INTERNATIONAL JOURNAL OF PHARMACEUTICS & DRUG ANALYSIS
VOL. 3 ISSUE 9, 2015; 261 – 263 ; http://ijpda.com

REVIEW ARTICLE

ETHNOBOTANY AND PHYTOPHARMACOLOGY OF *BAUHINIA VARIEGATA*

Geeta Deswal, Kanika Arora

Guru Gobind Singh College of Pharmacy, Yamunanagar
N. K. B. R. College of Pharmacy, Meerut, India.

Date Received: 20th August 2015; Date Accepted: 3rd September 2015 Date published: 11th September 2015

E-mail: deswalgeeta@gmail.com

Abstract: Bauhinia variegata linn belonging to family fabaceae, is a very popular ornamental tree commonly known as orchid tree. The family fabaceae comprises of 630 genera and 18,000 species. A wide range of chemical compound mainly flavanoids, tannins, alkaloids dibenzooxepins, lutein, isoquercetin and astragalin etc. are present.The crude extracts of various parts and pure isolates of Bauhinia variegata was reported to possess antibacterial, antitumour, hypoglycemic, anti-inflammatory activity, etc. Bauhinia variegata traditionally have been found to possess tonic, asreingent, vaginal disorders and diuretic properties.This article briefly reviews the botany, chemistry and pharmacology of Bauhinia variegata linn.

Keywords: Bauhinia species, Flavanoids, astringent, diuretic, lutein.

INTRODUCTION:

There are three basic necessities of humans i.e food, clothes and shelter and now the fourth one is good health, which is provided by plant kingdom. Nature stands a golden mark and provided the storehouse of remedies to cure all ailments of mankind. Plant kingdom represents a rich house of organic compounds, many of which have been used for medicinal purposes and could serve as lead for the development of novel agents having good efficacy in various pathological disorders in the coming years. Herbs have always been the principal form of medicine in India and presently they are becoming popular throughout the world, as people strive to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in count with the body's own defence. There is a widespread belief that green medicines are healthier and more harmless or safer than synthetic ones.

Bauhinia variegata belonging to family Fabaceae is a very popular ornamental tree commonly known as orchid tree and kachnar in hindi is a small to medium-sized tree growing to 10-12 m tall, deciduous in the dry season. About 600 species of Bauhinia grow in the tropical regions of the world.The genus includes trees, vines, and shrubs that are frequently planted for their showy flowers and ornamental foliage [1]. Bauhinia variegata is native to Southeastern Asia and grows throughout India and China. It is most commonly cultivated in India ascending to an altitude up to 1800 m in Himalayas and is a reliable greenhouse species [6].

This is a beautiful white variety of the more commonly seen Orchid Tree which has purple-varigated flowers. The flowers have four pure-white petals and one variegated deep purple. Orchid tree is closely related to peacock flower and to the tree many consider the world's most beautiful, the royal poinciana - and it shows. Orchid tree is staggeringly beautiful when in bloom - and it blooms for several months. Orchid tree grows 20-40 ft tall and 10-20 ft wide with a spreading crown of briefly deciduous leaves which are 4-6 in across and rounded with lobed ends and heart shaped bases. The leaves are shaped a little like a cow's hoof [7]. In the Neotropics, it can be used to attract humming birds - such as Sapphire-spangled Emerald (Amazilia lactea), Glittering-bellied Emerald (Chlorostilbon lucidus), or White-throated Hummingbird (Leucochloris albicollis) - into gardens and parks[1]. On the other hand, in some areas it has become naturalised and invasive [14].

Botanical Description

Bauhinia variegata is a small to medium-sized deciduous tree with a short bole and spreading crown, attaining a height of up to 15 m and diameter of 50 cm. In dry forests, the size is much smaller.[6]

BARK-The bark is light brownish grey, smooth to slightly fissured and scaly. Inner bark is pinkish, fibrous and bitter. The twigs are slender, zigzag; when young, light green, slightly hairy, and angled, becoming brownish grey.[8]

LEAVES-Leaves have minute stipules 1-2 mm, early caducous; petiole puberulous to glabrous, 3-4 cm; lamina broadly ovate to circular, often broader than long, 6-16 cm diameter; 11-13 nerved; tips of lobes broadly rounded, base cordate; upper surface glabrous, lower glaucous but glabrous when fully grown.[8]

FLOWER-Flower clusters (racemes) are unbranched at ends of twigs. The few flowers have short, stout stalks and a stalklike, green, narrow basal tube (hypanthium). The light green, fairly hairy calyx forms a pointed 5-angled bud and splits open on 1 side, remaining attached; petals 5, slightly unequal, wavy margined and narrowed to the base; 5 curved stamens; very slender, stalked, curved pistil, with narrow, green, 1-celled ovary, style and dotlike stigma.[20]

SEEDS- Pods dehiscent, strap-shaped, obliquely striate, 20-30 by 2-25 cm; long, hard, flat with 10-15 seeds in each; seeds brown, flat, nearly circular with coriaceus testa.[23]

Chemical constituents

ROOTS- The qualitative chemical test of B. variegata root powder showed the presence of carbohydrates, glycosides, flavonoids, tannins, phenolic compounds, proteins, gums and mucilages.[6],[3]

LEAVES- The phytoconstituents of leaves of Bauhinia variegata leaves are tannins, alkaloids, cardiac glycosides, flavanoids i.e quercetin, rutin, quercetrin, apigenin and apigenin 7-O-glucoside. B.variegata have similar composition, with germacrene D, spathulenol, δ-cadinine [23].

SEEDS- The seeds yield a fatty oil containing linolinic acid, oleic, steric, palmitic and myristic acid.[23]

BARK- The bark yields fibre and tannins.[9]

In the continuing search for novel agents, seven flavonoids, namely kaempferol (1), ombuin (2), kaempferol 7,4′-dimethyl ether 3-O-β-D-glucopyranoside (3), kaempferol 3-O-β-D-glucopyranoside (4), isorhamnetin 3-O-β-D-glucopyranoside (5) and hesperidin (6), together with one triterpene caffeate, 3β-trans-(3,4-dihydro xycinnamoyloxy)olean-12-en-28-oic acid (7) were isolated from the non-woody aerial parts of Bauhinia variegata.[22]. Phytochemical analysis of the root bark of Bauhinia variegata Linn yielded a new flavanone, (2S)-5,7-dimethoxy-30,40-methylenedioxyflavanone (1) and a new dihydrodibenzoxepin, 5,6-dihydro-1,7-dihydroxy-3,4-dimethoxy-2-methyldibenz [b,f]oxepin (2) together with three known flavonoids (3–5). The structures of the new compounds were determined on the basis of spectral studies.fig 2[18]

Pharmacological Activities-

Anti tumour activity-

Ethanolic extract of Bauhinia variegata (EBV) shows anti-tumour activity of against Ehrlich ascites carcinoma in Swiss albino mice.A significant enhancement of mean survival time of EBV treated tumour bearing mice was found with respect to the control group. EBV treatment was found to enhance peritoneal cell counts. After 14 days of inoculation, EBV is able to reverse the changes in the haemotological parameters, protein and PCV consequent to tumour inoculation. Oral administration of EBV was effective in reducing solid tumour mass development induced by EAC cells. EBV was found to be a potent cytotoxic towards EAC tumour cells.[12],[15]

Antioxidant activity

Alcoholic and aqueous extracts of Bauhini variegata Linn. can effectively decrease plasma cholesterol, triglyceride, LDL, and VLDL and increase plasma HDL levels. In addition, the alcoholic and aqueous extracts have shown significant antioxidant activity. By the virtue of its antioxidant activity, Bauhinia variegata Linn. may show antihyperlipidemic activity .[3]

***Antibacterial** activity (1)*

Defatted acetone and methanol extracts of bark of Bauhinia variegata L. showed the most antibacterial activity. (2) The aqueous and methanol extracts of B variegata bark showed the best antibacterial activity.[3]

Chemopreventive activity

Bauhinia variegata shows chemopreventive and cytotoxic effect of ethanol extract of *Bauhinia variegata* against induced DEN liver tumor and human cancer lines.[15]

***Immunomodulatory** Activity*

Ethanolic extract of the stem bark of *Bauhinia variegata* showed significant increase in the primary and secondary humoral antibody response and known as an immunomodulatory agent, probably through stimulation of both the specific and nonspecific arm of immunity.

Anti inflammatory activity

A novel flavonol glycoside 5,7,3',4'-tetrahydroxy-3-methoxy-7-O-alpha-L-rhamnopyranosyl(1-->3)-O-beta-galactopyranoside from the roots of *Bauhinia Variegata* showed anti-inflammatory activity.[20]

Antinociceptive activity

The new triterpene saponin, named as 23-hydroxy-3α-[O-α-L-$^1C_4$-rhamnopyranosyl-(1″ ⟶ 4′)-O-α-L-$^1C_4$-arabino pyranosyl-oxy]olean-12-en-28-oic acid O-α-L-$^1C_4$-rhamnopyranosyl- (1‴′ ⟶ 4‴′)-O-α-D-$^1C_4$-gluco pyranosyl-(1‴″ ⟶ 6‴)-O-α-D-$^1C_4$-glucopyranosyl ester) was isolated from the leaves of Bauhinia variegata Linn and was found to be nontoxic (LD50) and to have significant antinociceptive activity.[20]

Antihyperglycemic activity

Ethanolic and aqueous extracts of Bauhinia variegata L in normal and streptozotocin (STZ) induced diabetic rats

shows antihyperglycemic activity. There was significant reduction in Total cholesterol, LDL cholesterol, VLDL cholesterol and improvement in HDL cholesterol in diabetic rats. These results indicate that Bauhinia variegata possesses hypoglycemic effect.[16]

Antiarthritic activity

Ethanolic extract of Bauhinia variegata (EBV) showed a significant antiarthritic effect on complete Freund's adjuvant (CFA) induced arthritis in rats.[3]

Conclusion

The scientific research on B.variegata suggests a huge biological potential of this plant. It is strongly believed that detailed information as presented in this review on the phytochemical and various biological properties of the extracts might provide detailed evidence for the use of this plant in different medicines. Even today , plants are almost exclusive source of drugs for a amajority of the world population. Therefore, it remains a achallenge for scientist to provide efficient, safe and cheap medication especially for rural area. Bauhinia species and their quantification of individual phytoconstituents as well as pharmacological profile based on in vitro, in vivo studies and on clinical trial shoud be further investigated.

References

1. Bailey LH. The Standard Cyclopedia of Horticulture. New York: MacMillan; 1941.
2. Duret S, Paris R R. The flavonoid of several species of Bauhinia.Plant Medicinal Phytotherapy. 1977; 11: 213–216.
3. Gupta A K and Chauhan J S. 1984. Constituents from the stem of Bauhinia variegata. National Academy of Science Letters. 1984; 7: 15-16.
4. Gupta A K, Vidyapati T J, Chauhan J S. 5,7-Dihydroxyflavanone-40-O-_-l-rhamnopyranosyl-d-glucopyranoside from Bauhinia variegate, Indian J. Chemistry. 1979; 18B: 85-86.
5. Gupta A K, Vidyapati T J, Chauhan J S. Chemical examination of the stem of *Bauhinia variegata*. Planta Medica. 1980; 38: 174-176.
6. Golwala D K, Patel L D. Pharmacognostical studies of Bauhinia variegata linn root. Journal of Young Pharmacist. 2009; 1: 36-41.
7. Larson SS. Pollen Morphology of Thai species of Bauhinia (Caesalpiniaceae). Grana 1974; 14: 114-31.
8. Pandey Sonam, Agrawal R C. Effect of Bauhinia Variegate Bark Extract on DMBA-Induced Mouse Skin Carcinogenesis. A Preliminary Study. Global Journal of Pharmacology. 2009; 3 (3): 158-162.
9. Rahman W, Begum S J. Flavonoids from the white flowers of Bauhinia variegata. Natur Wissenschaften. 1996; 53: 384-385.
10. Rajkapoor B, Jayakar B, Murgeshand D A. Sci. Monit. 2006; 8: 79-92.
11. Rajkapoor B, Jayakar B, Murgesh N. Antitumor activity of Bauhinia variegata on Dalton's ascetic lymphoma. J. Ethnopharmacol. 2003; 89: 107-109.
12. Rajkapoor B, Jayakar B, Anandan R, Kavimani S. a anti ulcer effect of Bauhinia variegata linn in rats .J.Nat.Remedies. 2003; 3: 215-216.
13. Rajkapoor B, Jayakar B, Murgesh N. Sub chronic toxicity of plant extract Bauhinia varigata on rats. J. Ecotoxicology and Environmental Monitoring. 2004; 14 (1): 71-74.
14. Rajkapoor B, Jayakar B, Murugesh N. Antitumor activity of Bauhinia variegata against Ehrlich ascites carcinoma induced mice. Pharmaceut. Biol. 2003; 41: 604-647.
15. Rajkapoor B, Jayakar B, Murugesh N, Sakhtisekaran D. Chemo prevention and cytotoxic effect of Bauhinia variegata against N nitrosodiethylamine induced liver tumors and human cancer cell lines.Ethnopharmacology. 104: 407-409.
16. Reddy M V B, Reddy M K, Gunasekar D, Caux C, Bodo B. A flavanone and a dihydrodibenzoxepin from Bauhinia variegata. Phytochemistry. 2003; 64: 879–882.
17. The Ayurvedic Pharmacopoeia of India. 1999; 1:191-2.
18. Thiruvenkatasubramaniam R, Jayakar B. Anti-Hyperglycemic and Anti-Hyperlipidaemic Activities of Bauhinia variegata L on Streptozotocin Induced Diabetic Rats. Scholars Research Library. Der Pharmacia Lettre. 2010; 2(5): 330-334.
19. Wahab S M A E, Wassel G M, Ammar N M, Hanna T. Flavonoid constituents in the different organs of selected Bauhinia species and their effect on blood glucose. Herba Hungeria. 1987; 26:27–39.
20. Yadava R N, Reddy V M. Anti-inflammatory activity of a novel flavonol glycoside from the Bauhinia variegata Linn. Nat Prod Res 2003; 17:165-9.
21. Yadava R N, Reddy V M. A new flavone glycoside 5-hydroxy- 7,3′,4′,5′-tetramethoxyflavone 5-β-D-xylopyranosyl(1→2)-α-Lrhamnopyranoside from Bauhinia variegata. J Asian Nat Prod Res. 2001; 3: 341–346.
22. Zaka S H, Saleem N, Shakir S A. Fatty acid composition of Bauhinia variegata and Bauhnia malabarica seed oils-comparsion of their Physico-chemical Properties. 2006; 4(2): 169-170.