Review Paper:

Potential of *Bauhinia variegata* as a Phytomedicine for the Management of Polycystic Ovary Syndrome (PCOS) A Comprehensive Review

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Abstract

Bauhinia variegata L., a medicinally significant tree native to South and Southeast Asia, has been traditionally employed in various indigenous healing systems. This review presents a critical appraisal of its therapeutic potential, highlighting its bioactive constituents and pharmacological relevance in modern healthcare. Multiple plant parts of B. variegata are rich in phytochemicals such as flavonoids, terpenoids, alkaloids and glycosides. Notable compounds include kaempferol-3-O-D-glucoside, hesperidin and pyranoside from the bark, isoquercitrin, rutin and bauhinione from the stem and β-diol derivatives and heptatriacontane from the leaves. These constituents are associated with a diverse range of bioactivities including antioxidant, antimicrobial, anti-inflammatory, hypoglycemic, neuroprotective and nephroprotective effects.

Additionally, five recently identified compounds from the roots: β-sitosterol, piperine, piperolein B, retrofractamide A and dehydropipernonaline, have demonstrated selective cytotoxicity, particularly against MCF-7 breast cancer cells. Among its potential therapeutic roles, B. variegata shows promise in addressing polycystic ovary syndrome (PCOS), a multifactorial endocrine disorder affecting female reproductive health. Evidence from traditional formulations suggests its capacity to modulate hormonal activity and reduce associated symptoms. In conclusion, Bauhinia variegata holds significant value as a phytotherapeutic agent. Its broad pharmacological spectrum and traditional relevance warrant further experimental and clinical validation for integration into evidence-based medicine.

Keywords: *Bauhinia variegata*, polycystic ovary syndrome (PCOS), phytochemicals, medicinal plant.

Introduction

Bauhinia variegata is indigenous to the temperate and tropical Indian subcontinent including China, Laos, Myanmar, Vietnam and Pakistan, as well as Bhutan, Nepal and Southeast Asia. It is a 15-meter-tall deciduous tree. When young, its branches are grey and puberulent; later, they turn glabrous[29]. It is a key component of numerous Ayurvedic polyherbal formulas including Vidangarishta, Ushirasava and Kanchanara Guggulu. It possesses a wide range of phytochemical constituents, which are responsible for its exceptional therapeutic properties including antimicrobial, antitumor, anti-diabetic, hepatoprotective, immunomodulatory, haemagglutination, antioxidant, antigoitrogenic and nephroprotective effects[23].

Polycystic Ovary Syndrome (PCOS) is a hormonal disorder affecting 50-70% of women. Insulin resistance is a significant aspect of PCOS, leading to hyperinsulinemia, weight gain and irregular menstrual cycles. A major component of PCOS is insulin resistance, which can result in hyperinsulinemia, weight gain and irregular menstrual periods. Increased androgen production from the ovaries is stimulated by elevated insulin levels, leading to symptoms such as hirsutism, acne and hair loss on the scalp. Insulin resistance is made worse by obesity, especially central obesity, which raises the risk of metabolic syndrome and cardiovascular disease. Management includes prescription drugs like metformin, hormonal birth control and dietary and activity modifications. Increased risk of type 2 diabetes, gestational diabetes and cardiovascular illnesses is among the long-term health effects.

Drugs made from plants have a bright future in the treatment of Polycystic ovary (PCOS) since they work steadily and have few adverse effects. In addition to regulating the menstrual cycle without changing hormone levels, herbal medicines also increase bodily immunity[10]. Kanchanar Guggul, a Sanskrit term meaning 'protect from diseases', is used to treat various conditions like PCOS, uterine cysts, joint pains and hormone imbalances. It contains a combination of herbs like black pepper, varuna, long pepper, cardamom, *Bauhinia variegata* and triphala[46]. Ovarian cysts have traditionally been treated using an Ayurvedic combination of herbs, including *Bauhinia variegata* and guggul, which also help with weight loss[28]. In addition to conventional medications, a number of herbal plants including *Cimicifuga racemosa*, *Asparagus racemosus*, *Saraca asoka* and *Moringa olifera*, have demonstrated benefit in treating PCOS. Herbal plant therapy is an alternative to conventional therapy for PCOS. The medicinal

plant *Bauhinia variegata* is abundant in bioactive substances, including pyranoside, hesperidin and kaempferol-3-O-D-glucoside (bark); isoquercitrin, rutin, myricetol glycoside and bauhinione (stem) and derivatives of heptatriacontane and β-diol (leaves).

These phytochemicals contribute to various therapeutic effects including hemagglutinating (seeds), hypolipidemic (root, stem bark), haematinic and immunomodulatory (stem bark), nephroprotective, neuroprotective and antioxidant (root, flower) activities. Furthermore, there are significant antibacterial and anticarcinogenic qualities in the leaf, stem and root bark[18,41]. Five novel bioactive compounds from the roots of *Bauhinia variegata* Linn. including β-sitosterol, piperine, piperolein B, retrofractamide A and dehydropipernonaline, have also been identified in a recent study. These compounds exhibit significant cytotoxic activity against human cancer cell lines, with compound 5 specifically affecting MCF-7 cells, suggesting potential therapeutic applications[15].

Significant biological activity is demonstrated by *Bauhinia variegata* extracts, with methanolic leaf and bark extracts exhibiting strong antioxidant capacity. Extracts from the stem and roots demonstrated strong antiproliferative activity against MCF-7 breast cancer cells and over 90% death in brine shrimp lethality tests. Additionally, they demonstrated strong antidiabetic effects by blocking alpha-amylase and modest antibacterial and antifungal properties[16]. The hydroethanolic extract of *Bauhinia variegata* (HEBV) has demonstrated significant antileishmanial activity, causing cell cycle arrest at the sub-G0/G1 phase. This underscores the therapeutic potential of *B. variegata*, a plant renowned in traditional medicine systems like Ayurveda for its diverse pharmacological properties[17].

The objective of this review is to investigate and to assess *Bauhinia variegata's* potential as a medication for treating polycystic ovarian syndrome (PCOS). This entails looking into the pharmacological properties of the plant, its main bioactive components and its historical medical applications, especially in relation to treating PCOS symptoms and restoring hormonal balance. The goal of the review is to present a thorough understanding of the phytomedicine *Bauhinia variegata* and its possible uses in contemporary medicine.

For the prospective use of *Bauhinia variegata* as a phytomedicine, an exhaustive exploration across PubMed/MEDLINE, Google Scholar and Web of Science was conducted utilizing keywords such as "*Bauhinia variegata*," "phytomedicine," "herbal medicine," and "therapeutic potential." This comprehensive search strategy aimed to gather relevant research concerning the medicinal properties and potential therapeutic applications of *Bauhinia variegata*. Emphasizing peer-reviewed journals and systematic reviews, the search encompassed English-language publications spanning the past decade. Data extraction focused on specific aspects including botanical characteristics, phytochemical composition, pharmacological activities, clinical evidence and potential therapeutic synergies.

A meticulous analysis of the collected data aimed to discern patterns, emerging trends, gaps in knowledge and potential contradictions within the literature, thereby contributing to a comprehensive understanding of *Bauhinia variegata's* prospective role as a phytomedicine.

Various Biological activities of *Bauhinia variegata*

The study of plant-based natural therapies has drawn more attention from the pharmacological and medical communities. *Bauhinia variegata* is one such plant that has attracted interest due to its numerous therapeutic uses. Its therapeutic potential for a range of health issues has been revealed through numerous investigations. *Bauhinia variegata* has a multitude of botanical properties including antioxidant, antibacterial, hypoglycemic, anti-inflammatory, immunomodulatory, anticancer and nephroprotective effects (Figure 1). The plant's multifaceted therapeutic potential positions it as a valuable candidate for developing novel treatments for leishmaniasis and other health conditions[21].

This thorough analysis sheds light on *Bauhinia variegata's* promising function in traditional medicine and pharmaceuticals by summarising the substantial research undertaken on the plant.

Antioxidant Activity of *Bauhinia variegata*: Research has shown that *B. variegata* may contribute to pharmaceutical products that improve human health by supporting the antioxidant defence mechanism in preventing the production of free radicals[43]. Chemotaxonomic identification is required for the several *B. variegata.* plant sections that are employed in traditional medicine. Stigmasterol, kaempferol, protocatechuic acid and protocatechuic acid methyl ester were all found in the bark according to the current study, which also found that they were both potent antioxidants and cytotoxic phytochemicals.

Antimicrobial and Antifungal Activity of *Bauhinia variegata*: Ethanolic extracts of *Bauhinia variegata* have exhibited significant antibacterial properties against a range of pathogenic bacterial strains including *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pyogenes* and *Proteus mirabilis.* These findings substantiate the ethnomedicinal use of *B. variegata* in treating infectious diseases and suggest its potential as a natural reservoir for developing alternative antibacterial agents. The antimicrobial efficacy may be attributed to the plant's diverse secondary metabolites, which disrupt bacterial cell walls and metabolic pathways[36]. Significant antibacterial action is demonstrated by methanolic and ethanolic extracts of *Bauhinia variegata* leaves and bark, especially against Gram-positive bacteria such as *Staphylococcus aureus*, with inhibition zones as large as 18 mm at doses of 20 mg/mL.

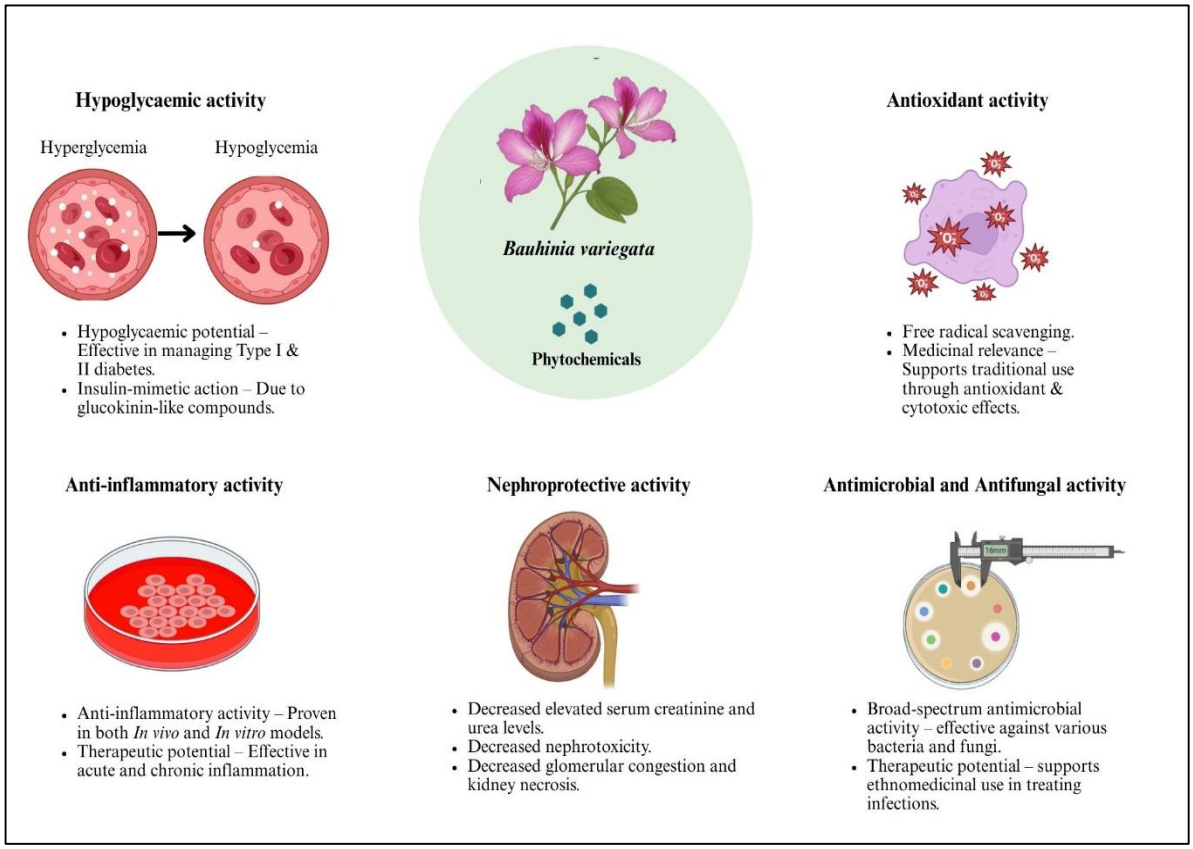

Figure 1: Illustration showing the diverse therapeutic activities of *Bauhinia variegata*, including antioxidant, anti-inflammatory, antimicrobial, hypoglycaemic and nephroprotective effects

Due to their high phenolic and flavonoid content, these extracts are efficacious and have activity levels equivalent to those of common antibiotics like ampicillin[5]. In addition to its antibacterial activity, *B. variegata* demonstrates promising antifungal properties. Notably, it exhibits inhibitory effects against phytopathogenic and dermatophytic fungi including *Mucor hiemalis* and *Trichophyton mentagrophytes*. Furthermore, Bauhinia flower extracts have been reported to exert potent fungicidal activity against *Sclerotinia gloeosporioides*, *Colletotrichum acutatum* and *Sclerotinia sclerotiorum*, with *S. sclerotiorum* being particularly susceptible[4,8]. These observations highlight the broad-spectrum antimicrobial potential of *B. variegata*, reinforcing its candidacy as a source of novel phytotherapeutic agents with antibacterial and antifungal properties[13].

Hypoglycaemic and Hypolipidemic activity of *Bauhinia variegata*: Emerging pharmacological evidence supports the hypoglycaemic efficacy of *Bauhinia variegata*, suggesting its therapeutic relevance in the management of both type I and type II diabetes mellitus. The presence of glucokinin-like compounds, which mimic the action of endogenous insulin, may underlie its plasma glucose-lowering effects[20]. Further investigations have demonstrated that flower extracts of *B. variegata* (Linn.) exert multifaceted metabolic benefits, including significant reductions in blood glucose levels, total cholesterol, triglycerides, low-density lipoproteins (LDL), very low-density lipoproteins (VLDL) and blood pressure, alongside an increase in high-density lipoprotein (HDL) levels. These outcomes indicate its potential in ameliorating both glycaemic and lipid imbalances.

Moreover, *B. variegata* exhibits notable antioxidant potential. Comparative analyses show that its radical scavenging activity, as assessed by DPPH (1,2-diphenyl-2-picrylhydrazyl) and hydrogen peroxide assays, reaches 86.60% and 68.47% respectively at 100 µg/mL. These values are comparable to the standard antioxidant butylated hydroxytoluene (BHT), which demonstrated 91.63% and 73.42% scavenging in the respective assays[45]. This dual antioxidant and hypolipidemic potential underscores the therapeutic versatility of *B. variegata* in managing metabolic disorders.

Nephroprotective Activity of *Bauhinia variegata*: The nephroprotective potential of *Bauhinia variegata* has been demonstrated in preclinical models of chemically induced nephrotoxicity. Notably, administration of ethanolic extracts derived from the whole stem of *B. variegata* conferred significant protection against cisplatin-induced nephropathy in rats. The protective effects were observed in a dose-dependent manner at concentrations of 200 and 400 mg/kg with marked reductions in serum creatinine and urea levels. Additionally, treated animals exhibited improved body mass and increased urine output, indicating a functional restoration of renal physiology[30].

According to 2022 research, a saponin-rich extract from *Bauhinia variegata* Linn. significantly lowered the formation of kidney stones in male Wistar rats. It also raised the levels of stone inhibitors, enhanced renal function indicators and reduced calcium oxalate crystal deposits[31]. Complementary findings from *in vitro* models have further validated the antioxidant-mediated nephroprotective effects of *B. variegata* root extracts. The extracts demonstrated potent free radical scavenging activity and were effective in mitigating gentamicin-induced renal damage. Treated groups showed significant decreases in elevated biochemical markers of renal dysfunction, including serum and urinary creatinine, urea and blood urea nitrogen (BUN).

Histopathological assessments revealed reduced glomerular and vascular congestion, minimal epithelial desquamation, diminished inflammatory cell infiltration and prevention of renal tubular necrosis[44]. These findings collectively underscore the therapeutic promise of *B. variegata* as a nephroprotective agent, likely mediated through its antioxidant and anti-inflammatory mechanisms.

Anti-inflammatory activity of *Bauhinia variegata*: The anti-inflammatory efficacy of *Bauhinia variegata* has been substantiated through both *in vivo* and *in vitro* experimental models. Specifically, ethanolic and petroleum ether fractions of the leaf extract have demonstrated significant anti-inflammatory activity in acute and chronic inflammation models, suggesting a broad therapeutic potential in modulating inflammatory responses[39].

Further supporting evidence from *in vitro* studies has revealed that *B. variegata* possesses notable anti-inflammatory properties, as indicated by its ability to inhibit key inflammatory mechanisms. These include the suppression of red blood cell hemolysis, prevention of protein denaturation and inhibition of proteolytic enzymes such as proteinase, all of which are established markers of anti-inflammatory potential[12]. Collectively, these findings indicate that *B. variegata* leaf extracts may serve as a promising candidate for the development of anti-inflammatory therapeutics, potentially via both membrane stabilization and enzyme inhibition pathways.

Immunomodulatory Activity of *Bauhinia variegata*: The immunomodulatory potential of *Bauhinia variegata*, a plant widely utilized in Indian traditional medicine, has been investigated in both humoral and cellular immune response models. Aqueous extracts prepared from the powdered leaves demonstrated a dose-dependent immunostimulatory effect. Notably, administration of the extract led to a significant increase in antibody titre, indicating enhancement of the humoral immune response. Furthermore, a probable elevation in delayed-type hypersensitivity (DTH) was observed, suggesting activation of cell-mediated immunity[38]. In parallel, an acetone:water extract of the stem bark also exhibited promising immunomodulatory effects, specifically by enhancing key innate immune functions such as neutrophil phagocytosis and chemotactic migration. These effects are likely attributed to the presence of bioactive tannins, which are known to strengthen host defense mechanisms and may offer protection against a variety of physiological and psychological stressors[32]. Together, these findings underscore the potential of *B. variegata* as a plant-derived immunotherapeutic agent capable of modulating both innate and adaptive immune responses.

Anticancer Activity of *Bauhinia variegata*: Research has shown that in Swiss albino mice, Kachanar extract (*Bauhinia variegata*) dramatically lowers tumour size, delays tumour initiation and inhibits the creation of skin papillomas. The extract's promise as a natural chemopreventive drug is highlighted by these dose-dependent effects, which can occasionally outperform cyclophosphamide[1]. Emerging studies highlight the anticancer potential of phytoconstituents derived from *Bauhinia variegata*, particularly in targeting key molecular pathways associated with tumor suppression (Figure 2).

In a molecular docking study, four lead compounds from *B. variegata* with high binding affinity for the tumor suppressor protein p53 were identified, suggesting their potential application in the treatment of triple-negative breast cancer. These bioactive compounds exhibit strong ligand–receptor interactions, reinforcing their candidacy as lead molecules for anticancer drug development[27].

Complementary experimental research supports these findings, revealing the cytotoxic effects of *B. variegata* bark extracts on lung cancer cell lines. Specifically, petroleum ether bark extract (PEBE) inhibited proliferation of A549 cells, while chloroform bark extract (CBE) demonstrated growth suppression and DNA damage in H460 cells. Both extracts induced apoptosis, thereby highlighting a potential mechanism of action through which the plant exerts its anticancer effects[19]. Collectively, these findings advocate for the continued exploration of *B. variegata* as a promising natural source of anticancer agents, with possible applications in the treatment of breast and lung malignancies.

Polycystic Ovary Syndrome (PCOS): Genetic Underpinnings and Phytotherapeutic Potentials

Polycystic ovary syndrome (PCOS) is a complex endocrine and metabolic disorder that primarily affects ovarian physiology. It is one of the most prevalent endocrinological conditions impacting women of reproductive age. The etiology of PCOS remains largely elusive, although current research suggests that both genetic and environmental factors play significant roles in its pathogenesis. Genetic predisposition is believed to influence several key features of the disorder including insulin resistance, insulin secretory abnormalities, hyperandrogenemia and polycystic ovarian morphology[37].

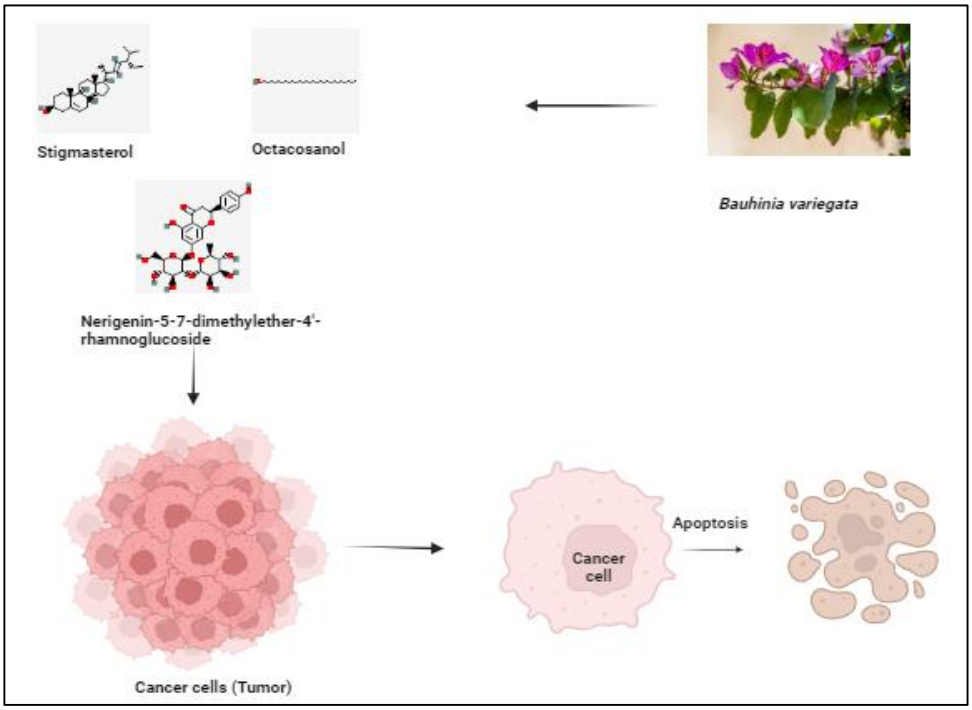

Figure 2: Anticancer activity of *Bauhinia variegata*—Effect on cell viability, apoptosis induction.

Recent investigations have highlighted the role of polymorphisms in key genes involved in the steroidogenesis pathway, suggesting their contribution to increased susceptibility to PCOS. These studies emphasize the utility of genetic biomarkers in elucidating the disease mechanism and enhancing diagnostic accuracy[3]. Furthermore, abnormalities in folliculogenesis and gonadotropin regulation, such as elevated luteinizing hormone (LH) secretion, are common in PCOS and may stem from a combination of genetic susceptibilities and environmental triggers[9].

A consistent clinical manifestation observed in most PCOS patients is menstrual irregularity including oligomenorrhea or abnormal uterine bleeding[26]. Importantly, PCOS is associated with a lifelong increased risk of developing metabolic syndromes such as type 2 diabetes mellitus. This association is largely attributed to a specific defect in insulin signaling, characterized by impaired insulin receptor function due to increased serine phosphorylation of insulin receptor substrates, especially IRS-1, likely mediated by elevated intracellular serine kinase activity[6]. The development of tiny cysts in the ovaries is a hallmark of PCOS, a disorder impacted by both environmental and genetic factors.

Infertility problems, weight gain, acne, irregular menstrual cycles and metabolic problems are some of the symptoms. Symptom management and health risk reduction can be achieved by early diagnosis and comprehensive therapy, which include medication, lifestyle modifications and medical assistance[24]. In recent years, the development of effective therapeutic agents derived from herbal medicine has gained traction as a promising approach for managing PCOS[25].

Numerous studies have demonstrated the efficacy of various medicinal plants in targeting the multifactorial symptoms of PCOS, including hormonal imbalances, metabolic dysfunctions and reproductive anomalies[24]. Among these, *Bauhinia variegata* L. has emerged as a plant of interest due to its broad spectrum of pharmacological activities. The medicinal properties of *B. variegata* have been validated by references found in classical Ayurvedic literature, particularly in the Samhita Granthas, which extensively document the roles of medicinal plants within traditional Indian healing systems[33]. Traditionally, polyherbal formulations containing *B. variegata* have been employed in the treatment of menorrhagia, cystic swellings, ovarian cysts and metabolic imbalances associated with PCOS. These formulations have shown favourable outcomes in improving ovarian morphology, enhancing ovulatory response and normalizing glucose, lipid and hormonal profiles[35].

Given its multifaceted pathology, PCOS requires a holistic therapeutic approach. Herbal remedies particularly those based on *B. variegata* and other botanicals offer promising complementary or alternative strategies to conventional pharmacotherapy. Such formulations address both the pathogenic mechanisms and the clinical manifestations of PCOS, offering new avenues for research and therapeutic development.

Composition of *Bauhinia variegata* and their biological properties

The phytochemical components of *B. variegata's* leaves and bark were discovered to contain alkaloids, oil, lipid glycosides, carbohydrates, phenolics, tannins, lignin, saponins, flavonoids and terpenoids, according to a qualitative study of the components. Thirty-three

phytochemical components were identified by GC-MS spectra analysis of an ethanolic extract of *Bauhinia variegata* that was made using cold extraction. Palmidrol, 2,6,10,14,18-pentamethyl-2,6,10,14,18-icosapent and neophytadiene had the highest concentrations. Phytochemicals were found to be part of the flavonoids, steroids, alkaloids, glycosides and terpenoids as neophytadiene, phytol and gamma-sitosterol[22].

Quercitrosides, rutosides and tannins are among the substances found in flowers that are utilised as laxatives and antidiarrheal medicines for a variety of illnesses[7]. The contents of leaves include catechol, tannins, ellagic acid, hydroxycinnamonate-12, 13-diol-7 dotetracont – 15-en-9-ol and sterol. They have been used as an anti-diabetic, lowering jaundice and appetite loss. They are high in vitamin C and lower sugar. Flavonol and glycosides in roots have anti-inflammatory, wound healing, nephroprotective and antioxidant properties[42].

Beta sitosterol, naringenin5, 7dimethylether 4-rhmnoglucosides and lupeol are compounds found in plant stem that have been shown to have anti-ulcer, antidiabetic and antitumor properties[33]. The bark of *Bauhinia variegata* includes many compounds including pyranoside, hesperidin, kaempferol-3-o-β-d-gluco, isoqucercitroside, rutoside, myricetol glycoside, bauhinione and 2,7-dimethoxy-3-methyl-9. These compounds have antibacterial and anticarcinogenic activities[18].

The ethanolic bark extract of *Bauhinia variegata* exhibited antitumor and anti-diabetic effects on triple-negative breast cancer and type I and II diabetes. Its pharmacological actions include hypoglycemic, diuretic and cholesterol-lowering qualities. Its rich phytochemical profile contains bioactive substances including kaempferol and hesperidin[14]. Seeds contain various essential oils, palmitic acids, linoleic acids, stearic acids and proteins, which are known for their haemagglutinating properties[40] (Table 1).

Key bioactive chemicals identified from *Bauhinia variegata* that have been shown to have considerable health advantages include cynidin-3-glucoside, malvidin-3-glucoside, malvidin-3-diglucoside, kaempferol-3-galactoside, kaempferol-3-rhamno glucoside and peonidin-3-glucoside[18].

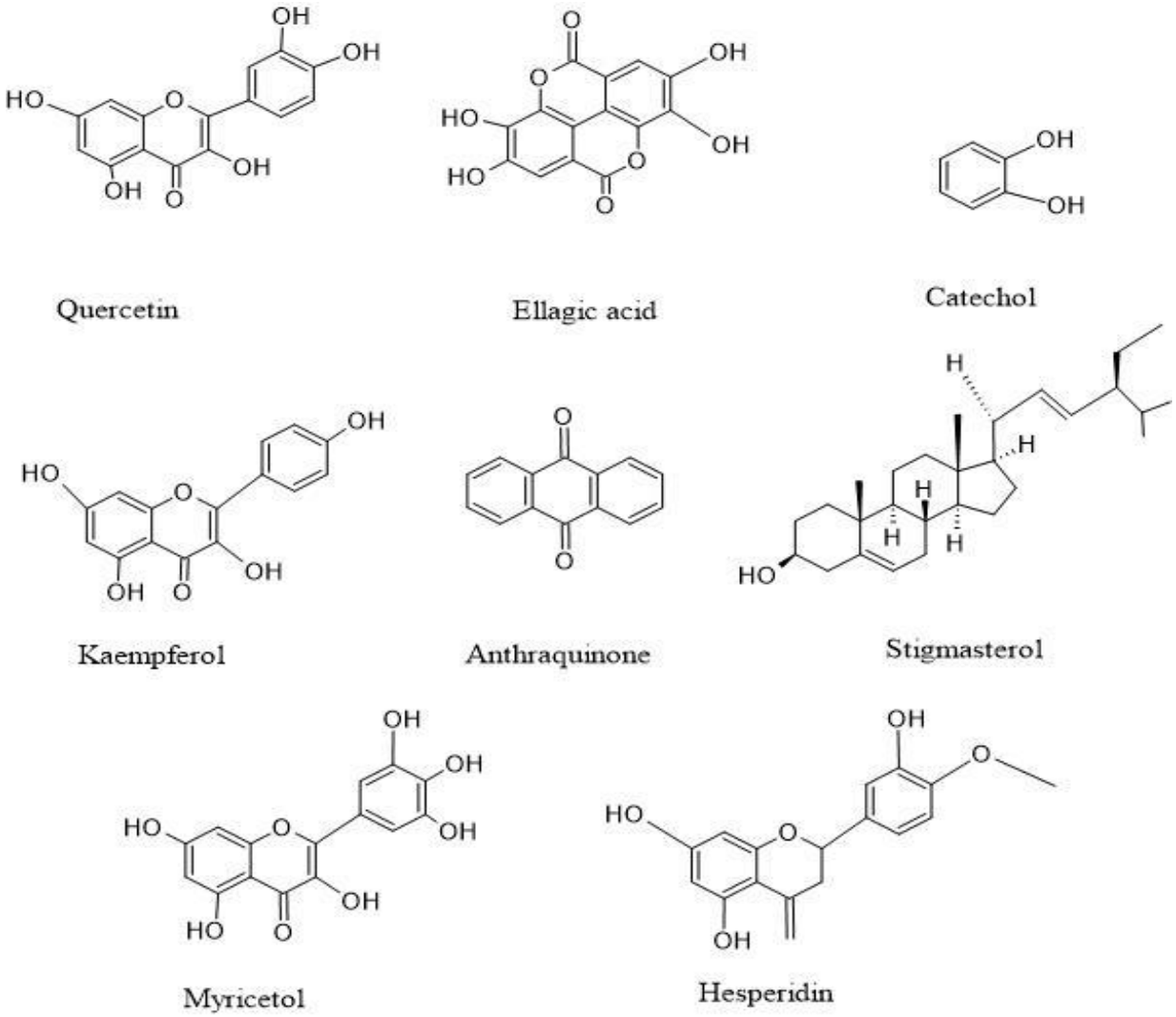

Figure 3: Phytochemical constituents of *Bauhinia variegata*

Table 1
Phytochemical makeup and biological activity of *Bauhinia variegata.*

S.N.	Part	Chemical constituents	Biological activity
1	Flowers	• Isoquercitoside • Rutoside • Quercitroside • Taxifoline • Rhamnoside • Capsaicin-3-glucoside • Glycoside Myricetol • Apigenin • Ascorbic • Aspartame • Amylase • Acid Octadecanoic	Flower buds have anti-diarrheal, laxative and antihelmintic properties; they are used to treat Kshyaghna, Pitthaghna, Rakata Pradaraghna and Kaasghna[2,7]
2	Leaves	• Heptariacontane-12 • 13- diol 7 dotetracont – 15- en -9- ol • Catechol • Tannins • Ellagic Acid • Sterol	Leaf extract juice is anti-diabetic and used to treat jaundice and appetite loss[42]
3	Roots	• Flavonol • Glycosides • 5, 7, 3, 4 tetrahydroxy-3-methoxy-7-oalpha-L rhamno-pyranosyl (1-3)-o-beta-D glucopyranoside • β-sitosterol • Piperine • Piperolein B • Retrofractamide A • Dehydropipernonaline	Anticancer,Nephroprotective, anti-inflammatory and wound-healing properties, as well as antioxidant activity[13,15,44]
4	Stem	• Beta sitosterol • Naringenin5 • 7dimethylether 4- rhmnoglucosides • Lupeol	Antiulcer, Antidiabetic, Antitumor activity[32]
5	Bark	• 5, 7-Dihydroxy flavanone-4'-O-a-L-rhamnopyranosyl b-Dglucopyranoside, hentriacontane • Octacosanol • Sitosterol • Stigmasterol • Nerigenin -5-7- dimethylether-4'- rhamnoglucoside • Lupeol • 5, 7, 3', 4'- tetrahydroxy-3-methoxy-7-O-alpha-L-rhamno-pyranosyl • 10-dihydrophenanthrene-1, 4- dione named as bahuinione	Immunomodulatory, anticancer, anti-ulcer, antidiabetic, hepatoprotective, antioxidant, nephroprotective, antihyperlipidemic, antigoitrogenic, anti-inflammatory, anti-microbial and molluscidal action[14]

Isolated from *Bauhinia variegata* Linn, campferol3-O-α-L-ramnosideo shows excellent pharmacokinetic parameters for drug candidature and possible antimalarial and anti-inflammatory activities. Promising biological activities were seen in *in silico* investigations on isolated compounds, such as kaempferol and luteol, which have cytochrome P450-inhibiting properties[14]. Numerous phytochemicals were present in *B. variegata* including Quercetin, ellagic acid, catechol, Kaempferol, anthraquinone, stigmasterol, myricetol and hesperidin (Figure 3). The secondary metabolites of *B. variegata* act as defence mechanisms against microbes and are the source of their therapeutic qualities. The plant has high levels of flavonoids and total phenols. Methanol is a more effective phyto-constituent isolator than chloroform because it extracts more phytochemicals. The development and discovery of new drugs may benefit from this preliminary estimate[11].

Conclusion

Kanchanara, also known as *Bauhinia variegata*, has a lot of medicinal promise, especially for treating polycystic ovarian syndrome (PCOS). A significant gap that requires more clinical studies to confirm its safety, efficacy and mechanisms of action is highlighted by the paucity of direct

research on its usefulness for PCOS, despite its historical usage in treating hormonal imbalances. Flavonoids, terpenoids, alkaloids and phenolics are among the bioactive substances found in the plant that contribute to its nephroprotective, hypoglycemic, immunomodulatory, anti-inflammatory, antioxidant and antimutagenic qualities. By encouraging ovulation, controlling menstrual cycles and enhancing lipid and hormone profiles, *Bauhinia variegata* has demonstrated potential in reducing PCOS symptoms.

PCOS, uterine cysts and hormonal abnormalities have all been treated with traditional formulations such as Kanchanar Guggul. Its medicinal promise is further supported by its anti-inflammatory, anti-cancer and antioxidant qualities. For consistency, standardisation and formulation improvements are needed for *Bauhinia variegata*, a possible phytomedicine for PCOS and associated conditions. In order to develop holistic treatment plans, future research should examine how it works in concert with other herbal medicines and conventional medications.

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