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A review on biocompounds and pharmacological activities of *Bauhinia purpurea*

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Abstract
Bauhinia purpurea L. is a medicinal plant, which has been traditionally used for various ailments in different parts of India. The present study was focused on review of Medicinal plant of B. purpura. The aim of this study was to evaluate the Antinociceptive, Analgesic, and Antipyretic properties of aqueous extract of *Bauhinia purpurea* leaves in male Balb-C mice and Sprague-Dawley rats. The ethanolic extract of the leaves was evaluated for its anti-inflammatory, Anti-ulcer, Antiproliferative, Antihypertensive, Antipsychotic, Antiepileptic, Antifungal, and Antioxidant activities. The results showed that the extract showed significant inhibitory activity against methanol extracts, while less antibacterial activity was observed in hexane, acetone, and ethanol extract. The extract also showed significant antioxidant activity against six pathogenic and Non-pathogenic microorganisms: *Bacillus subtilis, Staphylococcus aureus, Salmonella typhi, Escherichia coli, Pseudomonas aeruginosa, and Candida albicans*. In conclusion, the present study is focused on the review of the medicinal plant of the plant, and it is concluded that the leaf extract of this plant can be used to treat various ailments.

Keywords: *Bauhinia purpurea*, flavonoids, antioxidant, nephroprotective, beta-sitosterol

Introduction

For thousands of years, herbal medicines have been an essential part of human healthcare, providing a wide range of treatments for different ailments. These organic substances, which come from plants, have been the mainstay of traditional medical practices for ages, spanning many nations and regions. The effectiveness, safety, and holistic approach to health and wellness of herbal treatments have led to a millennium of interest in them in recent years. Based on these evidences the present study was focused on review of Medicinal plant of *Bauhinia purpurea*.

Medicinal plants help people to live healthy and disease-free [1]. Due to the existence of natural chemicals. They are a primary source of compounds with therapeutic characteristics. Plants are utilized for various purposes such as food, wood, and medicine [2].

Bauhinia is a flowering plant genus in the Cercidoideae subfamily and Bauhinieae tribe of the Fabaceae family. It has a pantropical distribution. The genus was named for Swiss-French botanists Gaspard and Johann *Bauhin* [3]. *Bauhinia purpurea* is found throughout India and is native to south China and Southeast Asia [4]. *B. purpurea's* bark is ashy dark brown, and its leaves measure 7.5-15 cm. *B purpurea* flowers are remarkable in that they contain five pink, fragrant petals, the petals are 3.8-5 cm long, and the flowers produce brown, flat seed pods. The leaves are roughly 10-20 cm long, rounded, broad, alternating, and blobbed at the base and apex. *B. purpurea* also develops fruits in the form of pods, which are around 30 cm long and contain 12 to 16 seeds that resemble peas in shape [5].

Locals and tribal people in Tamil Nadu use *Bauhinia purpurea Linn* plant as an ethnomedicinal treatment for a variety of diseases. Bark of *Bauhinia purpurea Linn* is used as astringent and antidiarrheal. *Bauhinia purpurea Linn* Flower buds and flowers, fried in purified butter, are given to patients suffering from dysentery. Stem of *Bauhinia purpurea* extract is applied both inside and topically. Goitre is treated with plants. In test animals, it displays antithyroid-like activity [6].

It has been reported that the pharmacological significance was noted due to the presence of various bioactive compounds in the. *Bauhinia purpurea* contains major class of secondary metabolites like glycosides, flavonoids, saponins, triterpenoids, phenolic compounds, oxepines, fatty acids and phytosterols [7].

Vernacular Names [8, 9]

Kannada	Sarul, Basavanapada
Sanskrit	Vanaraja
Hindi	Kaniar
English	Orchid tree

Fig 1: Flower

Fig 2: Leaves

Geographical Distribution

Bauhinia purpurea Linn is an ornamental, medium sized deciduous tree belongs to the family Fabaceae [2]. *Bauhinia purpurea* originated in south China and Southeast Asia and is now distributed throughout India [4]. It can be found in Florida, southern Texas, and coastal California in the United States. ascending to an altitude of 1300 m in the Himalayan, In India's western track and sub-Himalayan region, *Bauhinia purpurea* is a somewhat evergreen tree. In India's western track and sub-Himalayan region, *Bauhinia purpurea Linn* is a somewhat evergreen tree [8].

Taxonimical Classification [10]

Kingdom	Plantae.
Division	Magnoliophyta.
Class	Magnoliopsida
Order	Fabales
Family	Fabacaea
Sub Family	Caesalpinioideae
Genus	Bauhinia
Species	*Bauhinia purpurea*

Morphological Characters

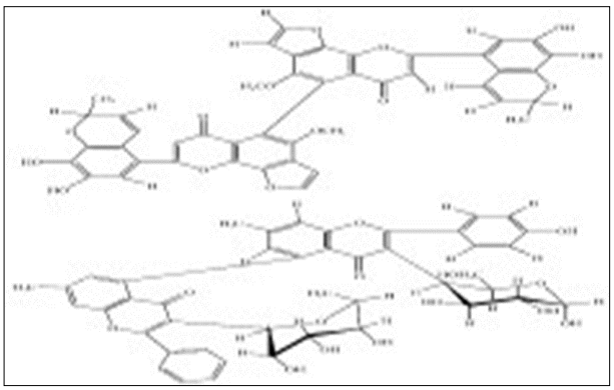
Bauhinia purpurea Linn is a small to medium-sized tree with dark brown bark that grows quickly, reaching a height of around 17 meters. The leaf is 7.5–15 cm long, bilobed, and similarly wide. Its surfaces are smooth and glabrous, and its edge is complete. The five-petaled, pink, fragrant blossoms are striking. Brown, strap-shaped, non-septate, dehiscent pods make up the fruit. It is 15–30 cm long and up to 1.5–2.5 cm wide, with 10–15 shiny-brown, flat, spherical seeds inside [11]. The bark is virtually smooth, ashy to dark brown, and young growth is brown-pubescent. The leaves are long, cleft about half way down into 2 acute or rounded bilobed very minutely pubescent beneath when young, base usually cordarte, 9-11 nerved [8].

Floral Character

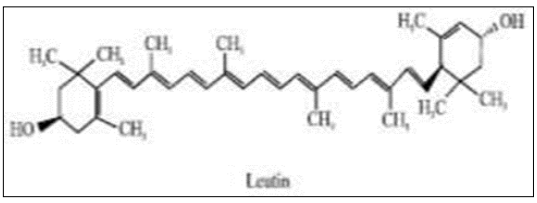
- The flowers are large, fragrant, and lovely purple, pink, lavender, crimson, or blue orchid-like blossoms, conspicuous with five petals that are prized as well as for their medicinal properties.
- Pedicels 5-13 mm long, stout, tementose, bract and bracteoles small tementose, deltoid. Calyx tementose, tube 7.5-10 mm long, limb long as the tube.
- Petals 3.8 to 5 cm long, oblanceolate, long clawed, spread veined.
- Stamens usually 3 fertile, others reduced to antherless filaments. Ovary downy, long-stalked; style long; stigma large, oblique. Pod 15-25 by 1.5-2 cm on a tementose stipe 1.5 to 2.5 cm long, linear, flat, pointed, greenish, tinged with purple till ripe, late in dehiscing. Seeds 12-15 suborbicular, flattened, 1.3 cm. wide and dark brown smooth [2, 12].

Phytochemistry

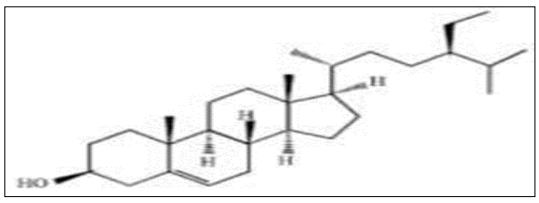
- The *Bauhinia purpurea Linn* tree's flowers, roots, stem and bark have been utilized in Ayurvedic medicine formulations [13].
- When evaluated quantitatively, the plant stem from *Bauhinia purpurea Linn*. Contains nutrients, secondary metabolites, and exhibits good antioxidant activity and serves as a foundation for pharmacological applications [14]. the seeds of *Bauhinia purpurea* were rich in calcium and iron, chalcone glycosides.9
- Three glycerol derivatives and 6- butyl-3-hydroxyflavanone derivatives are 2, 3dihydroxypropyl oleate, 2,3 dihroxypropyl linoleate, 2,3- dihydroxy propyl 16-hyroxydecanoate and 6-butyl-3-hydroxyflavanone, 6-(3' -oxobutyl) taxifolin respectively isolated from methanolic extract of heartwood of *Bauhinia purpurea Linn.* The 70% aqueous acetone extract of *Bauhinia purpurea Linn* leaves contains two new dimeric flavonoids namely bis[3',4'-dihydroxy-6-methoxy-7,8-furano-5',6'-monomethylalloxy]-5-C-5-biflavonyl and (4'-hydroxy-7-methyl 3-C-a-L-rhamnopyranosyl)-5-C-5-(4'-hydroxy-7- methyl-3-C-a-Dglucopyranosyl) bioflavonoid, and rich with proteins [8].
- The *Bauhinia purpurea Linn* flowers contains volatile oils, monoterpenes (e.g., a-terpinene, limonene, myrcene, linalool, citronellyl acetate) and a phenylpropanoid (eugenol). The fresh flower of *Bauhinia purpurea Linn* gives flavonoid quercetin, isoquercitin, glycosides, astragalin, proteins, anthocyanins [8, 9].



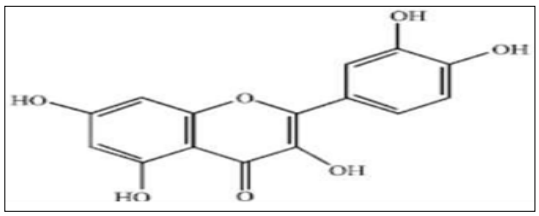
Structure of dimeric flavonoids



Structure of Lutein



Structure of beta-sitosterol



Structure of Quercetin

Fig 3: Chemical constituents of *Bauhinia purpurea*

Traditional Uses [15]

1. *B. purpurea* is a traditional medicinal used to cure wounds, sores, and diarrhoea. In India, *B. purpurea* has been used to treat ulcers, stomach tumours, fever, glandular swelling, and goitre's.
2. *B. purpurea* leaves were commonly used to cure wounds. *B. purpurea* is used in traditional medicine because to its antifungal, antimalarial, and cytotoxic effects. It is often used to treat inflammation, epilepsy, and convulsions.
3. The plant's stems, leaves, and roots are traditionally used to cure pain, infections, jaundice, diabetes, cough, and leprosy.
4. *B. purpurea* is commonly used to treat rheumatism, pain, dropsy, delirium, septicaemia, and convulsions. This plant is commonly used in traditional medicine to treat pain, digestion issues, fever, and stomach cancer

Pharmacological Activities

Anti-inflammatory activity

To evaluate anti-inflammatory activity of ethanolic extract of *Bauhinia purpurea* bark in Sprague Dawley rats. They evaluated the effects of carrageenan on paw edema and air pouch inflammation, arachidonic acid on ear edema, and Freund's adjuvant on haematological changes in both control and experimental rats. Ethanolic extract of *Bauhinia purpurea* bark by using different concentration of 200mg, 400mg, 600mg/kg body weight shows significant effect in inhibition of paw and ear edema and restored haematological changes to near-normal levels [16].

Nephroprotective Activity

This research project was conducted to evaluate the ethanol extract of *Bauhinia purpurea* leaves and unripe pods. Nephrotoxicity can be induced by using Gentamicin 100 mg/kg/day was administered intraperitoneally for eight days to Wistar rats. Each study group consisted of six rats in each group. Effect of concurrent administration of ethanol extract of leaves of *Bauhinia purpurea* and unripe pods of *Bauhinia purpurea* at a dose of 300 mg/kg/d given by oral route was determined using serum creatinine, serum uric acid, blood urea nitrogen and serum urea as indicators of kidney damage. The extracts reversed gentamicin-induced increases in serum creatinine, uric acid, and blood urea nitrogen levels. This is also supported by histological research [17].

Anti Diabetic Activity

The Effect of Ethanolic Extract and Purified Fraction-1 of *Bauhinia purprea* on Alloxan induced Diabetic Rats. The extract and fraction-1 showed anti-diabetic effects in alloxan induced diabetic rats, as evidenced by serum glucose levels. The presence of flavonoids, which inhibit cyclooxygenases and stimulate β-cell regeneration, may contribute to the hypoglycaemics activity, in addition to insulin secretion properties. The current investigation found that ethanolic extract and fraction-1 have significant hypoglycaemics activity ($P < 0.001$) [18].

The effect of a methanolic extract of *Bauhinia purpurea* bark on Streptozocin-induced diabetic rats: Streptozocin (50 mg/kg, i.p) increased fasting blood glucose levels significantly and remained elevated for two weeks. Two weeks of daily treatment with a methanolic extract of *B. purpurea* resulted in a dose-dependent reduction in blood sugar levels. Diabetic rats experienced considerable weight loss over 15 days, but vehicle control animals remain steady. As Observed that, there is significant reduction in blood glucose level in drug treated animals when compared to the diabetic control group [19].

Antinociceptive, Analgesic, and Antipyretic Activity

This research work demonstrated that effect of aqueous extract of *B. purpurea* leaf has antinociceptive, analgesic, and antipyretic properties in Male Balb-C mice and Sprague Dawley rats. The crude dried extract was tested in dosages of 6.0, 30.0, and 60.0 mg/kg. The researchers employed antinociceptive (abdominal constriction, hot plate, and formalin tests) and antipyretic (brewer's yeast-induced pyrexia test) tests. The 6.0 mg/kg aqueous extract of *B. purpurea* leaf demonstrated the best antinociceptive efficacy. Antipyretic efficacy was dose independent at concentrations of 6.0 and 30.0, with the former outperforming 100 mg/kg ASA [20].

Hepatoprotective Activity

The methanolic extract of *Bauhinia purpurea* leaves was Studied for their hepatoprotective effect in paracetamol induced liver toxicity in rat. rats are divided into five group(n=6) was administered orally with 10% Dimethyl sulfoxide (negative control), 200 mg/kg silymarin (positive control), or methanolic extract of *Bauhinia purpurea* leaves (50, 250 and 500 mg/kg) for 7 days. Pre-treatment with 500 mg/kg shows significantly Reduced the increased liver and body weight seen in the PCM-treated liver group. Methanolic extract of *Bauhinia purpurea* leaves High dose and silymarin effectively counteract Paracetamol toxic effect by decreasing ALT, AST, and ALP serum marker levels in a group pre-treated with 10% DMSO.

The extract showed antioxidant activity and high phenolic content, indicating potential hepatoprotective activity. methanolic extract of *Bauhinia purpurea* leaves antioxidant activity and high total phenolic content suggest further investigation into its potential benefits [21]. Male Sprague-Dawley rats (n = 6) were pre-treated once daily (p.o.) with Choroform extract of *Bauhinia purpurea* (50-500 mg/kg) for seven days before being given a hepatotoxic substance (3 g/kg Paracetamol) orally. The collected blood was used to assess liver enzyme levels, while the collected liver was utilized to determine endogenous antioxidant enzyme activity and to perform histological analysis. Choroform extract of *Bauhinia purpurea* was submitted to radical scavenging assays and phytochemical analysis. Choroform extract of *Bauhinia purpurea* significantly reduced Paracetamol toxic effect by increasing serum AST and ALT levels, catalase and SOD activity, and reducing liver weight/body weight ratio. It also showed high antioxidant capacity and flavonoids presence [23].

Anti- Ulcer Activity

The study investigated the anti-ulcer activity of a methanol extract of *Bauhinia purpurea* leaf in rats. Results showed no signs of toxicity at a dose of 5,000 mg/kg, and anti-ulcer activity was observed in all models tested. Methanol extract of *Bauhinia purpurea* leaf showed significant anti-ulcer activity in a dose-dependent manner, with dose-dependent reductions of gastric lesion development at 500 and 1,000 mg/kg, with protection ranging from 70 to 80%.

Methanol extract of *Bauhinia purpurea* leaf showed significant anti-ulcer activity in treating Indomethacin-

Induced Gastric Ulceration, with reductions in total ulcer area of 31.6, 50.8, and 47.4% compared to the control group.

Methanol extract of *Bauhinia purpurea* leaf showed anti-ulcer activity, reducing total ulcer area by 40-83% compared to the control group. It also increased gastric juice volume, pH, and acidity. Methanol extract of *Bauhinia purpurea* leaf doses 500 and 1,000 mg/kg significantly increased gastric wall mucus content by two-fold compared to the control group [22].

The study involved rats given chloroform extract of *Bauhinia purpurae* leaves orally after fasting, and tested for gastric ulcer and pyloric ligation. The extract showed no toxicity at 5000 mg/kg, showed dose-dependent antiulcer activity, increased gastric wall mucus production and pH, and reduced gastric content volume and acidity in the pylorus ligation assay [35].

Amelioration of Hyperthyroidism

The ethanolic leaf extract of *B. purpurea* was studied using a model of albino wistar rats. A 12day administration of LT_4 inducing agent (0.5 milligram per kilogram) results in an increase in blood triiodothyronine levels, a decrease in thyroid stimulating hormone concentrations, and a concentration of thyroxine. All alterations were reversed when *B. purpurea* extract (100 mg/kg) was concurrently administered to LT-induced hyperthyroid rats, demonstrating the plant's potential for managing hyperthyroidism. According to reports, the drug's effectiveness was comparable to that of the reference medication, propylthiouracil. Additionally, *B. purpurea* was given daily for 20 days at a dose of 2.5 mg/kg, which raised serum T_4 concentration and O_2 consumption, indicating a potential function for the bacteria in hyperthyroidism [24].

Cardiac Activity

After analysing the purified fraction-I of the ethanolic extract of the stem of *B. purpurea*, researchers discovered that the fraction-I had a positive inotropic and chronotropic effect on the heart of an isolated frog. Propranolol, a ß adrenergic blocker, inhibits its activity. The isolated compound's structural structure is now being characterized [18].

Wound Healing Activity

The wound healing characteristics of chloroform and methanol extracts from *B. purpurae* leaves were evaluated using four models: excision, incision, burn, and space wound. A low dose of 2.5% (w/w) chloroform and methanol extracts were administered topically to excision, incision, and burn wound models with hydrophilic and hydrophobic bases, respectively. Aloe Vera 5% (w/w) was utilized as the standard. For the dead space wound model, 100 and 500 mg/kg of Aloe vera were administered orally, with a normal dose of 300 mg/kg. In all four wound healing models, *B. purpurea* performs similarly to Aloe vera [25].

Toxic Effect of *Bauhinia purpurea* Mediated Synthesized Silver Nanoparticles against *Invitro* and *In-vivo* Models

Metal nanoparticles, including those of gold, silver, and other metals, are widely used and have a number of advantages. However, there are currently worries regarding the potential exposure to different living systems and the impact on the environment. Therefore, plant gum from *Bauhinia purpurea* was used in this study to synthesis silver nanoparticles, and various techniques such as UV-Visible Spectroscopy, Scanning Electron Microscopy, and X-ray Diffraction were used for their evaluation. Microscopic inspection, histology, and Inductively Coupled Plasma Optical Emission Spectrometry were employed to assess the accumulation and harmful effects of the produced silver nanoparticles on Eudrilus eugeniae, Danio rerio, and their embryos [26].

***Bauhinia purpurea* L. Flower Mediated Dye used as Sensitizers for TiO_2 Based Dye Sensitized Solar Cells**

Because organic dyes are numerous, eco-friendly, and have cheap production costs, they have emerged as a competitive alternative to costly natural sensitizers. The performance of a dye sensitized solar cell (DSSC) sensitized by a natural sensitizer of *Bauhinia purpurea* L. is examined in this study. extract of floral dye. The dyes have demonstrated considerable adsorption onto the semiconductor (TiO2) surface as well as absorption across a wide range of the visible region (341 nm) of the solar spectrum. The DSSCs created with the extracted dye had a fill factor (FF) of 0.64, an open circuit voltage (Voc) of 0.7 V, and a current short circuit (Jsc) of 1.4 mA [27]

Fibro lytic Effect

The left half of the mammary gland tissue displayed an excess of fibrous tissue proliferation along with a disarray of the alveolar structures, while the right half displayed an extensive proliferation of fibrous tissue in the mammary gland after intra-abdominal inoculation with 2000 colony-forming units (c.f.u.) of Staphylococcus aureus. On the other hand, in chronic mastitis, oral dosage of *Bauhinia variegates* L. bark powder at 6 gm/kg for 7 days and 3 gm/kg for an additional 7 days showed reduction of fibrous tissue. Because of its fibrolytic effect— which was not previously documented—the bark powder of *Bauhinia purpurea* L. at 6g/kg orally once daily enhanced the bioavailability of ceftriaxone and/or ceftizoxime in milk. Consequently, the fibrolytic effect of *Bauhinia purpurea* L. bark powder may be able to slow the growth of cancer [28].

Antilithiatic Activity

The main purpose of this study was to investigate the impact of ethanolic concentrate of *Bauhinia purpurea* L. leaves on lithiatic action in rat. Twenty-four rats were divided into 6 groups comprising four animals per groups. The blood was collected from the retro-orbital sinus; serum was separated by centrifugation and analysed for creatinine and uric acid. Both kidneys from each animal were removed and sectioned for histopathological examination. The results were expressed as mean ± standard error mean (SEM) and the statistical significance was assessed using one-way analysis of variance (ANOVA) followed by Dunnett's comparison test and $p<0.05$ was considered significant. In the present *in-vivo* study, renal stone inciting treatment to rodents came about in hyper-oxaluria. The study tested the antilithiatic action of *B. purpurea* L. ethanolic concentrate in rodents using ethylene glycol as a lithiasis specialist. The concentration of 100 mg/kg showed a significant decrease in calcium, oxalates, and creatinine in blood serum levels. The ethanolic concentrate showed a weak antilithiatic movement, correlated with cystone, indicating its potential for treatment [29].

Anti-helminthic activity

To study the anthelmintic activity of different solvent extract of flower of *Bauhinia purpurea* L. using Indian earthworms *Pheretimaposthuma* as test worm. In the bioassay, several quantities of extracts were tried, and the worm's paralysis and death times were determined. Piperazine citrate (30mg/ml) served as a reference standard. The studied extracts shown mild to moderate antihelmintic efficacy. The study found that ethyl acetate and methanol extracts caused considerable paralysis and mortality of worms. The aqueous extract of *Bauhinia purpurea* L. flower shown effective antihelmintic action [30].

Antipsychotic activity

The study investigates the extraction and isolation of Isoflavonoids from *Bauhinia purpurea* stem bark and their antipsychotic properties. Flavonoids are abundant medicinal herbs with excellent pharmacological activities. The isolated compound had a carbon and hydrogen content of 71.485% and 4.718%, respectively. The UV spectrum showed two bands characteristic of flavones, and LC/MS studies revealed a strong molecular peak at m/z 470.

The dose with 100 mg/kg i.p of *Bauhinia purpurea*(L) ethanolic extract revealed some effect on reduction in the conditioned avoidance response (CAR) which in turn the test animals failed to climb the pole [31].

Anti-bacterial Activity

The study presents an eco-friendly, rapid, and simple method for synthesizing silver nanoparticles (AgNPs) using *Bauhinia purpurea* flower extract as a non-toxic bio reducing agent. The spherical AgNPs were confirmed using various spectroscopy and evaluated for antibacterial activities against *Klebsiella* and *Staphylococcus sp.* The study found that biosynthesized AgNPs effectively countered bacterial growth against *Klebsiella sp*. and *Staphylococcus sp*. at a concentration of 6 mM, with silver cations causing protein denaturation, plasma membrane rupture, ATP depletion, and cell death [32].

Cytotoxicity Activity

The methanol extract of bark and n-hexane fractions of leaves had the maximum brine shrimp lethality, with an LC_{50} value of 0.357µg/m. This is followed by n-hexane. Bark and ethyl acetate portions of leaves showed LC_{50} values of 0.385 and 0.625 µg/ml, respectively. The ethyl acetate extract of bark had the lowest lethal activity, with an LC_{50} value of 0.882 µg/mL the current study's findings regarding the lethality of bark on brine shrimp are inconsistent.

The brine shrimp lethality bioassay reveals cytotoxic activity in human solid tumors and pesticidal activity, leading to the discovery of new natural pesticides and active antitumoral agents, possibly due to cell growth, mitotic activity, differentiation, and function [33].

Anti-obesity Activity

The study examined how an ethanolic extract of *Bauhinia purpurea* (EEB) affected body weight, lean mass, fat free mass, fat percent, tissue and plasma lipid profiles, plasma glucose, insulin, and insulin resistance, as well as the activity of amylase, lipase, leptin, and adiponectin in HCD-induced obese rats. After inducing obesity with HCD, rats were given EEB (100, 200, and 300 mg·kg−1 BW) or orlistat (5 mg·kg−1 BW) once daily for 42 days. HCD significantly increased body weight, fat free mass, fat percent, glucose, insulin resistance, tissue and plasma lipid profiles (except HDL), leptin levels, and amylase and lipase activities. At a dose of 300 mg·kg−1 BW, EEB reduced body weight, insulin resistance, glucose, leptin, plasma and tissue lipids, lipase, and amylase while increasing HDL and adiponectin in HCD fed obese rats. This could be due to bioactive factors in EEB, as revealed by LC-MS analysis. EEB may be a promising treatment for obesity and related consequences due to its ability to reduce high caloric diet-induced obesity [34].

Antimicrobial Activity

The study investigated the antimicrobial activity of a leaf extract from *B. purpurea*, a plant, against six pathogenic and Non-pathogenic microorganisms: *Bacillus subtilis, Staphylococcus aureus, Salmonella typhi, Escherichia coli, Pseudomonas aeruginosa and Candida albicans.* The extract showed significant inhibitory activity against methanol extracts, while less antibacterial activity was observed in hexane, acetone, and aqueous extracts. The extract contained eleven compounds, including lupeol, stigmasterol, lanosterol, ergosterol, betatocopherol, phytol, hexadeconic acids, hexadeconic acids methyl esters, octadecadienoic acids, and octadecatrienoic acid. Stigmasterol and lupeol were the most abundant, followed by lanosterol and ergosterol. The extract showed no inhibition against Gram-negative *S. typhi, E. coli and P. aeruginosa or against fungus C. albicans* [36].

Anti-oxidant Activity

This study compared the antioxidant activity of *Bauhinia purpurea* L. plant parts. The plant's leaves and bark were tested for 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging and NO scavenging capacity. Solvent partitioning was used to create extracts with varying polarity, including n-hexane, ethyl acetate, and methanol extract. All The extracts demonstrated high antioxidant activity in terms of DPPH and NO scavenging capacity. For DPPH radical scavenging, ethyl acetate extract of bark had the maximum activity (1.08 µg/mL), followed by n-hexane extracts of bark and leaves (2.40 and 3.07 µg/mL, respectively). The IC_{50} result for standard ascorbic acid was 33.77 µg/mL. The ethyl acetate extract of leaves demonstrated the strongest NO scavenging activity, with IC_{50} values of 1.04 µg/mL. The n-hexane and ethyl acetate extract of bark had IC_{50} values of 1.92 and 2.04 µg/mL, respectively. The IC_{50} value for standard ascorbic acid was 71.06 µg/mL [37].

Anti-diarrheal Activity

The ethanolic extract of *B. purpurea* leaves was tested for anti-diarrheal properties in rats using castor oil-induced diarrhea and gastrointestinal motility. Test with charcoal food. The extracts at dosages of 100, 200, and 300 mg/kg shown substantial efficacy relative to the standard in both models. The study concluded that the herb has established its folkloric claim [38].

Anti-epileptic (Anticonvulsant)

Ethanolic extract of *B. purpurea* leaves. The ethanolic extract of *B. purpurea* was tested for antiepileptic action on

Swiss Albino mice using the PTZ (pentylenetetrazole-induced seizure) and MEZ (maximum electric shock) models at varying doses. The anticonvulsant activity was demonstrated by a considerable reduction in the duration of epileptic episodes such as flexion, extension, convulsions, and stupor [39].

Anti-cancer Activity

Four novel components from *B. purpurea* roots, stems, pods, and leaves were extracted and identified as dibenzo [b, f] oxepins (2a, 3-5). These four chemicals significantly inhibited the development of human cancer cells. Bauhinia statins 1-(2a) showed capacity to inhibit P388 cancer cell growth. New statin structures were determined using Mass Spectroscopy and 2D NMR [40].

Hormone regulation

Aqueous alcoholic bark extract of *B. purpurea* (2.5 mg/kg body weight) and aqueous root extract of *Withania somnifera* (1.4 g/kg body weight) were administered daily for 20 days to stimulate thyroid activity in female mice. Plant extracts increased hepatic glucose-6phosphatase (G-6-Pase) activity and antiperoxidative effects, resulting in decreased lipid peroxidation (LPO) and increased antioxidant enzyme activity. *Bauhinia Withania* considerably enhanced serum triiodothyronine (T3) and thyroxine (T4) concentrations, but solely elevated serum T4 levels [41].

Table 1: Pharmacological activities of *Bauhinia purpurea*

Sl. No	Part of The Bauhinia purpurea	Extract of the plant part	Activity	Animals/Microorganisms used	References
01	Bark	Ethanolic extract	Anti-inflammatory activity	Sprague Dawley rats	Hari B *et al.*,2012 [16].
02	Leaves and unripe pods	Ethanolic extract	Nephroprotective Activity	Wistar rats	Lakshmi BVS *et al.*,2009 [17].
03	1. Stem 2. Bark	1. Ethanolic extract. 2.Methanolic extract	Anti Diabetic Activity	Wistar Rat	1) Murali Krishna IQS *et al.*,2008. 2) Pahwa S *et al.*,2012.
04	Leaf	Aqueous extract	Antinociceptive, Analgesic, and Antipyretic Activity.	Male Balb-C mice and Sprague-Dawley rats	Kassem FF *et al.*,2013 [20].
05	Leaf	Methanolic extract	Hepatoprotective Activity.	Wistar rats	Yahya F *et al.*,2013 [21].
06	Leaf Leaf	Methanolic extract chloroform extract	Anti- Ulcer Activity	Wistar rats	Zakaria ZA *et al.*,2012 [22]. Hisam EEA *et al.*,2012 [22]
07	Leaf	Ethanolic extract	Amelioration of Hyperthyroidism	Albino wistar rats	Panda S *et al.*,2003 [24].
08	Stem	Ethanolic extract	Cardiac Activity	Wistar Rat	Murali Krishna IQS *et al.*,2008.
09	Leaves	chloroform and methanol extracts	Wound Healing Activity	--------	Ananth *et al.*,2010 [25].
10	Flowers	----------	Dye	----------	Sudhakar C *et al.*,2016 [27].
11	Bark	Ethanolic extract	Fibrolytic Effect	Staphylococcus aureus	Dash JR *et al.*,2019 [28].
12	Leaves	Ethanolic extract	Antilithiatic Activity	Wistar Rat	Chanchal DK *et al.*,2020 [29].
13	Flowers	Different solvents extract	Anti-helminthic activity	*Pheretimaposthuma*	Ramana H *et al.*,2017 [30].
14	stem bark	Ethanolic extract	Antipsychotic activity	Wistar Rat	Shamala T *et al.*,2022 [31].
15	Flowers	Silver nanoparticles	Antibacterial Activity	*Klebsiella* and *Staphylococcus sp*	Chinnappa S *et al.*2017.
16	Bark and Leaves	Methanol extract nhexane fractions	Cytotoxicity Activity	human solid tumors	Fatima Urmi K *et al.* 2013 [33].
17	Leaves	Ethanolic extract	Anti-obesity Activity	Wistar Rat	Padmaja TK *et al.* 2014 [34].
18	Leaves	ethanolic extract	Antimicrobial Activity	*Bacillus subtilis, Staphylococcus aureus, Salmonella typhi, Escherichia coli, Pseudomonas aeruginosa and Candida albicans*	Negi B *et al.* 2012 [36].
19	Bark and leaves	n-hexane, ethyl acetate, and methanol extract	Anti-oxidant Activity	DPPH Method.	Urmi KF *et al.*, 2013 [33].
20	Leaves	ethanolic extract	Anti-diarrheal Activity	Wistar Rat	Mukherjee PK *et al.*,1998 [38].
21	Leaves	Ethanolic extract	Anti-epileptic (Anticonvulsant)	Swiss Albino mice	Joshi VD *et al.*,2011 [39].
22	Roots, stems, pods, and leaves	Dibenzo [b, f] oxepins	Anti-cancer Activity	P388	Pettit GR *et al.*,2006 [40]
23	Bark	Aqueous alcoholic	Harmone Regulation	Swiss Albino mice	Panda S *et al.*,1999 [41].

Conclusion

The focus of this study was on reviewing the medicinal plant *Bauhinia purpurea*, which has been traditionally used for various ailments in different parts of India. The plant belongs to the Fabaceae family and is known for its effectiveness in treating a variety of diseases. Various

bioactive compounds have been identified in the plant, such as glycosides, flavonoids, saponins, triterpenoids, phenolic compounds, oxepines, fatty acids, and phytosterols. The plant has demonstrated pharmacological activities such as anti-inflammatory, nephroprotective, antidiabetic, antinociceptive, analgesic, antipyretic, hepatoprotective, anti-ulcer, antihyperthyroidism, cardiac activity, wound healing, antimicrobial, fibrolytic, antilithiatic, antihelmintic, antipsychotic, cytotoxicity, anti-obesity, antioxidant, anti-diarrheal, antiepileptic, anti-cancer, and hormone regulation activities. The plant extract has shown promising results in various animal models, indicating its potential for use in the treatment of human ailments. Further research is needed to explore the full potential of *Bauhinia purpurea* as a medicinal plant.

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