

REVIEW ON MEDICINAL IMPORTANCE OF FABACEAE FAMILY

Ahmad, F.¹; Anwar, F.²; Hira, S.³

¹Riphah International University- Pakistan

²Riphah International University- Pakistan

³Riphah International University- Pakistan

[*fareeha.anwar@riphah.edu.pk](mailto:fareeha.anwar@riphah.edu.pk)

Abstract

Wild plant gathering is an ancient tradition that has endured in many rural communities in Pakistan. In the recent times, the practice of herbal medicine is diminishing. Thus in the way of revitalization of traditional herbal medicines, it is an effort to record the valuable ethno-botanical and ethno-medicinal knowledge. The research was carried by studying 25 different plants of family leguminosae/fabacea belonging to different species. The family "leguminosae" has extremely diverse characteristics which includes that, it is one of the most important group of plant, because these are used by humans such as legumes are using as crops, green manures and forages. The family leguminosae is also divided into 3 subfamilies papilionodae, caesalpinioideae and mimosoideae. These plants had a number of pharmacological action including analgesic activity, anti-inflammatory, antiulcer, anticancer, antidiabetic, anti-inflammatory, antirheumatic, antimicrobial, antibacterial, and cytotoxic activities.

Keywords: Fabaceae, *Astragalus*, *Indigofera*, *Acacia*, symbiotic relationship

Introduction

The plant family Leguminosea or Fabaceae includes legumes which are fruits of plants and plant is known as plant of bean or pea. In the world, among largest families of flowering plant, leguminosae is 3rd largest group of plant having 19,400 species and are classified in about 730 genera. The prevalent and largest genera are *Astragalus* that is over 2,400 species, *Acacia* that is over 950 species, and *Indigofera* which are about 700 species, *Crotalaria* is about 700 species, and *Mimosa* is around 500 species, which comprises about 9.4% of all flowering plant species.[1] The family "leguminosae" has extremely diverse characteristics which includes that is one of the most important group of plant, because these are used by humans such as legumes are using as crops, green manures and forages. These plants are also using to synthesize a large range of natural products including flavors, poison, dyes, and also has a great importance in medicinal purpose. [2] In history, and as well as, traditionally these herbs provide a safe and effective therapy for the treatment of numerous diseases. As combination of herbs also use for a number of diseases but better understanding can be attained by analyzing the pharmacological action of individual constituents. [3] No doubt, new allopathic drugs are also using in the treatment of many diseases but certain type of side effects are also associated with them. Such crude form of herb are relatively less effective but they possess comparatively little side effects.[4]

Characteristics of the Fabaceae

Main and unique feature of this family is its legumes which are the fruit of the plant. Species of this family ranges from dwarf herbs of arctic and alpine vegetation to massive tree of tropical forest. The family leguminosae is also divided into 3 subfamilies papilionodae, caesalpinioideae and mimosoideae. Sometimes these sub families are also recognizes as a separate and independent families. Identification of these subfamilies is done by their flowers.[5]

Legumes of this family are also used for economically for nitrogen fixation.as legumes are able to convert the atmospheric nitrogen into useful nitrogenous compounds, which are used for the growth of plant. This is done by the bacteria of the genus *Rhizobium* present in the root nodules. There is development of symbiotic relationship among bacteria and legumes.so they able to fix free nitrogen for plants and in return legumes are able to provide fixed carbon produced by

photosynthesis. The tendency of legumes for semi aired to aired habitat is related to a nitrogen demanding metabolism and this is thought to be an adaption for unpredictable habitat.[2]

Material and Methods

Plants Belongs to Family Leguminosea/ Fabaceae

Acacia catechu

Acacia catechu belongs to family Fabaceae .Its common name is khair. The part which is used for medicinal purpose is bark. It has Anti-inflammatory. [6]Hepatoprotective, Antipyretic, antidiarrheal, hypoglycaemic activity.[7]

Acacia nilotica

Acacia nilotica belongs to sub family mimosecea. Its common name is Kikar, Babool. Bark is used for medicinal purposes. It has Antihypertensive, antispasmodic, [8] anti-inflammatory [9] and antifungal activities.[10]

Acacia modesta Wall

Acacia modesta Wall belongs to family Fabaceae. Its common name is Phulahi. Its leaves and gums are used for medicinal purposes. Analgesic, anti-inflammatory, anti-platelet, [11]heam agglutination, antibacterial, phytotoxic and insecticidal activities are included in it.[12]

Cicer arietinum L.

Family of this plant is Fabaceae. Its seeds are used for medicinal purpose. It is commonly known as Chicken pea. It has Free radical scavenging and antioxidant activity, [13] beneficial effects CVD, type 2 diabetes, digestive diseases and some cancers.[14]

Caesalpinia pulcherrima

It belongs to sub family Caesalpinioideae. It is commonly called as Barbados pride. The parts which are used for medicinal purpose include leaves, stem bark, flower, buds and pod. It has anti-inflammatory activity [15], antiulcer, anticancer, antidiabetic, anti-rheumatic, antimicrobial, antibacterial, and cytotoxic pharmacological activities.[16, 17]

Cajanus cajan

Commonly known pigeon pea belong to family Fabaceae. Its leaves has many pharmacological effects including antihyperglycemic, [18] antioxidant. [19], anti-oxidant, hepatoprotective effects [20]and has protective effects against Dox-induced neuronal dysfunction.[21]

Desmodium gangeticum

It belongs to family Fabaceae. Its common name is Shahtara. Its seeds are used for pharmacological action. It has immunopotentiatory actions, action against *Leishmania*-infection [22] hypocholesterolemic, and free radical scavenging activity. [23]

Delonix regia

Delonix regia belongs to sub family Caesalpiniaceae and is commonly called as Royal Poinciana. Its leaves are used for pharmacological action. It has Anti-diabetic [24], Anti-inflammatory [25], hepatoprotective and anti-oxidant effects [26].

Glycyrrhizaglabra

Glycyrrhizaglabra belongs to family Fabaceae. Its commonly called as liquorice and the part which are used for medicinal purpose is root and leaves. It has anti-inflammatory, antiulcer, expectorant, antimicrobial, [27] memory enhancement and anti-genotoxic effect. [28]

Pisum sativum

It is commonly called as pea and belongs to family Fabaceae. Its leaves are used for medicinal purposes. Antimalarial, [29] anti-oxidant, anti-inflammatory and immunomodulating potentials have investigated in this plant. [30]

Pseudoptadenia contorta

It belongs to family Leguminosae and commonly known as Saia-de-comadre. Its leaves has anti-oxidant potential and anti-viral activity. [31]

Sutherlandia frutescens

It belongs to family Fabaceae and commonly called kankerbos. Its shoots has analgesic, anti-inflammatory and anti-diabetic properties. [32]

Trigonella foenum-graecum

Commonly known fenugreek belongs to family Fabaceae. Its leaves and seeds are used for study of pharmacological effect. It has anti-inflammatory, antipyretic effects, [33] hypoglycaemic, antihyperglycaemic, [34] and anti-neoplastic effects. [35]

Tamarindus indica

Tamarindus indica belongs to family Fabaceae. Its common name is tamarind and its seeds and fruit have a number of pharmacological action including anti-snake venom properties, [36] anti-diabetic, [37] Hypolipidemic, weight reducing

activity [38] laxative, digestive, carminative, remedy for biliousness, bile disorders and febrile conditions. [39]

Conclusion

The present study deals with the study of medicinal plants. A total of 25 plants belonging to different species of leguminosae family. Different plants part were used for different diseases in past. This study showed that many people of developed areas still depend upon the use of medicinal plants or ayurvedic treatment for a number of diseases.

Discussion

As plants are used for a long period of time for the treatment of certain diseases which is termed as ayurvedic treatment but here we concluded scientifically that which plant possess any of these specific property, so this article presents a study of plants which possess efficacy for a number of illness. This healthcare knowledge transmitted orally from one generation to generation. As we have abundant source of these plants. Hopefully in future we will be able to use these plants in our medical treatments.

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References

1. Rahman, A.M. and M.I.A. Parvin, Study of Medicinal Uses on Fabaceae Family at Rajshahi, Bangladesh. *Research in Plant Sciences*, 2014. **2**(1): p. 6-8.
2. Patel, S. and D.B. Shah, Phylogeny in Few Species of Leguminosae Family Based on matK Sequence. *Computational Molecular Biology*, 2014. **4**(4).
3. Sinclair, S., Chinese herbs: a clinical review of Astragalus, Ligusticum, and Schizandrae. *Alternative Medicine Review*, 1998. **3**: p. 338-344.
4. Mali, R.G. and A.A. Mehta, A review on anthelmintic plants. *Natural product radiance*, 2008. **7**(5): p. 466-475.
5. Harborne, J., *Phytochemistry of the Leguminosae*. *Phytochemical Dictionary of the Leguminosae*, eds Bisby, FA et al. London: Chapman & Hall, 1994.
6. Burnett, B., et al., A medicinal extract of *Scutellaria baicalensis* and *Acacia catechu* acts as a dual inhibitor of cyclooxygenase and 5-lipoxygenase to reduce inflammation. *J Med Food*, 2007. **10**(3): p. 442-451.
7. Ray, D., K. Sharatchandra, and I. Thokchom, Antipyretic, anti-diarrhoeal, hypoglycaemic and hepatoprotective activities of ethyl acetate extract of *Acacia catechu* Willd. in albino rats. *Indian J Pharmacol* 2006. **38**(6): 408.
8. Gilani, A., et al., Studies on antihypertensive and antispasmodic activities of methanol extract of *Acacia nilotica* pods. *Phytotherapy Research*, 1999. **13**(8): p. 665-669.
9. Dafallah, A.A. and Z. Al-Mustafa, Investigation of the anti-inflammatory activity of *Acacia nilotica* and *Hibiscus*

- sabdariffa. Am J Chi Med 1996. 24(03n04): 263-269.
10. Pai, M.B., et al., Antifungal efficacy of Punica granatum, Acacia nilotica, Cuminum cyminum and Foeniculum vulgare on Candida albicans: an in vitro study. Indian J Dental Res 2010;21(3): 334.
 11. Bukhari, I.A., et al., Analgesic, anti-inflammatory and anti-platelet activities of the methanolic extract of Acacia modesta leaves. Inflammopharmacology, 2010;18(4):187-196.
 12. Ahmad, B., et al., Screening of Acacia modesta for haemagglutination, antibacterial, phytotoxic and insecticidal activities. J Med Plants Res 2011;5(14):3090-3096.
 13. Vadnere, G., et al., In vitro free radical scavenging and antioxidant activity of Cicer arietinum L.(Fabaceae). Int. J. PharmTech. Res, 2012;4: 343-350.
 14. Jukanti, A.K., et al., Nutritional quality and health benefits of chickpea (Cicer arietinum L.): a review. Br J Nut 2012;108(S1): S11-S26.
 15. Rao, Y.K., S.-H. Fang, and Y.-M. Tzeng, Anti-inflammatory activities of flavonoids isolated from Caesalpinia pulcherrima. J Ethnopharmacol 2005;100(3):249-253.
 16. Zanin, J.L.B., et al., The genus Caesalpinia L.(Caesalpinaceae): phytochemical and pharmacological characteristics. Molecules 2012;17(7): 7887-7902.
 17. Sharma, V. and G. Rajani, Evaluation of Caesalpinia pulcherrima Linn. for anti-inflammatory and antiulcer activities. Ind J Pharmacol 2011;43(2):168.
 18. Anwar, M.M., et al., Antihyperglycemic activity and brine shrimp lethality studies on methanol extract of Cajanus cajan (L.) Millsp. leaves and roots. Adv Nat App Sci 2010; 4(3): 311-317.
 19. Rao, K.M. and T. Sresty, Antioxidative parameters in the seedlings of pigeonpea (Cajanus cajan (L.) Millspaugh) in response to Zn and Ni stresses. Plant science, 2000. 157(1): p. 113-128.
 20. Ghosh, A. and P.C. Sil, Anti-oxidative effect of a protein from Cajanus indicus L against acetaminophen-induced hepato-nephro toxicity. J Bioch Mol Biol 2007;40(6): 1039.
 21. Pal, S., M. Ahir, and P.C. Sil, Doxorubicin-induced neurotoxicity is attenuated by a 43-kD protein from the leaves of Cajanus indicus L. via NF-κB and mitochondria dependent pathways. Free Rad Res 2012;46(6):785-798.
 22. Singh, N., et al., Efficacy of Desmodium gangeticum extract and its fractions against experimental visceral leishmaniasis. Journal of Ethnopharmacology, 2005. 98(1): p. 83-88.
 23. Kurian, G.A., S. Philip, and T. Varghese, Effect of aqueous extract of the Desmodium gangeticum DC root in the severity of myocardial infarction. J Ethnopharmacol 2005. 97(3):457-461.
 24. Rahman, M., et al., Effect Of Delonix Regia Leaf Extract On Glucose Tolerance In Glucoseinduced Hyperglycemic Mice. Afr J Trad Compl Alt Med 2011; 8(1).
 25. Shewale, V.D., et al., Anti-Inflammatory Activity of Delonix regia (Boj. Ex. Hook). Advances in pharmacological sciences, 2011;2012.
 26. Azab, S.S., M. Abdel-Daim, and O.A. Eldahshan, Phytochemical, cytotoxic, hepatoprotective and antioxidant properties of Delonix regia leaves extract. Med Chem Res 2013;22(9):4269-4277.
 27. Asl, M.N. and H. Hosseinzadeh, Review of pharmacological effects of Glycyrrhiza sp. and its bioactive compounds. Phytotherapy Res2008. 22(6): 709-724.
 28. Dhingra, D., M. Parle, and S. Kulkarni, Memory enhancing activity of Glycyrrhiza glabra in mice. J Ethnopharmacol 2004;91(2): 361-365.
 29. Abatan, M.O. and M.J. Makinde, Screening Azadirachta indica and Pisum sativum for possible antimalarial activities. J Ethnopharmacol 1986;17(1):85-93.
 30. Ndiaye, F., et al., Anti-oxidant, anti-inflammatory and immunomodulating properties of an enzymatic protein hydrolysate from yellow field pea seeds. Eur J Nut 2012;51(1): 29-37.
 31. Moreira, D.d.L., et al., Antioxidant and antiviral properties of Pseudopiptadenia contorta (Leguminosae) and of quebracho (Schinopsis sp.) extracts. Química Nova, 2005;28(3): 421-425.
 32. Ojewole, J., Analgesic, antiinflammatory and hypoglycemic effects of Sutherlandia frutescens R. BR.(variety Incana E. MEY.)(Fabaceae) shoot aqueous extract. Methods and findings in Experimental Clinical Pharmacology 2004;26(6): 409-416.
 33. Ahmadiani, A., et al., Anti-inflammatory and antipyretic effects of Trigonella foenum-graecum leaves extract in the rat. J Ethnopharmacol 2001;75(2): 283-286.
 34. Abdel-Barry, J.A., I.A. Abdel-Hassan, and M.H. Al-Hakim, Hypoglycaemic and antihyperglycaemic effects of Trigonella foenum-graecum leaf in normal and alloxan induced diabetic rats. J Ethnopharmacol 1997;58(3): 149-155.
 35. Sur, P., et al., Trigonella foenum graecum (fenugreek) seed extract as an antineoplastic agent. Phytotherapy Res 2001;15(3): 257-259.
 36. Ushanandini, S., et al., The anti-snake venom properties of Tamarindus indica (leguminosae) seed extract. Phytotherapy Res 2006;20(10): 851-858.
 37. Maiti, R., et al., Antidiabetic effect of aqueous extract of seed of Tamarindus indica in streptozotocin-induced diabetic rats. J Ethnopharmacol 2004. 92(1): p. 85-91.
 38. Jindal, V., et al., Hypolipidemic and weight reducing activity of the ethanolic extract of Tamarindus indica fruit pulp in cafeteria diet-and sulphiride-induced obese rats. J Pharmacol Pharmacoth 2011;2(2): 80.
 39. De Caluwé, E., K. Halamová, and P. Van Damme, Tamarindus indica L.: a review of traditional uses, phytochemistry and pharmacology. Afrika focus 2010;23(1): 53-83.
 40. Sundaram, R. and S. Mitra, Antioxidant activity of ethyl acetate soluble fraction of Acacia arabica bark in rats. Indian J Pharmacol 2007;39(1): 33.
 41. Quist, E.E., R.D. Phillips, and F.K. Saalia, Angiotensin converting enzyme inhibitory activity of proteolytic digests of peanut (Arachis hypogaea L.) flour. LWT-Food Sci Tech 2009. 42(3): 694-699.
 42. Chang, J.-C., et al., Biosynthesis enhancement and antioxidant and anti-inflammatory activities of peanut (Arachis hypogaea L.) arachidin-1, arachidin-3, and isopentadienylresveratrol. J Agr Food Chem 2006;54(26): 10281-10287.
 43. Ku, K.-L., et al., Production of stilbenoids from the callus of Arachis hypogaea: a novel source of the anticancer compound piceatannol. J Agr Food Chem 2005;53(10): 3877-3881.
 44. Jiang, S., Y. Ma, and D. Yan, Antioxidant and antimicrobial properties of water soluble polysaccharide from Arachis hypogaea seeds. J Food Sci Tech 20145;1(10): 2839-2844.
 45. Chen, G.-h. and W.-f. Huang, Progress in pharmacological effects of compositions of Astragalus membranaceus [J]. Chinese J New Drugs 2008;17(17):1482-1485.
 46. Roopashree, T., et al., Antibacterial activity of antipsoriatic herbs: Cassia tora, Momordica charantia and Calendula officinalis. Int J App Res Nat Prod 2008;1(3): 20-28.
 47. Maity, T.K., et al., Studies on antiinflammatory effect of

- Cassia tora leaf extract (fam. Leguminosae). *Phytotherapy Res* 1998;12(3): 221-223.
48. Chidume, F., et al., Antinociceptive and smooth muscle contracting activities of the methanolic extract of Cassia tora leaf. *J Ethnopharmacol* 2002;81(2): 205-209.
49. Rejiya, C., T. Cibirin, and A. Abraham, Leaves of Cassia tora as a novel cancer therapeutic—an in vitro study. *Toxicology in vitro*, 2009;23(6): 1034-1038.
50. Phongpaichit, S., et al., Antifungal activity from leaf extracts of Cassia alata L., Cassia fistula L. and Cassia tora L. *Songklanakarin J Sci Technol*, 2004;26(5): 741-48.
51. Hajare, S., et al., Analgesic and antipyretic activities of Dalbergia sissoo leaves. *Ind J Pharmacol* 2000;32(6): 357-360.
52. Hajare, S., et al., Anti-inflammatory activity of Dalbergia sissoo leaves. *Fitoterapia*, 2001;72(2):131-139.
53. Garimella, T., C. Jolly, and S. Narayanan, In vitro studies on antilithiatic activity of seeds of Dolichos biflorus Linn. and rhizomes of Bergenia ligulata Wall. *Phytotherapy Res* 2001;15(4): 351-355.
54. Atodariya, U., et al., Anti-urolithiatic activity of Dolichos biflorus seeds. *J Pharmacogn Phytochem* 2013;2(2).
55. Bijarnia, R.K., et al., A novel calcium oxalate crystal growth inhibitory protein from the seeds of Dolichos biflorus (L.). *Prot J* 2009;28(3-4):161-168.
56. Yim, J.H., et al., Antinociceptive and anti-inflammatory effects of ethanolic extracts of Glycine max (L.) Merr and Rhynchosia nulubilis seeds. *Int J Mol Sci* 2009;10(11):4742-4753.
57. Sharma, N., V. Garg, and A. Paul, Antihyperglycemic, antihyperlipidemic and antioxidative potential of Prosopis cineraria bark. *Ind J Clin Bioch* 2010;25(2):193-200.
58. Tippani, R., et al., Antioxidant and analgesic activities of Pterocarpus marsupium Roxb. *J Herb Med Plant* 2010;16(1): 63-68.
59. Mensor, L.L., et al., Screening of Brazilian plant extracts for antioxidant activity by the use of DPPH free radical method. *Phytotherapy Res* 2001;15(2):127-130.
60. CC, E.A., Comparative phytochemical and antimicrobial screening of some solvent extracts of Samanea saman (Fabaceae or Mimosaceae) pods. *Afr J Pure App Chem* 2010;4(9): 206-212.

Table 1. There is a list of plants which are enlisted alphabetically along with their medicinal uses and their part used. These plants belong to family leguminosae and its different genera.

Sr. No	Scientific Name	Family	Local Name	Part use	Uses
1	<i>Acacia Arabica</i>	Mimosaceae	Babul	Bark	Inflammation, diabetes, immunosuppression, neurodegenerative diseases, free radical scavenger and hepatoprotective.[40]
2	<i>Arachishypogaea</i>	Fabaceae	Peanut	Seeds	Hypotensive potential, antioxidant,[41] anti-inflammatory activities, [42] anticancer [43] antioxidant and antibacterial. [44]
3	<i>Astragalusmembranaceus</i>	Fabaceae	Milk Vetch	Roots	Anti-radiation and anticancer effects; protect cardiovascular, liver, kidney, lung and brain cells, improve immune function.[45]
4	<i>Cassia tora</i>	Leguminaceae	Charota	Leaves	Antibacterial activity [46], anti-inflammatory effect [47], Antinociceptive[48], effective against free radical mediated diseases [49] and anti-fungal activity.[50]
5	<i>Dalbergiasissoo</i>	Fabaceae	shesham	Leaves	Analgesic and antipyretic, [51] Anti-inflammatory activity.[52]
6	<i>Dolichosbiflorus</i>	Fabaceae	Kulthi	Seeds	Antilithiatic activity [53], Anti-Urolithiatic Activity [54]Calcium Oxalate Crystal Growth Inhibitory effect [55]
7	<i>Glycine max</i>	Fabaceae	Black soybeans	seeds	Anti-nociceptive and anti-inflammatory. [56]
8	<i>Prosopis cineraria</i>	Fabaceae	Jand (Punjabi)	Bark	Antihyperglycemic, antihyperlipidemic and antioxidative.[57]
9	<i>PterocarpusmarsupiumRoxb</i>	Papilionaceae	Malabar kino	bark	Antioxidant activity, analgesic activity. [58]
10	<i>Platypodiumelegans</i>	Leguminosae	graceful platypodium	Leaves	Antioxidant activity.[59]
11	<i>Samaneasaman</i>	Fabaceae	French Tamarind	Pods	Antimicrobial activity. [60]