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***Bauhinia purpurea*: PHYTOCHEMICAL AND BIOLOGICAL REVIEW**

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Abstract

Bauhinia purpurea belongs to the family Caesalpiniaceae, and used as vegetables by tribal's of Kathkors and Gondas in India. *Bauhinia purpurea* is rich in polyphenolics and are known for its medicinal properties and has been traditionally used by Indians and in other parts of South Asian countries like Pakistan, Sri Lanka and Malaysia for treating ailments like ulcer, wound, glandular swelling, expelling gases, Diarrhoea and stomach tumours. Biological reports proved activities like Anti-nociceptive, Anti-inflammatory, Analgesic, Antimalarial, Antimycobacterial, Cytotoxicity Antidiabetic, Cardiotonic, Wound healing, Anti-diarrhoeal. The present review has been undertaken with an objective to give previous biological and phytoconstituents reports on *Bauhinia purpurea*.

Keywords: *Bauhinia purpurea*, phytoconstituents, bioactivities.

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INTRODUCTION

Natural products have been the single most productive source of leads for the development of drugs. *Bauhinia purpurea* (family: Caesalpinaceae) is a medium sized, evergreen, ornamental tree found throughout India. The leaves are rigidly subcoriaceous, glabrous and shallowly cordate. The purple colored flowers of the species distinguishes it specifically from other species of *Bauhinia*. It is presently being used for ailments such as sores, wounds, diarrhea, dropsy, pain, rheumatism, convulsions, delirium, septicemia (Asolker et al., 2000). In previous papers there was different compounds isolated from the plant as two new dimeric flavonoids from 70% aq. Acetone extract of *B. purpurea* leaves and phytol fatty esters, lutein, and β -sitosterol with Antifungal activity (Yadav and Tripathi, 2000). α -Amyrin Caprylate was isolated from ethanolic extract of leaf of *B. purpurea* (Verma et al., 2009). The ethanolic extract of leaf of *B. purpurea* showed antioxidant activity (Vishal et al., 2009). It was reported that the plant exhibited various pharmacological activities such as CNS activity, cardiogenic activity, lipid-lowering activity, antioxidant activity, hepatoprotective activity, hypoglycemic activity, (Rajanarayana et al., 2001) Even through, traditionally, leaves of *Bauhinia purpurea* (Linn) were extensively used for the treatment of variety of wounds (Chopda and Mahajan, 2009). Present review was undertaken to give all the papers about previous bioactivities and phytoconstituents of *B. purpurea*.

Phytochemical and Biological Studies of

Phyto-constituents

Seed oil

Bauhinia purpurea seed oil was The characteristics of the extracted oil and the seed residue (meal) were determined out for their possible utilizations. The extracted oil was also analysed for iodine value, saponification value, unsaponifiable matter, acid value, peroxide value, refractive index and colour values. Fatty acid composition analysis by gas chromatography has shown that linoleic (55.34%) and oleic (11.84%) acids were the predominant unsaturated fatty acids, while palmitic acid (17.47%) and stearic acid (11.40%) were the major saturated fatty acids. Three tocopherols and six phytosterols were identified and quantified; among these, α -tocopherol and β -sitosterol was predominant, respectively. The physicochemical characteristics has revealed that *Bauhinia purpurea* oil has nutritive and dietetic potentialities (Sarfranz et al., 2010).

The ethyl acetate extract of *Bauhinia purpurea* was undergone column chromatography with different solvent fractions. Hence, two compounds were isolated from ethyl acetate extract of

Bauhinia purpurea with the compound 1 was eluted with benzene: Chloroform 90:10 v/v and compound 2 were eluted with ethyl acetate: methanol 80:20 v/v. The structures of the two isolated compounds were characterized by using FT-IR, NMR and Mass spectrophotometric methods. Thus, the compound was ethyl 2-amino-5-hydroxy-3,6,6-trimethyl heptonate (C₁₂H₂₅NO₃) and compound 2 was characterized as 3,6,7-trihydroxy-2-(3-methoxyphenyl)-4H-chromen-4-one (Shaji Selvin, et al., 2012).

Eleven new secondary metabolites together with two known flavanones and five known bibenzyls were isolated from the root extract of *Bauhinia purpurea*. New compounds include eight dihydrodibenzoxepins, a dihydrobenzofuran, a novel spirochromane-2,1'-hexenedione, and a new bibenzyl. Antimycobacterial, antimalarial, antifungal, cytotoxic, and anti-inflammatory activities of the isolated compounds are reported (Boonphong et al., 2007).

General phytochemical screening of the aerial parts of *Bauhinia purpurea* revealed the presence of steroids, terpenes, phenolic compounds, saponins, fatty acids, alkaloids. The aim of this study is to identify and characterize the bioactive principle from the aerial parts of the plant. It has wide folk medicinal use. For isolation of the compound, the dried aerial parts powder of *Bauhinia purpurea* was subjected to hot extraction with ethanol; this extract was subjected to chromatography. Isolated compound were purified by chloroform. The isolation and purification afforded white crystalline powder which was subjected to physical, chemical and spectral identification by IR, ¹H-NMR, ¹³C-NMR and GC-MS. The compound was concluded as β-sitosterol (Neelima and Sudhakar, 2012).

The flavone glycoside, 5,6-dihydroxy-7-methoxy flavone 6-O-beta-Dxylopyranoside, was isolated from the chloroform-soluble fraction of the ethanolic extract of *bauhinia purpurea* stems, and a new flavone glycoside, 6,4' dihydroxy 3-prenyl 3,5,7,5' tetra methoxy flavone-6-O-α-Lrhamnopyranoside, has been found in the seed of *bauhinia purpurea* (Yadava and Tripathi, 2000).

BIOLOGICAL ACTIVITIES

ANTI INFLAMMATORY AND ANTI NOCICEPTIVE ACTIVITIES

The present study was carried out to evaluate the anti nociceptive activity of the roots of the *Bauhinia purpurea* Linn plant. The rats weighing around 150-200g were selected, the ethanolic extracts of dried roots of *Bauhinia purpurea* Linn were administered at following dose of 100, 200, 400 mg/kg body weight were used. The study was conducted as per the "Tail flick Method" and "Acetic acid induced writhing method". *Bauhinia purpurea* Linn roots have shown

significant Anti nociceptive activity at 200 and 400 mg/kg in both the models, whereas 100mg/kg dose did not produce significant results when compared with control. ($P < 0.001$). The results of anti inflammatory activity of ethanolic extract produced significant results at doses of 200 & 400mg/kg ($P < 0.001$) in “carrageenan induced paw edema model” and” cotton pellet Granuloma pouch method”. The findings indicated the Anti inflammatory & Anti nociceptive evaluation of root bark extract of *Bauhinia purpurea* Linn (Nirmala et al., 2012).

ANTHELMINTIC ACTIVITY

Aqueous and Ethanolic extracts from the whole plant of *Bauhinia purpurea* were investigated for their anthelmintic activity against *Pheretima posthuma*. Three concentrations (25, 50 and 100 mg/ml) of each extracts were studied in activity, which involved the determination of time of paralysis and time of death of the worm. Both the extracts exhibited significant anthelmintic activity at highest concentration of 100 mg/ml. Piperazine citrate in same concentration as that of extract was included as standard reference and normal saline water as control (TEKESHWAR et al., 2011).

ANTIDIABETIC ACTIVITY

The present investigation was carried out to study the antidiabetic effect of the methanolic extract of leaf of *Bauhinia purpurea* in Streptozotocin (STZ) induced diabetic model. The antidiabetic activity was evaluated in normal & STZ induced diabetic rats. Decreased blood glucose levels of the test animals showed that the extract exhibited significant antidiabetic activity, when compared to diabetic control group. The results also indicated dose dependent effect. Vehicle control animals were found to be stable in their body weight, but diabetic rats showed significant reduction in body weight during 15 days. The effect of methanolic leaf extract of *Bauhinia purpurea* on glucose level in STZ induced diabetic rats exhibited a significant reduction ($P < 0.01$) in blood glucose level, when compared to the diabetic control group. The antidiabetic activity produced by the extract might be due to the increased uptake of glucose at the tissue level or due to an increase in pancreatic beta cell function or due to inhibition of intestinal absorption of glucose (PAHWA et al., 2012). Another investigation was carried out to study the antidiabetic effect of the methanolic extract of bark of *Bauhinia purpurea* in Streptozotocin induced diabetic model. The antidiabetic activity was evaluated in normal & Streptozotocin induced diabetic rats. Decreased blood glucose level of the test animals showed that the extract exhibited significant antidiabetic activity when compared to diabetic control group. The results also indicated dose dependent effect. The antidiabetic activity produced by the extract might be due to the increased

uptake of glucose at the tissue level or due to an increase in pancreatic beta cell function or due to inhibition of intestinal absorption of glucose (Pahwa et al., 2012).

Cardiotonic activity

The present study evaluated the cardiotonic activity of fresh flower juice, alcoholic and chloroform extracts of *Bauhinia purpurea* and to establish its mechanism of action. The selected flower extracts (fresh juice, alcoholic and chloroform extracts) produced a positive inotropic effect against normal and hypodynamic frog heart coupled with loss of potassium in a dose dependent manner. The standard drug digoxin showed dose dependent positive inotropic effect and loss of K⁺ ions (52.87±1.80ppm) at a dose of 300µg. The flower extracts (fresh juice 2, 20, 200mg; alcoholic extract 60, 600, 6000µg; chloroform extract 60, 600, 6000 µg) showed dose dependent percentage inhibition of Na⁺, K⁺ ATPase activity. The percentage inhibition of Na⁺, K⁺ ATPase activity of fresh, alcoholic, and chloroform extracts at a maximum dose was found to be 74.46±0.71%, 54.05±6.98% and 47.55±2.12% respectively. The standard drug digoxin showed percentage inhibition of Na⁺, K⁺ ATPase activity at a dose of 300µg was found to be 93.80±1.98. The order of percentage inhibition of Na⁺, K⁺ ATPase activity was found to be: Digoxin> fresh flower extract > alcoholic extract > chloroform extract. The present findings (inhibition of Na⁺, K⁺ ATPase activity and loss of potassium in hypodynamic heart) clearly indicated that the flowers of *Bauhinia purpurea* possess significant cardiotonic activity (Saikrishna et al., 2012).

Cytoprotective effects

The present study was undertaken to evaluate the protective effect of ethanolic extracts of *B. purpurea* ethanolic leaf extract (BPELE) against absolute ethanol-induced gastric mucosal damage in experimental rats. The rats were divided into four groups, respectively pre-treated orally with carboxymethyl cellulose solution (ulcer control groups), omeprazole 20 mg/kg (reference group), 250 and 500 mg/kg of BPELE (experimental groups) 1 h before oral administration of absolute ethanol to generate gastric mucosal damage. After an additional hour, the rats were sacrificed and the ulcer areas of the gastric walls were determined. The ulcer control group exhibited severe mucosal injury, whereas groups pre-treated with *B. purpurea* ethanolic leaf extract exhibited significant protection of gastric mucosal damage. These findings were also confirmed by histology of gastric wall. Significant increases in gastric mucus production and decrease in acidity of gastric content were observed in treated groups with BPELE compare to ulcer control group. These results concluded that the treatment with BPELE prior to absolute alcohol has significantly protect gastric mucosa as ascertained grossly by significant reduction of

ulcer area, increases in gastric mucus production and decrease the acidity of gastric content and histology by comparatively decreases in gastric mucosal damage, reduction or absence of edema and leucocytes infiltration of submucosal layer compared to ulcer control group. BPELE was able to decrease the acidity and increase the mucosal defense in the gastric area thereby justifying its use as an antiulcerogenic agent (Ismail, 2011).

Antioxidant activity

The present study was to determine the secondary metabolites and antioxidant activities of shade dried *Bauhinia purpurea* leaf aqueous extract. Quantitative analysis for total phenolics was done by Folin-ciocalteau method and total flavonoids by aluminium chloride method. Likewise, various antioxidant activities were assessed by following standard methods. The flavonoid content was higher ($160.0 \pm 6.9 \text{ mg/g}$) compared to phenolics ($126.66 \pm 6.11 \text{ mg/g}$). Similarly, the nitric oxide scavenging activity ($258.66 \pm 4.61 \text{ mg/g}$) and reducing power activity ($141.33 \pm 2.30 \text{ mg/g}$) was found to be higher compared to total antioxidant ($81.33 \pm 6.11 \text{ mg/g}$) and metal chelating activity ($30.66 \pm 2.30 \text{ mg/g}$). The results obtained reveal that *Bauhinia purpurea* leaf extract proves to be a good antioxidant and needs further characterization to confirm its diversified therapeutic applications (Vishal et al., 2009).

CONCLUSION

The present review supports the potential of the *Bauhinia purpurea* as a medicinal tree. In view of the nature of the plant, more research can be done to investigate the unexplored and unexploited potential of this plant.

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