



AN UPDATED REVIEW ON BAUHINIA RACEMOSA LAM. AND ITS MEDICINAL PROPERTIES

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ABSTRACT

The aim of the present study is to extensively review the phytochemical and pharmacological activities of *Bauhinia racemosa*, belonging to family fabaceae. Phytochemical screening of the dried leaf extract showed the presence of proteins, carbohydrates, flavonoids, alkaloids, amino acids, glycosides, triterpenoids, and tannins. The ethanolic extract of *Bauhinia racemosa* exhibited various pharmacological activity including Antimicrobial, Antioxidant, Anti HIV-1, Antifilarial, Anthelmintic. Antihistaminic, Analgesic, Antiulcer, Anticancer, antipyretic, anti-inflammatory, hepatoprotective, and Astrigent properties.

KEYWORDS: *Bauhinia racemosa*, fabaceae, Phytochemical.

INTRODUCTION

India with its biodiversity and knowledge of rich ancient traditional systems of medicine built a strong base for the utilization of a large number of plants in general healthcare and alleviation of common ailments of the people India.^[1] In addition, herbal medicines have some advantages such as fewer side effects, better tolerance, relatively less expensive and readily available.^[2] So, such plants should be investigated to better understand their properties, safety & efficiency and studies involving the use of plants as therapeutic agents should be emphasized.^[3] *Bauhinia* species, named as such after Jean Bauhin and Gaspard Bauhin are important ornamental, forest and medicinal plants, including climbers and trees.^[4] The plant *Bauhinia racemosa* (L.) belongs to the Caesalpinioidae family. It is popularly known as “Apta” in Marathi and “Kanchnal” in Hindi. Other common names include Mountain Ebony and Kachnar (India and Pakistan). The bark and leaves are known to cure skin diseases, throat troubles, tumors, chronic dysentery, headache, and malaria.^[5] The review revealed that different medicinal uses of *Bauhinia racemosa*.

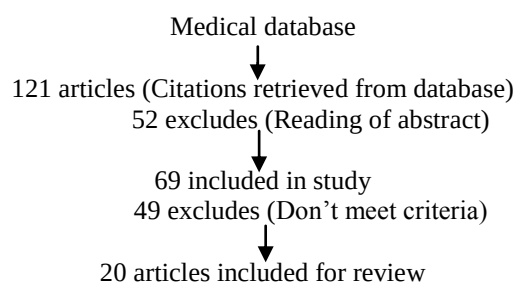
MATERIALS AND METHOD

Biodiversity: They are seen in temperate, sub-tropical and tropical zones of the world. *Bauhinia racemosa* Lam. Fabaceae-Caesalpinioidae is a small deciduous tree as orchid trees with dark brown scabrous bark, distributed in Asian countries like India, Pakistan, Sri Lanka Ceylon, China, and Timor.^[6] In the United States

of America, the trees grow in Hawaii, Coastal California, Texas, Louisiana, and Florida.

METHODOLOGY

A systematic search strategy was devised to look for pharmacological activities of *Bauhinia racemosa* species. Relevant medical websites and databases were searched. We searched databases like EMBASE and Scopus from Elsevier, Medline from PubMed, and Google Scholar. Keywords used for search included *Bauhinia racemosa*, *Bauhinia*, *Racemosa*, and *Phytochemical*. In addition, experts in the field were contacted to select studies that meet the criteria, and we also looked up references of key articles. The authors read the articles in full and extracted the data in a standardized fashion. Hence, this review presents 20 studies studying the pharmacological and medicinal properties of *Bauhinia racemosa*. We have not reviewed the original data behind the studies listed here. We have, in all cases, took original author's representations as true and evidence-based.



RESULTS AND DISCUSSION

Chemical constituents

B. racemosa contains several important phytoconstituents which synthesizes primary and secondary metabolites which have medicinal value. Phytochemical analysis has shown that it has interesting phytochemical bioconstituents, include flavonoids, terpenoids, tannins, steroids and others and the deep phytochemical study results in the isolation of methyl gallate, gallic, kaempferol, quercetin, quercetin 3-O- α -rhamnoside, kaempferol 3-O- β -glucoside, myricetin-3-O- β -glucoside, quercetin-3-O-rutinoside (Rutin).^[7] Studies had shown the presence of two triterpenic acids; oleanolic and ursolic, two hydrolysable tannins, gallic and ellagic acids, and three flavonoids; luteolin, quercetin 3-O- β -glucoside and myricetin 3-O- β -glucoside.^[8]

Chemical bioconstituents such as β -sitosterol and β -amyrin were isolated from the stem bark.^[9] and at least two flavonols (kaempferol and quercetin) and two coumarins (scopoletin and scopolin) from the leaves of the plant and Stilbene (resveratrol) were isolated from the heart wood of *B. Racemosa*.^[10] Galactolipid^[11] and tetracyclic phenols^[12] were also identified in some studies.

Medicinal properties

Bauhinia racemosa shows various pharmacological activities like Chemoprotective antitumor activity, anti-diabetic activity, hepatoprotective, anti-inflammatory activity, anti-mutagen activity, anti-nociceptor, antioxidant, anti-hyperlipidemic activity, etc., due to its presence of various active constituent all over the parts of plant.^[13]

Antibacterial Activity

In a study^[7], petroleum ether extract, chloroform extract, ethyl acetate extract and methanol extracts of leaves of *Bauhinia racemosa* Linn. were prepared and antibacterial activity were studied by disc diffusion method against certain enteric bacterial pathogens such as *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Enterobacter aerogenes*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Salmonella typhi*, *Staphylococcus epidermidis* and *Proteus vulgaris*. Other studies^[8,14] also showed the plant has Antibacterial activity against enteric bacterial pathogens.

Astringent property

The stem bark of the plant is an astringent and is used in the treatment of headache, fever, skin diseases, tumors, blood diseases, dysentery, diarrhea, glandular inflammation, and goiter.^[9]

Antiulcer Activity

The fresh flower buds of the plant showed antiulcer activity.^[15] Another experiment was conducted to study the antiulcer effect of the dried fruit powder of the plant *Bauhinia racemosa* in Wistar albino rats. Thirty Wistar

rats of either sex weighing between 150-200gm were selected and divided into five groups, each comprising of six rats. From the results obtained, it was concluded that aqueous extract in the dose rate of 200mg/kg body weight and alcoholic extract (100mg/kg & 200mg/kg body weight) could produce antiulcer activity.^[16]

Hematology and Hepatorenal function

A sub-chronic toxicity studies of a methanol extract of *Bauhinia racemosa* (MEBR) stem bark in Swiss albino mice shows elevated the levels of serum enzymes and altered the hematological parameters with its constituents.^[17]

Anti HIV-1 agent

A study conducted to evaluate the anti-HIV-1 activity of *Bauhinia racemosa* Lam. stems and to investigate the bioactive constituents from the plant extracts. Different extracts of *B. racemosa* stems were tested for their anti-HIV-1 activity. The results show that *B. racemosa* methanol extract has potentials as an anti- HIV-1 agent.^[18]

Anti-inflammatory analgesic and antipyretic effect

Desai et al.^[19] also reported medicinal use of *Bauhinia racemosa* in case of headache and fever and reported that plucked stem bark can be applied in case of swelling, wound and mouth ulcer. Stem bark and leaves of the *Bauhinia racemosa* are extensively used in the treatment of inflammation, headache and fever.^[20,21]

Antihelmintic property & Antifilarial property

It has antihelmintic property due to Kaempferol, coumarins, steroids and confirmed by *Pheretima posthuma*, test worm.^[22] The active constituent of this plant has parasite-specific peculiarities in order to interfere with their proliferation in the human host.^[23] The study proved that the active galactolipids, emerged as the lead molecule which was active on forms of lymphatic filarial parasite, *B. Malayi*.^[23]

Antihistaminic effect and Antioxidant effect

The phytochemical studies shows antihistaminic and antioxidant effect.^[24] The antioxidant activity of the methanol extract increased in a concentration-dependent manner by free radical scavenging activity.^[25,26]

Antitumor activity

The methanol extract of *Bauhinia racemosa* stem bark exhibited antitumor effect by modulating lipid peroxidation and augmenting anti-oxidant defense system. Studies showed antitumor activity against Ehrlich ascites carcinoma^[26] and nitrosodiethylamine-induced hepatocarcinogenesis.^[27]

Analgesic Activity

The secondary metabolites have analgesic activity. In a study, the analgesic property of the active constituent is assessed by "Tail Immersion Method".^[28]

The pharmacological and medicinal properties of *B. racemosa* is illustrated in Table 1.

Sl.No	Title	Year	Parts Used (extracts used)	Chemical Constituents (specimen used)	Indication
1	Antimicrobial and Antioxidant Activities of <i>Bauhinia racemosa</i> Lam. and Chemical Content. (7)	2014	aerial parts (ethanol)	flavonoids, tannins(<i>Bacillus subtilis</i> , <i>Candida albicans</i>)	Antimicrobial and Antioxidant Activities
2	Biological activity of aqueous extract of some medicinal plants.(8)	2014	Leaves(ethanol, chloroform, acetone)	Bacterial and fungal strains	Antibacterial activity .
3	Anti-HIV-1 potential of <i>Bauhinia racemosa</i> Lam. (Caesalpiniaceae) and Phytochemical profile(18)	2013	Stem (methanol)	flavonoids, tannins and terpenes	Anti HIV-1 agent
4	Galactolipids from <i>Bauhinia racemosa</i> as a new class of antifilarial agents against human lymphatic filarial parasite,. <i>Brugia malayi</i> (11)	2012	Leaves (ethanol)	Galacolipid (filarial parasite,. <i>Brugia malayi</i>)	Antifilarial property
5	Investigation of in-vitro anthelmintic activity of <i>Bauhinia racemosa</i> Linn(22)	2011	Whole plant(Pet.ether, ethanol,aqueous)	Kaempferol,coumarins,steroids (Pheretima posthuma ,test worm)	Anthelmintic property
6	Antihistaminic effect of <i>Bauhinia racemosa</i> leaves(24)	2011	Leaves (methanol)	Alkaloid, saponins	Antihistaminic effect
7	In-vitro Antibacterial Efficacy of Solvent Extracts of Leaves of <i>Bauhinia racemosa</i> Lam. (Caesalpiniaceae) Against Enteric Bacterial pathogens.(14)	2011	Leaves (Petroleum ether, chloroform, ethyl acetate and methanol extracts)	saponins, tannins, carbohydrates, alkaloids, flavonoids glycosides, steroids, proteins and alkaloids	Antibacterial activity against enteric bacterial pathogens

Sl.No	Title	Year	Parts Used (extracts used)	Chemical Constituents (specimen used)	Indication
8	Phytochemical composition and <i>in vitro</i> antimicrobial activity of <i>Bauhinia Racemosa</i> lamk (caesalpinaceae).(29)	2010	leaves (aqueous and methanol extract)	Flavenoid,protein, oil,fats, phenolic compounds, saponins tannins (bacterial and fungal cultures)	Antimicrobial Activity
9	Study of Analgesic activity of <i>Bauhinia racemosa lam</i> in Rats(28)	2009	Stem bark (Aqueous & alcoholic extracts)	(Wistar albino rats)	Analgesic activity
10	Study of Antiulcer Activity of <i>Bauhinia racemosa</i> Lam in rats (15)	2009	dried fruit powder (aqueous and alcoholic)	Flavonoids (quercetin, naringin, silymarin, anthocyanosides,s ophoradin , saponins and tannins (Wistar albino rats)	Antiulcer activity
11	Effect of Bauhinia racemosa stem bark on N-nitrosodiethylamine- induced hepatocarcinogenesis in rats.(27)	2007	Bark (methanol)	Alkaloid,flavanoid, saponins(rats)	Anticancer activity
12	.Phytochemical Studies on <i>Bauhinia racemosa</i> Lam., <i>Bauhinia purpurea</i> Linn. and <i>Hardwickia binata</i> Roxb(30)	2007	Leaves (ethanol)	Alkaloid,flavanoid, saponins,tannins	Antibacterial activity
13	Anti-inflammatory analgesic and antipyretic effects of methanol extract from Bauhinia racemosa stem bark in animal models.(21)	2005	Bark (Methanol extract)	Alkaloid,flavanoid, saponins(mice)	Analgesic,antipyretic and antiinflammatory
14	Effects of methanol extract of Caesalpinia bonducella and Bauhinia racemosa on Hematology and Hepatorenal function in mice.(17)	2005	Bark (Methanol extract)	Alkaloid,flavanoid, saponins(mice)	Hepatoprotective activity

Sl.No	Title	Year	Parts Used (extracts used)	Chemical Constituents (specimen used)	Indication
15	Antioxidant and antimicrobial activities of <i>Bauhinia racemosa</i> L. stem bark(25)	2005	Stem bark (methanol)	Phenolic compound(fungal species)	Antioxidant and antimicrobial activities
16	Antitumor activity and antioxidant role of <i>Bauhinia racemosa</i> against Ehrlich ascites carcinoma in Swiss albino mice(26)	2004	stem bark (methanol)	flavonoids, terpenoids, and steroids (Ehrlich ascites carcinoma (EAC) tumor in mice)	Antitumor and Anti oxidant property
17	A new tetracyclic phenol and other constituents from root of <i>Bauhinia racemosa</i> (12)	2000	Stem bark And root (alcoholic)	3-hydroxy-de-o-methyl racemosol ,lupeol,betulin, setosterol	Anticancer effect against human epidermal carcinoma
18	Study of the flavonoid content of <i>Bassia muricata</i> and <i>Bauhinia racemosa</i> .(10)	2000	Leaves (Methanol and alcohol)	Flavonoid	Antiulcer property
19	Evaluation of some pharmacological properties of different extracts of <i>Bauhinia racemosa</i> leaf and <i>Bassia muricata</i> whole plant.(16)	1995	Leaves (Methanol and alcohol)	Flavonoid	Antiulcer property
20	Chemical studies on <i>Bauhinia racemosa</i> . (9)	1976	Stem Bark (Methanol\$alcohol)	Flavonoid	Astringent property (skin diseases, tumours ,fever etc)

CONCLUSION

Bauhinia racemosa is an important source of many pharmacologically and medicinally important constituents. The plant is widely studied for the various pharmacological and therapeutic activities like Antibacterial Activity, Astringent property, Antiulcer Activity, Analgesic Activity, Antitumor activity, Antihistaminic effect & Antioxidant effect, Antihelminthic property & Antifilarial property, Anti-inflammatory analgesic & antipyretic effect, Anti HIV-1 agent, Hematology and Hepatorenal protective function. Most of the pharmacological studies were in preliminary phase, carried out in animals and are not sufficient for the development of a pharmaceutical product. Further studies will possibly lead to exploration of new method of therapeutic and industrial application.

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