



Pharmaceutical properties of Indian species of *Ficus* Linn.

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Abstract

The paper deals with the review of pharmaceutical properties of species of *Ficus* L. occurring in India.

Key-Words: Pharmaceutical, *Ficus*, Extract.

Introduction

Plants have been used for treating ailments for thousands of years through the empirical knowledge gathered about the useful and harmful properties of different plants and also by intuition. In India, the *Charak Samhita* and *Sushrut Samhita* described the medicinal properties of 500 and 700 plants respectively under 37 classes or “*Ganas*” (Saxena, 2003). The oldest record of medicinal use of plants is found in the *Rig Veda*, which is approximately 8000 years old. In *Atharva Veda* remarkable description of Indian medicinal plants were provided by ancient Indian scholars. *Ayurveda*, an *Upaveda*, composed around 2500 BC deals with medicine, healthcare and treatment of disease from indigenous drugs. From *Vedas* it is learnt that Indo-Aryans used the ‘*Soma*’ (a plant product) as a revitalizing agent, which exhibits an amazing stimulating effect (Satyavati *et al.*, 1976). More than 90% of the formulations under the Indian Systems of Medicine i.e. Ayurveda, Siddha, Unani and Homoeopathy (AYUSH), predominantly contain plant-based raw materials (Anonymous, 2008).

The genus *Ficus* L. (Moraceae) was first published in *Systema Naturae* by Carolus Linnaeus in 1735. *Ficus* is one of the largest genus among angiosperms. Among the genera of seed plants it ranked as the twenty-first (Frodin 2004). It comprises of about 800 species distributed in tropical and subtropical regions of the world (Adebayo *et al.* 2009). In India, 115 species are distributed throughout the country with the maximum diversity of the species lies in the North-East region having about 43 species in Meghalaya alone and may be considered as the hotspot region in India (Chaudhary *et al.*, 2012).

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Members of the genus have been used as food, fodder, medicine, as source of rubber and several other uses. Studies on pharmaceutical activities of *Ficus* have been carried out by several workers (Sehgal, 2003; Patil & Patil, 2010; Lalla, 2005; Joseph & Raj, 2011; Mousa *et al.*, 1994; Zahra *et al.*, 2009; Khan *et al.*, 2007; Shukla *et al.*, 2004; Vohra & Parasar, 1970; Singh *et al.*, 2009; Aref *et al.*, 2010; Kuete *et al.*, 2011; Shukla, 1995; Daniel *et al.*, 2003; Morton & McManus, 1986; Aswar *et al.*, 2008; Mahalingam, 2008; Sharma *et al.*, 2010; Gabhe, 2006; Abdulla *et al.*, 2010; Mukherjee *et al.*, 1998; Taur, 2007 and several others). These works have provided information on medicinal properties of several members of *Ficus*.

Pharmaceutical activities of *Ficus* species

Analgesic (pain reliever): Analgesic activity of the leaf extract of *Ficus glomerata* Roxb. and stem bark of *Ficus bengalensis* Linn. have been confirmed respectively by Sehgal (2003) and Patil & Patil (2010). Kumar *et al.* (2012) also published a review paper on analgesic property of *Ficus carica* Linn.

Treatment of cancer: Medicinal plant products exhibiting anticancer activity continue to be the subject of extensive research aimed at the development of new or alternative drugs for the treatment of different human tumors. Lalla (2005) reported *F. glomerata* and *F. racemosa* Linn. for the treatment of skin cancer. Both the natural and compounds synthesised from *F. carica* showed in vitro inhibitory effects on proliferation of various cancer cell lines (Joseph & Raj, 2011). Fruit extracts of *F. benjamina* Linn., *F. bengalensis*, *F. religiosa* Linn. and *Ficus sycomorus* Linn., an African species, exhibited anti-tumor activity in the potato disc bioassay (Mousa *et al.*, 1994).

Treatment against ulcer: The healing activity of whole plant extract of *F. deltoidea* Jack. was studied in gastric ulcer induced by ethanol in rats, the extract

promoted ulcer protection as ascertained by the comparative significant decreases in ulcer areas and inhibition of sub mucosal edema and leucocytes infiltration of sub mucosal layer (Zahra *et al.*, 2009). Sivaraman & Muralidharan (2010) reported *F. hispida* as a potent anti-ulcerogenic as well as ulcerhealing properties and could act as a potent therapeutic agent against peptic ulcer disease. Anti-ulcerogenic potential of *F. bengalensis* is also reported by Kulshreshtha *et al.* (2011).

Antiageing agent / antioxidant: Cell membranes are especially vulnerable to the aggression of free radicals. When the nucleus is damaged, the cell loses its ability to replicate itself. The impaired cell replication results in the weakened immune system, skin ageing and many age related disorders. Various antioxidants deactivate the free radicals and prevent oxidation on a cellular level. Some commonly used plants as antiageing agents includes *F. bengalensis* (Khan *et al.*, 2007; Patil & Patil, 2010). The antioxidant effect of species of *Ficus* may be attributed to the polyphenolic compounds they possess. The antioxidant effect of aqueous extract of the bark of *F. bengalensis* has been evaluated in hypercholesterolemia rabbits by Shukla *et al.* (2004) and confirmed its significant antioxidant effect. The potential health-promoting constituents of fig fruits were studied with six commercial fig varieties differing in color (black, red, yellow and green) for total polyphenols, total flavonoids, antioxidant capacity and profile of anthocyanins. In the dark-colored mission and the red Brown-Turkey varieties, the anthocyanin fraction contributed 36 and 28% of the total antioxidant capacity, C3R (cyanidin- 3-*O*-rutinoside) contributed 92% of the total antioxidant capacity of the anthocyanin fraction. Fruits of the mission variety contained the highest levels of polyphenols, flavonoids, and anthocyanins and exhibited the highest antioxidant capacity (Joseph & Raj, 2011).

Anti diabetic: Diabetes mellitus is the most common endocrine disorder that impairs glucose homeostasis resulting in severe diabetic complications including retinopathy, angiopathy, nephropathy, neuropathy and causing neurological disorders due to perturbation in utilization of glucose. According to Ayurvedic system of medicine *F. bengalensis* is well known in the treatment of diabetes (Rashid, 2008). This attracted the attention of many earlier workers who studied the hypoglycemic effect of extracts from its bark and tried to isolate active compounds. Bark of this plant has anti-diabetic properties. The hypoglycemic effect of extract of bark was demonstrated in alloxan diabetic rabbits, rats and in humans. Potent hypoglycemic water insoluble principle was isolated from the bark and a

water soluble hypoglycemic principle was also isolated from the bark which was effective at a low dose of 10 mg/kg, bw/day (Patil & Patil, 2010). Both the banyan bark principles were effective in mild as well as severe alloxan induced diabetes in rabbits, and improved lipid profile (Vohra & Parasar, 1970). The aqueous leaf extract of *F. carica* induced a significant hypoglycemic effect in oral or intraperitoneal administration in streptozotocin - diabetic rats. Weight loss was prevented in treated diabetic rats and the survival index was significantly altered by plasma insulin levels (Joseph and Raj, 2011). Singh *et al.* (2009) reported that *F. bengalensis*, *F. carica* and *F. glomerata* are effective in the treatment of diabetes. The hypoglycemic activity of ethanol extracts of leaves of *F. glomerata* has significant antihyperglycemic effect in experimental albino rat model of diabetes mellitus (Sharma *et al.*, 2010). Hypolipidemic effect of the water extract of the bark of *F. bengalensis* was investigated in alloxan induced diabetes mellitus in rabbits showing a good glycemic control also corrects the abnormalities in serum lipid profile associated with diabetes mellitus in view of the ability of the water extract of *F. bengalensis* to improve carbohydrate and lipid metabolism (Shukla, 1995). The fruits of *F. glomerata*, locally known as Gular have been used since ancient times in the ethno-medicine including as a remedy of diabetes mellitus (Chopra *et al.*, 1976). The aqueous extract of *F. bengalensis* at a dose of 500mg/kg/day exhibits significant antidiabetic and ameliorative activity as evidenced by histological studies in normal and *F. bengalensis* treated streptozotocin induced diabetic rats. On the basis of the findings, it could be used as an Antidiabetic and Ameliorative agent for better management of diabetes mellitus (Mahalingam, 2008). *F. exasperate* Vahl and *F. arnottiana* Miq. are also reported to have anti-diabetic activity by Sonibare *et al.* (2006) and Mazumdar *et al.* (2009) respectively.

Anti fungal activity: Methanolic extracts of *F. carica* latex had a total inhibition against *Candida albicans* (100%) at a concentration of 500µg/ml and a negative effect against *Cryptococcus neoformans* whereas *Microsporium canis* was strongly inhibited (75%) and totally with ethyl acetate extract at a concentration of 750µg/ml (Joseph & Raj, 2011). Aref *et al.* (2010) also reported that the methanolic, hexanoic, chloroformic and ethyl acetate extracts of *F. carica* latex possess anti-fungal activity. Antifungal activities have also been reported for *F. exasperate* (Sonibare *et al.*, 2006).

Anti bacterial activity: The methanol extract of *F. carica* showed a strong antibacterial activity against oral bacteria while the combined effects of methanol

extract with ampicillin or gentamicin were synergistic against oral bacteria (Joseph & Raj, 2011). The fruit extracts of *F. sycomorus*, an African species, *F. benjamina*, *F. bengalensis* and *F. religiosa* had significant antibacterial activity (Mousa *et al.*, 1994). Aref *et al.* (2010) also reported that the methanolic, hexanoic, chloroformic and ethyl acetate extracts of *F. carica* latex possesses anti-bacterial activity. *F. exasperata* leaf, stem bark and root contained bioactive substances with the highest inhibitory activities against some human bacterial pathogenic organisms (Adebayo *et al.*, 2009).

Anti pyretic: The ethanol extract of *F. carica*, at doses of 100, 200 and 300 mg/kg showed significant dose-dependent reduction in normal body temperature and yeast provoked elevated temperature. The effect extended up to five hours after drug administration when compared to that of Paracetamol (150 mg/kg.), a standard antipyretic agent. This shows the anti pyretic effect of ethanol extract of *F. carica* (Joseph and Raj, 2011). *F. bengalensis* also shows antipyretic activity (Patil & Patil, 2010).

Scavenging & immune response: The water extract (WE) and crude hot-water soluble polysaccharide (PS) from *F. carica* fruit were investigated for scavenging abilities on DPPH, superoxide and hydroxyl radicals and reducing power. The immune activities of PS were evaluated using the carbon clearance test and serum hemolysin analysis in mice. Both WE and PS have scavenging activities on DPPH with the EC₅₀ (0.72, 0.61) mg/ml, respectively. The PS showed higher scavenging activity than WE on superoxide radical (EC₅₀, 0.95 mg/ml) and hydroxyl anion radical (scavenging rate 43.4% at 4 mg/ml). The PS (500 mg/kg) also has a significant increase in the clearance rate of carbon particles and serum hemolysin level of normal mice. This indicates the scavenging activity and immune responses of the extract (Joseph and Raj, 2011)

Hepatoprotective: Shade dried leaves of *Ficus carica* were extracted using petroleum ether (60-80°) and tested for antihepatotoxic activity on rats treated with 50 mg/kg of rifampicin orally. The result indicated promising hepatoprotective activity (Gond and Khadabadi, 2008). The ethanolic extract of *F. benjamina* possesses hepatoprotective activity against CCl₄ induced hepatotoxicity in rats (Kanaujia *et al.*, 2011)

Antiatherogenic: One month treatment of alloxan diabetic dogs with glycoside, viz. leucopelargonin derivative (100mg/kg/day) isolated from the bark of *F. bengalensis* decreased fasting blood sugar and *F. bengalensis* glycosylated haemoglobin by 34% and

28% respectively. Body weight was maintained in both the treated groups while the same was decreased significantly by 10% in the control group. In cholesterol diet fed rats, as the atherogenic index and the hepatic bile acid level and the faecal excretion of bile acids and neutral sterols increased, the HMGCOA reductase and lipogenic enzyme activities in liver and lipoprotein lipase activity in heart and adipose tissue and plasma LCAT activity and the incorporation of labeled acetate in to free and ester cholesterol in liver decreased significantly (Daniel *et al.*, 2003).

Anthelmintic/ vermifuge: The latex of *F. glabrata*, has been evaluated clinically and shown to be a potent and well tolerated anthelmintic agent (Morton and McManus, 1986). The methanolic, chloroform, and pet ether extracts of the roots of *F. bengalensis* have potent anthelmintic activity when compared with conventionally used drug and is equipotent to standard anthelmintic drug (Aswar *et al.*, 2008). The aqueous extract of *F. racemosa* possesses wormicidal activity and thus may be used as an anthelmintic (Chandrashekhar *et al.*, 2008).

Anti-inflammatory: The anti-inflammatory effect of ethanolic and petroleum ether extracts of the bark of *F. bengalensis* were evaluated in carrageenan-induced hind paw edema in rats and the paw volume was measured plethysmometrically at 0 to 3h after injection. The results indicated the ethanolic extract of *F. bengalensis* exhibited more significant activity than petroleum ether in the treatment of inflammation compared with the standard drug Indomethacin (Patil *et al.*, 2009). Kumar *et al.* (2012) also published a review paper on anti-inflammatory activities of *F. carica*.

Immunomodulatory: Gabhe (2006) evaluated the immunomodulatory activity of the aerial roots of *F. bengalensis*. The successive methanol and water extracts exhibited a significant increase in the percentage of phagocytosis versus the control. In the in vivo studies, the successive methanol extract was found to exhibit a dose related increase in the hypersensitivity reaction to the SRBC antigen. It also resulted in a significant increase in the antibody titer value to SRBC.

Wound healing: In Ayurvedic medicine, *F. racemosa* Linn. is used as a wound healing agent (Biswas & Mukherjee, 2003). The aqueous extract of the whole plant of *F. deltoidea* was investigated by Abdulla *et al.* (2010) to evaluate the rate of wound healing enclosure and the histology of healed wounds in rats and results strongly document the beneficial and significant effects to accelerate the rate of wound healing enclosure in the experimentally-induced wounds in rats.

Antidiarrhoeal: Mukherjee *et al.* (1998) evaluated ethanol extracts of *F. bengalensis* (hanging roots), *Eugenia jambolana* Lam. (bark), *F. racemosa* (bark) and *Leucas lavandulaefolia* Rees (aerial parts) and showed significant inhibitory activity against castor oil induced diarrhoea and PGE2 induced enter pooling in rats. These extracts also showed a significant reduction in gastro-intestinal motility in charcoal meal tests in rats. The results obtained establish the efficacy of all these plant materials as anti-diarrhoeal agents. Mandal & Kumar (2002) reported *F. hispida* Linn. leaf extract as an anti-diarrheal agent.

Anti-stress and anti-allergic: Extracts of *F. bengalensis* bark was screened for its antiallergic and antistress potential in asthma by milk-induced leucocytosis and milk-induced eosinophilia. Aqueous, ethanol, and ethyl acetate extracts showed significant decrease in leucocytes and eosinophils in the order given while petroleum ether and chloroform extracts were inactive. This shows the application of polar constituents of *F. bengalensis* bark as anti stress and anti allergic agents in asthma (Taur, 2007).

F. religiosa is also used for the treatment of Bronchial Asthma. Malhotra *et al.* (1960) was the first who investigated the antiasthmatic potential of the alcoholic bark extract of the *F. religiosa*. The extract showed inhibitory effect on both acetylcholine-induced and histamine-induced experimental asthma (Malhotra *et al.*, 1960).

Conclusion

Review of literature shows that out of about 115 species of *Ficus* occurring in India, 11 species have pharmaceutical value. Of the Indian species of *Ficus*, it has been found that *F. bengalensis* have been reported to be beneficial in the treatment of maximum number of diseases (pain reliever, cancer, anti-ulcerogenic, ageing, diabetes, fever, antherogenesis, helminthes infections, inflammation, Immune system, diarrhoea, allergy and stress) followed by *F. carica* (diabetes, fever, scavenging, immune response, fungal diseases, bacterial diseases and diseases caused by microbes). Species such as *F. racemosa* (syn. *F. glomerata*), *F. deltoidea*, *F. hispida*, *F. benjamina*, *F. exasperate*, *F. religiosa*, *F. arnottiana* and *F. glabrata* are also reported to contain pharmaceutical properties for the treatment of different diseases.

References

1. Abdulla M.A., Ahmed K.A., Abu-Luhoom F.M. and Muhanid M.. (2010). Role of *Ficus deltoidea* extract in the enhancement of wound healing in experimental rats, *Biomedical Research*, 21 :(3): 241-245.

2. Adebayo E.A., Ishola O.R., Taiwo O.S., Majolagbe O.N. and Adekeye B.T. (2009). Evaluations of the methanol extract of *Ficus exasperate* stem bark, leaf and root for phytochemical analysis and antimicrobial activities, *African Journal of Plant Science.*, 3 :(12):283-287.
3. Anonymous. (2008). Agro-techniques of medicinal plants. National Medicinal Plant Board, Deptt. of AYUSH, Ministry of health and Family Welfare, Govt. of India. TERI Press, New Delhi, 1: xiii.
4. Aref H. L., Salah K. B. H., Chaumont J. P., Fekih A. W., Aouni M., Said K. (2010). In vitro antimicrobial activity of four *Ficus carica* latex fractions against resistant human pathogens (antimicrobial activity of *Ficus carica* latex), *Pak. J. Pharm. Sci.*, 23 :(1):53-58.
5. Aswar M., Aswar U., Watkar B., Vyas M., Wagh A. and Gujar K.N. (2008). Anthelmintic activity of *Ficus bengalensis*, *International J Green Pharmacy*, 2 :(3):170-172.
6. Biswas T.K. and Mukherjee B. (2003). Plant medicines of Indian origin for wound healing activity: a review, *Int J Low Extreme Wounds*, 2:(1):25-39.
7. Chandrashekhar C.H., Latha K.P., Vagdevi H.M. and Vaidya V.P. (2008). Anthelmintic activity of the crude extracts of *Ficus racemosa*, *International Journal of Green Pharmacy*, April-June: 100-103.
8. Chaudhary L.B., Sudhakar J.V., Kumar A., Bajpai O., Tiwari R. and Murthy G. V. S. (2012). Synopsis of the Genus *Ficus* L. (Moraceae) in India, *Taiwania*, 57 :(2):193-216.
9. Daniel R.S., Devi K.S., Augusti K.T. and Nair C.R. (2003). Mechanism of action of Antiatherogenic and related effects of *Ficus bengalensis* Linn flavonoids in experimental animals, *Indian J Exp. Biol.*, 41:296-303.
10. Frodin D.G. (2004). History and Concept of Big Plant Genera, *Taxon*, 53:753-776.
11. Gabhe S.Y., Tatke P.A. and Khan T.A. (2006). Evaluation of the Immunomodulatory activity of the methanol extract of *Ficus bengalensis* roots in rats, *Indian J Pharmacol*, 38: (4):271-275.
12. Gond N.Y. and Khadabadi S.S. (2008). Hepatoprotective Activity of *Ficus carica* Leaf Extract on Rifampicin-Induced Hepatic Damage in Rats, *Indian J Pharm Sci*, 70 :(3): 364-366.

13. Joseph B. and Raj S.J. (2011). Pharmacognostic and phytochemical properties of *Ficus carica* Linn –An overview, *Int.J. PharmTech Res*, 3 :(1):8-12.
14. Kanaujia V. K., Irchhaiya R., Singh H.K., Kailasiya D., Verma M., Yadav R. D. and Shivhare D. (2011). Evaluation of hepatoprotective activity on the leaves of *Ficus benjamina* Linn., *J. Nat. Prod. Plant Resour*, 1:(3): 59-69.
15. Khan I., Alam S., Akhter S., Shahin N. and Ansari F.Z. (2007). Ageing and its herbal treatment, *The Pharma Review*, 12:131-134.
16. Kuete V., Kamga J., Sandjo L.P., Ngameni B., Poumale H.M.P., Ambassa P. and Ngadjui B.T. (2011). Antimicrobial activities of the methanol extract, fractions and compounds from *Ficus polita* Vahl. (Moraceae), *BMC Complementary and Alternative Medicine*, 11:6. doi:10.1186/1472-6882-11-6
17. Kulshreshtha M., Goswami M., Rao C.V., Ashwlayan V. D. and Yadav S. (2011). Anti-Ulcerogenic Potential of *Ficus bengalensis* Leaf, Biochemical Parameter & Histopathological Study, *Journal of Applied Pharmaceutical Science*, 01: (02): 65-68.
18. Lalla J.K. (2005). Herbal medicines revisited, *The Pharma Review*, 12:101-105.
19. Mahalingam G. and Krishnan K. (2008). Antidiabetic and ameliorative potential of *Ficus bengalensis* bark extract in streptozotocin induced diabetic rats, *Indian Journal of Biochemistry*, 23:(4):394-400.
20. Malhotra C. L., Das P. K. and Dhalla N. S. (1960). Parasympatholytic activity of *Ficus religiosa* Linn., *Indian J Med Res*, 48:734-742.
21. Mandal S.C. and Kumar C.K.A. (2002). Studies on anti-diarrhoeal activity of *Ficus hispida*. Leaf extract in rats, *Fitoterapia*, 73:(7-8):663-7.
22. Mazumdar P.M., Farswan M. and Parcha V. (2009). Hypoglycaemic effect of *Ficus arnottiana* Miq. bark extracts on streptozotocin induced diabetes in rats, *Natural Product Radianance*, 8:(5):478-482.
23. Modi R.K., Kawadkar M., Sheikh S., Kastwar R. and Tiwari G. (2012). A review on: Comparative studies on ethanolic extract of root and stem bark of *Ficus carica* for analgesic and anti-inflammatory activities, *Int. J. of Pharm. & Life Sci.*, 3 :(8):1930-1934.
24. Morton A.D. and Mc Manus I.C. (1986). Attitudes to and knowledge about the acquired immune deficiency syndrome: lack of a correlation, *British Medical Journal*, 293:1212.
25. Mousa O., Vuorela P., Kiviranta J., Wahab S.A., Hiltohen R. and Vuorela H. (1994). Bioactivity of certain Egyptian *Ficus* species, *J Ethnopharmacol*, 41:71- 6.
26. Mukherjee P.K., Saha K., Murugesan T., Mandal S.C., Pal M. and Saha B.P. (1998). Screening of anti-diarrhoeal profile of some plant extracts of a specific region of West Bengal, India, *Journal of Ethnopharmacology*, 60: 85–89.
27. Patil V.V. and Patil V.R. (2010). *Ficus Benghalensis* Linn.-an overview, *International Journal of Pharma and Bio Sciences*, 6:(2).
28. Patil V.V. and Patil V.R. (2011). *Ficus carica* Linn.-An Overview, *Research Journal of Medicinal Plant*, 5 :(3):246-253.
29. Patil V.V., Pimprikar R.B. and Patil V.R. (2009). Pharmacognostical Studies and Evaluation of Anti inflammatory Activity of *Ficus bengalensis* Linn., *J.Pharm*, 1:49-53
30. Rashid A.B.A. (2008). The chemical constituents from the stems of *Ficus deltoidea*. B.Sc. Final Year Project Report, University Teknologi Mara, Selangor.
31. Satyaavati G.V., Raina M.K. and Sharma M. (1976). *Medical plants of India*. Indian Council of Medical Research .New Delhi.76-77.
32. Sehgal A. (2003). Herbal medicines-harmless or harmful, *Anesthesia*, 57:947-948.
33. Sharma V.K., Kumar S., Patel H.J. and Hugar S. (2010). Hypoglycemic activity of *Ficus glomerata* in alloxan induced diabetic rats, *International Journal of Pharmaceutical Sciences Review and Research*, 1:(2):18-22.
34. Shukla R., Anand K., Prabhu K.M. and Murthy P.S. (1995). Hypolipidemic effect of water extract of *Ficus bengalensis* in alloxan induced diabetes mellitus in rabbits, *Ind. J. Clin. Biochem*, 10:(2):119-121.
35. Shukla R., Gupta S., Gambhir J.K., Prabhu K.M. and Murthy P.S. (2004). Antioxidant effect of aqueous extract of the bark of *Ficus bengalensis* in hypercholesterolaemic rabbits, *Journal of Ethnopharmacology*, 92:47–51.
36. Singh S., Gupta S.K., Sabir G., Gupta M.K. and Seth P.K. (2009). A database for anti-diabetic plants with clinical/ experimental trials, *Bioinformation*, 4 :(6):263-268.

37. Sivaraman D. and Muralidharan P. (2010). Anti-ulcerogenic evaluation of root extract of *Ficus hispida* Linn. in aspirin ulcerated rats, *African Journal of Pharmacy and Pharmacology*, 4:(2): 079-082.
38. Sonibare M.O., Isiaka A.O., Taruka M.W., Williams N.S., Soladoye M. and Emmanuel O. (2006). Constituents of *Ficus exasperata* leaves, *Natural product communications*, 23-26.
39. Taur D.J., Nirmal S.A., Patil R.Y. and Kharya M.D (2007). Antitress and ant allergic effects of *Ficus bengalensis* bark in asthma, *Nat Prod Res*, 21 :(14):66-70.
40. Vohra S.B. and Parasar G.C. (1970). Antidiabetic studies on *Ficus bengalensis* Linn., *Ind. J. Pharmacy*, 32: 68-69.
41. Zahra M.A.S.F., Mahmood A.A., Hapipah M.A., Suzita M.N. and Salmah I. (2009). Anti-ulcerogenic Activity of Aqueous Extract of *Ficus deltoidea* against Ethanol induced Gastric Mucosal Injury in Rats, *Research Journal of Medical Sciences*, 3 :(2):42-46.