012) were tested *in vitro* antimicrobial activity of the extracts of *Ficus glomerata* against two different bacterial species *Bacillus substilis* and *Escheri-chia coli* by cup plate diffusion method. Successive soxhlet extractions of dried powdered bark were car-ried out using petroleum ether and methanol as a sol-vent. The results revealed that methanolic extract showed good activity as compared to petroleum ether extract. Methanolic extract is more potent towards gram - positive bacteria.

Kumbhar et al (2012) evaluated an analgesic activity of a *Ficus glomerata* leaf extract in mice. Dried leaves of a plant were extracted in ethanol using Soxhlet extrac-tor. Extract was orally administered in mice and eva-luated using hot plate and tail immersion methods. Significant analgesic activity comparable with standard dose of pentazocine was observed in both the cases which confirm analgesic activity of the plant.

Sudhakar et al (2012) was used *Pauropsylla depressa* to induce leaf galls in *F. glomerata*. Preliminary phyto-chemical screening of the various extracts of galled leaves in *F.glomerata* showed the presence of alkalo-ids, steroids, quinones and phenols in addition to fluo-rescence compounds.

ETHANOMEDICINE INFORMATION

Leaves, fruits, roots, and barks are the parts with tradi-tional ayurvedic use. It is used in dental preparations (Anonymous, 1952; Kitrtikar and Basu, 1999).The tree is found to be stomachic, carminative and useful in the treatment of menorrhagia. It is also useful in treatment of asthma, piles and skin diseases. The bark is useful in treating diabetes, hemoptysis, bronchitis, dry cough, diseases of kidney, spleen, dysentery, diarrhea, di-abetes, bilious affections, inflammations, cancer, aph-rodisiac and astringent to the bowels (Nadkarni KM, 2005; Yusuf et al., 1994; Kitrtikar and Basu, 1980). The bark is astringent, and an infusion of it is employed as a mouth wash in spongy gum condition. The bark is anti-septic, antipyretic and vermicide, and a decoction of the bark is used in various skin diseases and ulcers (Nayar and Bisht, 1959). Leaves of this plant were tra-ditionally used for treats diarrhoea (Bulusu S, 2006). It is useful in urological disorders dyspepsia, haemorr-hages in lipid disorders and obesity. Fruits are effective against leprosy, diseases of the blood, fatigue, bleeding nose and leucoderma (Parrotta JA, 2001).

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