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BAUHINIA TOMENTOSA: A REVIEW

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ABSTRACT

Bauhinia tomentosa is commonly known as yellow bauhinia, yellow orchid tree and yellow bell orchid tree. It is an erect, branched shrub belonging to the family Fabaceae. The plant is reported to contain proteins, amino acids, fatty acids, minerals, alkaloids, flavonoids, phyto steroids, saponins, tannins, phenolic compounds, fixed oils and fats. Pharmacological studies proved its anti-oxidant, anti-bacterial, anti-hyperglycemic, anti-lipidemic, anti-ulcer, immunomodulatory, anti-diarrhoeal, anti-microbial and anti-diabetic activities. This review presents a detailed survey on therapeutic uses, chemical constituents and pharmacological activities of *Bauhinia tomentosa*.

Keywords: *Bauhinia tomentosa*, Chemical constituents, Fabaceae, Pharmacological studies.

INTRODUCTION

The genus bauhinia contains more than 200 species of flowering plants belongs to the family Fabaceae (subfamily Cesalpinoideae). It is an erect, branched shrub grows up to a height of 2-4m contains hairy branches, leaves and pods. Leaves are 4-7cm long, wide and split about one third to the base into two, with oval, rounded lobes. Flowers are bell shaped, pendulous, solitary, grows up to 7cm long. They usually appeared in pairs. Pods are slender, pale brown, velvety, pointed 10-11x1.5-2cm, splitting on the tree to release 6-12 seeds. Seeds are 7-8.5x5.5-7x2-3mm, ovate compressed, reddish brown in color with v-shaped marginal hilum [1].

Seed acts as tonic and aphrodisiac. Fruit is used as diuretic. Leaf is used as a main ingredient in preparing plaster to treat abscesses. Root and bark decoction is used for curing abdominal troubles and as an anthelmintic. Root bark infusion is used as an external application to treat inflamed glands and abscesses. Bark is used externally to treat wounds and tumours. Combination of seed paste with vinegar is used as a local application to the wounds produced by venomous animals. Leaves have anti diabetic action. The whole

plant is used for treatment of snake bite and scorpion sting. Buds and flowers are used in dysentery. Root bark is internally used for treating large intestine problems. Flower is used for curing diarrhoea and dysentery. A decoction of root bark is applied as vermifuge and stem bark infusion is used as astringent. Seed acts as tonic and aphrodisiac [2].

Whole plant yields tannins. Leaves contain kaempferol-7-rhamnoside, kaempferol-3-O-glucoside, quercetin-3-O-glucoside and quercetin-3-O-rutinoside. Flowers contain glycosides, tannins, alkaloids, phytosteroids, flavonoids, saponins, carbohydrates, phenolic compounds and tannins. Seeds contain fatty oils, proteins, water soluble mucilage and saponins. Bark yields fiber. Roots contain carbohydrates, reducing sugars, saponins, tannins, phenolics and flavonoids [1].

PHARMACOLOGICAL ACTIONS

Anti bacterial activity

The antibacterial activity [3] of aqueous and ethanolic extracts of leaves of *Bauhinia tomentosa* have been evaluated against human pathogenic bacteria such as *Escherichia coli*, *Salmonella typhi*, *Streptococcus*

pyrogens, *Enterobacter aerogens*, *Pseudomonas aeruginosa*, *Streptococcus faecalis*, *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus cereus*, *Proteus vulgaris*. The anti bacterial assay was performed by disc- diffusion technique. Antibacterial activity was evaluated based on zone of inhibition appeared around the discs. Ethanol extract shows higher anti bacterial activity than aqueous extract. Ethanol extract shows maximum inhibitory activity against *Streptococcus faecalis* and minimum inhibitory activity for *Enterobacter aerogens*. Aqueous extract shows maximum inhibitory activity against *Streptococcus faecalis* and minimum activity against *Bacillus cereus*.

Anti bacterial activity

The anti bacterial activity [4] of n-butanol, chloroform, aqueous extracts of *Bauhinia tomentosa* flower have been evaluated against *Bacillus subtilis*, *Enterobacter aerogens*, *klebsiella pneumonia*, *Salmonella typhi*, *Staphylococcus aureus* using agar well diffusion assay. n-butanol extract showed maximum anti bacterial activity against *Salmonella typhi* and *Enterobacter aerogens* when compared to chloroform and aqueous extracts.

Anti microbial activity

Methanol, ethanol, chloroform, petroleum ether, ethyl acetate and aqueous extract of *Bauhinia tomentosa* leaves were evaluated for anti microbial activity [5] against *Bacillus cereus*, *Bacillus subtilis*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Candida albicans* and *Aspergillus niger* by cup-plate method. Methanol, ethanol, chloroform extract shows maximum antimicrobial activity against tested microorganisms when compared to other extracts.

Anti-ulcer activity

Aqueous extract of leaves of *Bauhinia tomentosa* was evaluated for anti-ulcer activity [6] using Alcohol-induced and Aspirin-induced ulcer model in rats. The aqueous extract shows anti-ulcer activity against alcohol induced and aspirin induced ulcer in rats.

Anti-hyperglycemic & Anti-lipidemic activity

The anti-hyperglycemic & anti-lipidemic activity [7] of ethanolic extract of *Bauhinia tomentosa* flower was evaluated for the management of streptozotocin-induced diabetes in rats. Ethanolic extract was administered intra peritoneally for 7 days at dose of 100mg/Hg & 200mg/Hg for 48hrs after streptozotocin injection (100mg/Hg). There will be decreased plasma glucose, plasma insulin, total cholesterol, triglycerides, low density lipoproteins, very low density lipoproteins, and increased high density lipoproteins were observed in of streptozotocin-induced diabetic rats. The ethanolic extract shows potent anti-hyperglycemic &

anti-hyper lipidemic effects in streptozotocin-induced diabetic rats.

Anti-hyperglycemic activity

Anti-hyperglycemic activity [8] of aqueous extract of *Bauhinia tomentosa* leaf was evaluated against oral glucose tolerance test in overnight fasted as well as in alloxan induced diabetic rats. The hypoglycemic activity is mainly because of active compounds like phenols and flavonoids. The significant blood glucose lowering effect of *Bauhinia tomentosa* leaf extract in alloxan induced diabetic rats are more helpful in maintaining the blood sugar level in patients with diabetes.

Anti-diabetic activity

The anti-diabetic activity [9] of aqueous extract of *Bauhinia tomentosa* leaf was evaluated against Alloxan-induced albino Wistar rats. Diabetes was induced with alloxan monohydrate (150mg/kg body weight) in rats. Aqueous extract is administered at the dose of 300mg/kg orally for 30 days. The aqueous extract significantly reduces the glycemic parameters, lipid parameters and serum enzymes and increases high density lipoproteins, total proteins, and glycogen levels. These results confirmed the potent anti-diabetic activity of *Bauhinia tomentosa*.

Anti-diabetic activity

The anti-diabetic activity [10] of ethanolic extract of roots of *Bauhinia tomentosa* were tested against glucose tolerance test in normal rats and alloxan induced diabetic rats. Ethanolic extract was administered for 14 days at the doses of 250 & 500mg/kg i.p 5 days after alloxan injection (120mg/kg). These doses shows potent anti-diabetic activity when compared to glibenclamide (10mg/kg).

Anti-diarrhoeal activity

The anti-diarrhoeal activity [11] of aqueous extract of *Bauhinia tomentosa* was evaluated in castor oil induced diarrhoea, prostaglandin induced enteropooling and charcoal meal test at doses of 5, 50, 100 & 200mg/kg using albino rats. The aqueous extract of *Bauhinia tomentosa* reduces diarrhea at dose of 200mg/kg i.p by inhibiting gastrointestinal motility and prostaglandin E₂ induced enteropooling.

In- vitro anticancer activity of gold nano particles

Green synthesis of gold nano particles (AuNP) using leaves extract of *Bauhinia tomentosa* will be evaluated for its anti cancer activity. The *in-vitro* anti-cancer activity confirmed by Methylthiazolyl Diphenyl-Tetrazolium Bromide (MTT) assay on the cell lines of Human laryngeal epithelial carcinoma (HEp-2) cells show IC₅₀ values of extract at 53.125µg/ml and

AuNP's at 34.375 µg/ml. The AuNP's inhibited the proliferation of (HEp-2) cells in dose and time dependent manner. IC₅₀ values of AuNP showed that the concentration required to inhibit 50% of HEp-2 cells was less than that of *Bauhinia tomentosa* [12].

Anti inflammatory activity

The anti-inflammatory activity [13] of ethyl acetate and methanol extracts of *Bauhinia tomentosa* (stem bark & roots) was evaluated against 5-lipo oxygenase enzyme. Ethyl acetate extract of *Bauhinia tomentosa* (yields complete inhibition at 100µg/ml & an IC₅₀ value of 18.47± 0.67 µg/ml) shows potent anti-inflammatory activity by inhibiting 5-lipo oxygenase enzyme.

Anti-oxidant activity

Free radical scavenging potential of *Bauhinia tomentosa* was assessed using various in vitro anti-oxidant models. Reactive oxygen species like super oxide anions, hyhroxyl, nitric oxide and peroxinitrate radicals play important role in oxidative stress related to pathogenesis of various diseases. The anti-oxidant activity of ethanolic extract of *Bauhinia tomentosa* was evaluated with total phenolic content. Ethanolic extract of *Bauhinia tomentosa* shows potent anti-oxidant properties, serve as free radical inhibitor [14].

Anti-nociceptive & Anti-oxidant activity

The analgesic & anti-oxidant potential of ethanol, methanol & aqueous extract of *Bauhinia tomentosa* against Eddy's hot plate, acetic acid induced writhing test & 1,1-di phenyl-2-picrylhydrazyl(DPPH) radical scavenging and nitric oxide scavenging assays [15]. Methanol and aqueous extract at doses of 200, 400mg/kg and ethanol extract at maximum dose (400mg/kg) inhibits number of writhing's as well as increases mean latency time. In case of acetic acid induced writhing test ethanol, methanol and aqueous extract at the dose of 400mg/kg shows maximum inhibition. DPPH radical scavenging activity has been observed with IC₅₀ values of methanol, ethanol and aqueous extracts was found to be 81.21%, 79.18% & 72.5% inhibition compared to standard indomethacin shows maximum inhibition of 79.26%. These extracts also possess potent nitric oxide scavenging activity with IC₅₀ values of 220.43, 150.45 & 310.25µg/ml of ethanol, methanol & aqueous extracts respectively when compared to standard IC₅₀ value of ascorbic acid value of 125.10 µg/ml.

Anti-oxidant/ immunomodulatory/ anti-inflammatory

The methanolic extract of *Bauhinia tomentosa* was evaluated for its immunomodulatory, anti-oxidant and anti-inflammatory activity [16] in BALB/c mice.

Methanolic extract of *Bauhinia tomentosa* is administered intra peritoneally and observed for total leukocyte count, bone marrow cellularity and α-esterase positive cells and compared with control groups. Anti-oxidant activity was confirmed by observing the inhibition of non-enzymatic lipid peroxidation and nitric oxide radical scavenging activity. Anti-inflammatory activity was evaluated against inflammation induced by carrageenan and formalin. Methanolic extracts shows reduced acute inflammation of paw edema induced by carrageenan and formalin.

DNA cleavage studies

DNA cleavage studies of ethanolic extracts of bark of *Bauhinia tomentosa* and the whole plant of *Mussaenda frondosa* have been performed. The cleavage of pCU18 DNA was estimated by using agarose gel electrophoresis. Ethanolic extract of *Bauhinia tomentosa* shows more cleavage activity than *Mussaenda frondosa*. These results are compared with standard DNA cleavage agent FeSO₄ [17].

Inflammatory bowel disease

Protective activity [18] of *Bauhinia tomentosa* was evaluated against acetic acid induced ulcerative colitis. Animals are treated with *Bauhinia tomentosa* (5, 10, 20mg/kg body weight) for 5 days before inducing ulcerative colitis. Reduced levels of glutathione nitric oxide, glutathione peroxidase, superoxide dismutase results in inhibition of ulcerative colitis in a dose dependent manner. The extract obtained from *Bauhinia tomentosa* will exhibit protective effect in experimentally induced ulcerative colitis possibly by regulating the anti oxidant and inflammatory mediators.

CONCLUSION

The present review concludes that survey of *Bauhinia tomentosa* was reported to contain proteins, amino acids, fatty acids, minerals, alkaloids, flavonoids, phyto steroids, saponins, tannins, phenolic compounds, fixed oils and fats. Pharmacological studies such as anti-oxidant, anti-bacterial, anti-hyperglycemic, anti-lipidemic, anti-ulcer, immunomodulatory, anti-diarrhoeal, anti-microbial and anti-diabetic activities has been proved by using different animal models.

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