Medicinal uses, phytochemistry and pharmacology of Bauhinia racemosa lam

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Abstract

Bauhinia racemosa Lam. is a tall sized tree growing throughout Srilanka, China, India and Pakistan. Various parts of the plant have great medicinal potential in folklore medicine and used in diarrhoea, fever, skin diseases, cough, malaria etc. Analgesic, anti-inflammatory, antipyretic, antispasmodic, antialcer, cytotoxicity and hypotensive activities of Bauhinia racemosa have been reported. Different parts of this plant contain β-amyrin, β-sitosterol, kaempferol, quercetin, scopoletin, scopolin and tannins.

Keywords: Bauhinia racemosa, medicinal uses, phytochemistry, pharmacology

Introduction

Plants have always played a major role in the prevention and cure of diseases in human worldwide. The use of medicinal plants is increasing day by day in both developed and developing countries due to increase in recognition of natural products [1]. Genus Bauhinia has played a significant role in human civilization since ancient times. Genus Bauhinia is comprised of trees and shrubs which grow in warm climate. About 300 species of Bauhinia are found in tropical regions with 5-7 m tall tree in deciduous forests. It is generally planted in gardens and along the roadsides for its beautiful white flowers. Many species are widely planted in the tropics as orchid trees, particularly in northern India, southeastern China and Vietnam. Bauhinia racemosa Lam. is widely distributed in Pakistan, India, Srilanka, Burma and China. It is a useful species for filling blanks in forest plantings and helps in preventing soil erosion. In the United States of America, the trees grow in coastal California, Florida, Hawaii, Louisiana and Texas [2].

Table 1: Name of Bauhinia racemosa Lam. in different languages [2, 3]

| Bengali    | Banraji |
|------------|---------|
| English    | Mountain ebony |
| Gujarati   | Asundro |
| Hindi      | Ashta, Jhinjeri, Katmauli, Kachnal |
| Punjabi    | Koshandra |
| Sanskrit   | Yugmapatra, Yamalapratakah, Ashmantaka, Kanchini |
| Tamil      | Atti, Kokku mandarai, Tataki |
| Telugu     | Tella arechettu |
| Urdu       | Kachnaar |

Table 2: Taxonomy [4]

| Kingdom          | Plantae |
|------------------|---------|
| Division         | Magnoliophyta |
| Class            | Magnoliopsida |
| Order            | Fabales |
| Family           | Caesalpiniaceae (Gulmohar family) |
| Genus            | Bauhinia |
| Species          | Racemosa |
Table 3: Botanical description [5, 6]

| Parts | Characteristics |
|-------|-----------------|
| Plant | Small bushy, deciduous tree with a short unbranched trunk, drooping branches grows in warm climate. |
| Stem | Bluish black rough, pinkish red inside turning brown on exposure. Rough with vertical cracks, young twigs hairy. Longitudinally fissured. |
| Leaves | Green in colour, broader than long and compound. leaflet, ovate, rounded at apex, pubescent beneath when young. 2.5-7.5 cm broad, divided half way down into two lobes, glabrous above, hairy below, base usually cordate, 7-9 nervet, petiole 7.0-18 mm long. |
| Flowers | White or pale yellow in colour, terminal or leaf-opposed racemes. Small flowers are borne in loose racemes, 5 - 10 cm long. Flowers are 7.5-12.5 cm in diameter, white in colour, petals are 5, narrow lance like, stamens 10, all fertile, filaments hairy at the base. Ovary hairy, stigma sessile. Pedicel 5-10 mm long, hairy, jointed near the middle, bracts short, linear, acute, hypanthis very short. Calyx c. 6.0-8.0 mm long, spathaceous, reflexed. |
| Pods | Pods 12.5 - 25 cm by 1.7 - 2.5 cm in size curved, swollen, rigid. |
| Seeds | Seeds 12 to 20 glabrous dark reddish brown or black, compressed 7-8 mm long. |

**Fig 1: Bauhinia racemosa Lam.**

**Nutritional importance**

The seeds of *Bauhinia racemosa* are rich in calcium, potassium, magnesium, zinc, manganese and iron. Glutelins is predominated whereas albumins and globulins are less in seed protein of *Bauhinia racemosa*. Essential amino acids like isoleucine, lysine, phenylalanine and tyrosine are high where as the contents of sulphur amino acids are limiting in the seed proteins. The fatty acids, linoleic, oleic and palmitic acid are relatively higher in the seed lipids [7, 8, 9].

**Economic importance**

The leaves of *Bauhinia racemosa* are used for making bidis, thus the plant is commonly known as Bidi leaf tree. *Bauhinia racemosa* is planted for its value as well as for its extreme beauty. The tree is staggeringly beautiful when in bloom and it blooms for several months. The flowers can be found in white colour and the flowers of the plant are of much importance in apiculture and also as a pot herb in curries and made into pickle. The plant is used as fodder for goats, sheep and cattle. The tree also yields useful fibers and gum. The bark is used for tanning and dyeing. The wood is hard and heavy, thus used for making plough and yokes and also used as fuel [8, 10].

**Table 4: Ethnomedicine**

| Parts | Uses |
|-------|------|
| Bark  | Headache, malaria, dysentery, diarrhea, fever, skin diseases, tumors, wash abscesses, warts, wound, skin disorders, diarrhea and dysentery [11, 12]. |
| Leaves | Thirst, urinary discharges, quartan fever, headache, skin diseases, tumors, troubles, diseases of the blood, diarrhea [13, 14]. |
| Flower | Cough, bronchitis [13]. |
| Fruit | Astringent to the bowels [11]. |
| Fiber  | To stitch wounds. [11]. |

**Table 5: Phytochemistry**

| Parts | Compounds |
|-------|-----------|
| Heartwood | Resveratrol (3,5,4’-trihydroxy trans-stilbene), Phytoalexin [15]; Pacharin (1,7-Dihydroxy-3-Methoxy-2-methyl-Dibenzo (2, 3-6, 7) Oxeine) [16, 17]; Coumarins, Flavonoids, Alkaloids, Steroids, Triterpenoids, Tetracyclic phenol, Tannin, Carbohydrates, Racemosol [17, 18]. |
| Stem bark | Luteolin, Octacosane [2], β-amyrin, β-sitosterol [15]; Oleic acid, Ursolic acid, Ellagic acid, Gallic acid Quercetin, 3-O-β-gluco-side, Myricetin 3-O-β-glucoside [18]. |
| Leaves  | Kaempferol, Galactolipid [16]; Hydroquinone, Catechol, 4-nitrophenol [19]; Scopolin, Scopoletin and Quercetin [18](2S)-1,2-di-O-linolenoyl-3-O-a-galactopyranosyl-(1/6)-Ob-galactopyranosyl glycerol : (2S)-1-O-linolenoyl-2-O-palmitoyl-3-O-a-galactopyranosyl-(1/6)-O-b-galactopyranosyl glycerol : (2S)-1-O-oleoyl2-O-palmitoyl-3-O-a-galactopyranosyl-(1/6)-O-
b galactopyranosyl glycerol, (-)epiafzelechin, (-)epicatechin, (-)catechin, Protocatechuic acid [19].

| Flower | Seed | Seed oil |
|--------|------|---------|
|        |      | Lipid [21], Crude protein [11, 18], Flavonoids, Phosphatidylinositol [21]. |

### Table 6: Pharmacology

| Part        | Extract                                | Pharmacological activity                      |
|-------------|----------------------------------------|-----------------------------------------------|
|             | Petroleum ether, chloroform, ethylacetate, methanol | Anthelmintic [26], Antimicrobial [27]. |
| Leaves      | Ethanol, n-hexane, chloroform, n-Butanol | Antiulcer [15], Antihistaminic [9]. |
|             | Aqueous, methanol                       | Antiulcer [15], Antihistaminic [9]. |
|             | Ethanol                                | Antihyperglycaemic [29]. |
| Bark        | Alcohol                                | Antipyretic [15]. |
|             | Aqueous and alcoholic                  | Antitumor [9]. |
|             | Methanol                               | Analgesic [15]. |
|             |                                        | Anti-inflammatory [33]. |
|             |                                        | Anti-HIV activity [14]. |
|             |                                        | Antioxidant, Hepatoprotective [35]. |
| Fruit       | Aqueous, alcoholic                      | Antulcer [15]. |
| Whole plant | Petroleum ether, ethanol, aqueous       | Antihistaminic [9]. |
|             | Aqueous, alcoholic                      | Antihyperglycaemic [26]. |
|             | Ethanol                                | Antihelminic [26]. |
|             | Methanolic                             | Antioxidant [37]. |

### Table 7: Bioactive phytochemicals present in various parts of Bauhinia racemosa Lam

| Parts            | Constituents                                                                 | Pharmacological activity                    |
|------------------|-----------------------------------------------------------------------------|---------------------------------------------|
| Aerial parts     | Methyl gallate, Gallic acid, Kaempferol, Quercetin, Quercetin 3–O–α–rhamnosside, Kaempferol 3–O–β–glucose, Myricetin–3–O–β–glucose, Quercetin 3–O–rutinoside (Rutin) | Anti-microbial [38]. |
| Stem bark        | Quercetin, Naringin, Silymarin, Anthocyanosides, Sophoradin, Saponins, Tannins | Anti-ulcer [15, 32]. |
| Leaves           | Phenol,2,4-bis(1,1-dimethylethyl)-, mome inositol, Neophytadiene, 6-octen-1-ol,3,7-dimethyl Propanoate, 16-heptadecenal, citronellyl butyrate | Anti-filarial [15, 28]. |
| Roots            | Racemosol, de-o-methyl racemosol                                                | Anti-bacterial, anti-fungal, anti-viral [2]. |

### Conclusion

The traditional medicinal uses, phytochemistry and pharmacology of Bauhinia racemosa presented in this review could be helpful for future studies and research. The plant has good future prospective for discovery of new molecules and pharmacological activities.

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