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Phytochemical, Pharmacological Profile and Commercial Utility of Tropically Distributed Plant *Bauhinia variegata*

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Abstract: *Bauhinia variegata* Linn is a widely used medicinal plant distributed in the tropical regions throughout the world. Its various part i.e. flowers, flower buds, stem, roots, stem bark, seeds, leaves have been used since ancient times for the treatment of a large range of diseases such as dysentery, diarrhoea, haemorrhoids, piles, oedema, laxative, anthelmintic, astringent, antileprotic, wound healing, antigoitrogenic, antitumor, antidote for snake poisoning, dyspepsia, carminative etc. The plant contains several flavonoids, steroids, glycosides, reducing sugars as active constituents that bring about its biological effects. Preclinical (*invivo* and *invitro*) investigations have demonstrated pharmacological activities such as antioxidant, hypolipidemic, immunomodulatory, anti-inflammatory, anti-microbial, insecticidal, antibacterial, antidiabetic, antiulcer, hepatoprotective, anti-arthritic, anti-mutagenic, cytotoxic, trypsin inhibitor, anti-goitrogenic. The present review is an attempt to compile information on various ethnomedical aspects, morphology, microscopy, phytochemical studies, pharmacological studies and its ayurvedic preparation, to explain the multifaceted role of this medicinal plant.

Key words: Medicinal Plant · Extract of *Bauhinia Variegata* · Biochemical Parameters · Phytochemical Studies · Ayurvedic Preparations.

INTRODUCTION

Medicinal plants or their constituents have been used since ancient times for the treatment of a large range of diseases and played a vital role in protecting and restoring world health. Over the past decade, interest in phytotherapeutic plants have been increased expressively as about 20-30% or medicines available in the market are directly or indirectly derived from the natural herbs. Phytotherapeutic constituents can be obtained from any part of the plant such as leaves, flower, roots, seeds, fruits etc [1]. The phytotherapeutic effects of plant materials are unique to the particular plant species and its medicinal effects are due to the combination of secondary product present in the plant [2]. There is a routine activity of discovering new bioactive compounds by systematic screening of medicinal plant in many laboratories [3]. According to the World health organization (WHO), a large proportion of population especially in developing countries depends essentially on medicinal plants for physical and psychological health care [4]. Recently, there is an increase in the demand of investigating natural herbs for new lead molecules, structures, with proved safety, efficacy and quality due to toxic side effects of drugs of modern medicines and lack of medicines for many chronic diseases. Phytotherapeutic agents are usually marketed in the form of powder, liquid or viscous preparations. Medicinal plants have been used since ancient times but it is necessary to establish the scientific evidence for their therapeutic actions and serve as the source of discovery of new effective drugs.

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Bauhinia Linn (Caesalpiniaceae) is a genus of more than 200 species of flowering plant (15 species out of 200 species found in India), distributed throughout the tropical regions of the world [5]. This genus was named after the bauhin brothers, Swiss-French botanist. This genus is called by various names throughout the world (Raktakanchana, Kachnar, Gandari, Yugapatraka, Kantar, Camel's foot, Mountain ebony, Napoleon's hat, Orchid tree, Poor man's orchid etc.) [6]. RaktaKachnar (*Bauhinia variegate* linn) is a medium-sized, deciduous tree, which remains leafless in the month of Jan-April and in that period flowering of the tree starts. Usually tree grows at an altitude of 1,300 m and starts flowering at the age of 2-3 years. *B. variegata* can be propagated naturally (by seedling before the monsoon, which germinate during the rainy season) as well as by artificially (by direct sowing and stump planting). Regeneration is sometimes plentiful in fresh soil deposits on landslips. These seeds are prone to be attacked by birds and insects which destroy whole seeds. It can be grown on the road side pavement, parks, temples (as this tree has a religious significance) and also in urban sit outs areas. The aim of present review is to highlight its morphology, microscopy, phytochemical studies, pharmacological studies and its ayurvedic preparation, to explain the multifaceted role of this medicinal plant.

Morphology: It is medium sized deciduous, fast growing, sun loving, flowering tree with a short, dark trunk and hairy branches (thin and ascending). It is usually grows on a rocky soil on hill slopes to sandy loam and loamy soil in the valley, basically an acidic soil as it doesn't tolerate salty conditions. The bark of the tree is greyish brown, rough externally (due to presence of fissures, transverse cracks, exfoliations) and smooth surface, creamish colour internally (On drying, the colour of the inner surface become reddish brown and smooth). Leaves are alternate, linear-lanceolate, running parallel venation, green colour, entire margin, smooth and glabrous surface, broad, rounded and bilobed apex, upto 15 cm long, as broad as or broader than long, 9-15 nerved, cleft 1/4 to 1/3 into two obtuse lobes, green colour which changes to brown on drying. Leaves and leaflets often show sleep movements. Flowers are bisexual, fragrant, showy, magenta and rosy purple coloured with five petals (4-6 cm long and 2-3 cm wide). Fruits are elongated, pod like shape, 6-12 inches, dry/hard covering and brownish in colour. Seeds are 15-16 mm long, 11-13 mm wide[6-11].

Microscopical studies: 1. Leaf:

Petiole: The microscopical studies of a leaf showed that petiole is divided into epidermis (single layered, thin walled rectangular cells, covered with a thin cuticle), which is followed by collenchymatous tissues (two-three layered), then parenchymatous cells (two-four layered, shows abundant solitary calcium oxalate crystals). Vascular bundle (xylem and phloem are well developed) of a petiole are present below the two-five layer of sclerenchymatous tissues.

Lamina: The microscopial studies of a leaf showed that lamina is divided into upper and lower epidermis (single layered, thin walled rectangular cells, covered with a thin cuticle), palisade tissue (double layered, columnar cells, spongy tissues are loosely arranged), well developed vascular bundles.

Midrib: The microscopical studies of a leaf showed that midrib is divided into upper and lower epidermis (single layered, thin walled rectangular cells, covered with a thin cuticle). This is followed by collenchymatous tissues (two-three layered), then parenchymatous cells (two-four layered, thin walled, shows abundant solitary calcium oxalate crystals), well developed vascular bundles (shield shape, surrounded by sclerenchymatous tissue)[12].

Quantitative Microscopy of Leaf:

- Stomatal index: 5.27
- Palisade ratio: 7.6
- Vein termination no.: 6.6
- Vein islet no.: 8.3

Roots:

Young Roots: The microscopial studies of roots showed that young roots are divided into periderm (broad and deeper origin, divided into phellum and phelloderm zone. Phellum zone is 150 µm wide and made up of compact and compressed tubular cells. Phelloderm cells are 100 µm wide), secondary phloem (sieve elements and phloem parenchyma cells are arranged randomly and cylindrically), secondary xylem (thin walled fibres, vessels are circular, thin walled, widest vessels, narrow vessels re 50 and 100 µm in diameter. Primary xylem is also clearly visible).

Thick Roots: The microscopial studies of roots showed that thick roots are divided into periderm (broad and distinct phellum, 3.5 mm thickness, inner boundary has sclerenchyma elements), secondary phloem (dense mass, wide rays of phloem fibres, radial rows of phloem elements). The vessels of secondary xylem are much wider, thin walled (solitary, radial multiples) while the fibres of secondary xylem are gelatinous (tangential bands or radial blocks) and normal type.

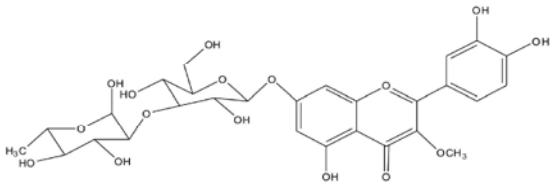
Very Old and Thick Roots: The microscopial studies of old and thick roots showed that uneven periderm with broken and fissured phellum tissue. The secondary phloem is 350 µm wide, has narrow rays at the outer regions and dilated rays at certain place. Phloem fibres were scattered in large masses. The sieve elements were randomly distributed[13].

Flowers: The microscopial studies of flowers of this plant showed two types of trichomes, unicellular covering trichomes which are pointed at the apex and broad at the base and multicellular glandular trichomes (thin walled and balloon shaped). Pollen grains are like spheroid shape in equatorial view, opened with a circular, large, thickened pore. Ovary part of the flower shows marginal placentation (superior) [14].

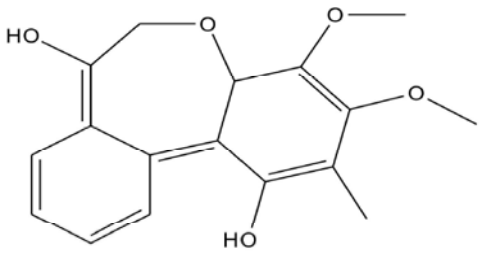
Bark: The microscopial studies of bark of this plant showed that the uppermost zone of the bark is cork cells which is 12-20 layered, below it there is a single layer of phellogen which is followed by wide zone of phelloderm, tangentially elongated to isodiametric cells. This zone also contains lignified fibres and stone cells. The pericyclic fibres found in the bark have narrow lumen, thickened, lignified, broad walled and tapering ends. The phloem part of the bark is characterized by sieve tubes, companion cells, crystal fibres, phloem fibres, phloem parenchyma and stone cells, transverse by uni-bivariate medullary rays[14].

Phytochemical Studies:

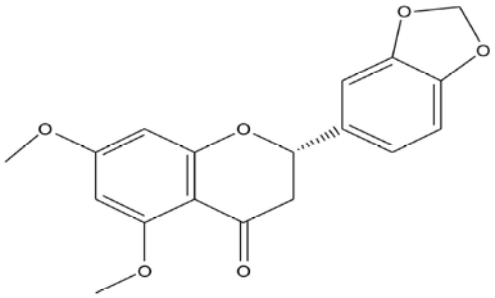
Root: Phytochemical studies [15,16] of the root bark yielded a (2S)-5, 7-dimethoxy-3' ,4'-methylenedioxy flavanone and 5,6-dihydro-1,7-dihydroxy-3,4-dimethoxy-2-methyldibenzoxepin (Mopuru *et al*. 2003); 5,7,3',4'-tetrahydroxy-3-methoxy-7-O-α-L-rhamnopyranosyl (1→3)-O-β-D-glucopyranoside (Yadava *et al*. 2002).



5,7,3',4'-tetrahydroxy-3-methoxy-7-O-α-L-rhamno pyranosyl (1 →3)-*O*-*β*-galactopyranoside



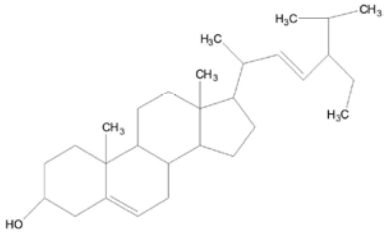
5,6-dihydro-1,7-dihydroxy-3,4-dimethoxy-2-methyldibenzoxepin



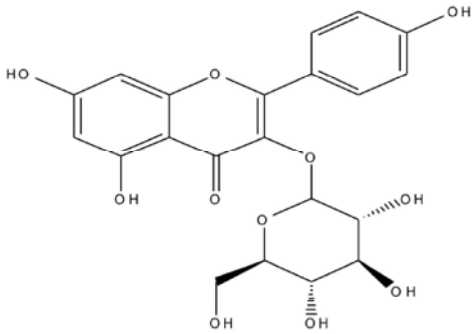
(2S)-5,7-dimethoxy-3',4'-methylenedioxyflavanone

Stem: Phytochemical studies[17-23] of the stem bark yielded a hentriacontane, octacosanol and stigmasterol [17]; 5,7-dihydroxyflavanone-4'-O-α-L-rhamnopyranosyl-β-D-glucopyranoside [20,21]; β-sitosterol, lupeol and kaempferol-3-glucoside[22];2,7-dimethoxy-3-methyl-9,10-dihydro phenanthrene-1,4-dione (Zhao *et al*. 2005) on the basis of spectroscopic analysis. It also shows the presence of glycosides, reducing sugars, nitrogenous substances [11].

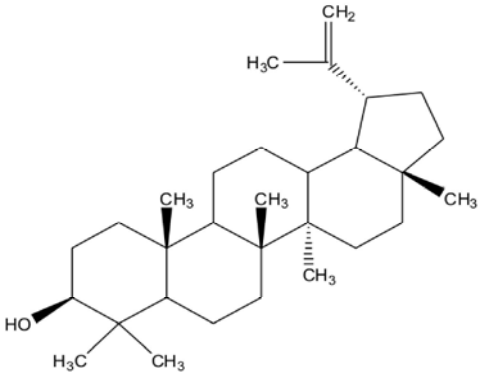
Hentriacontane



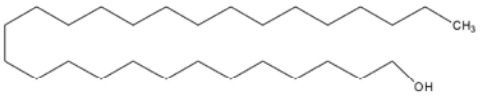
Stigmasterol



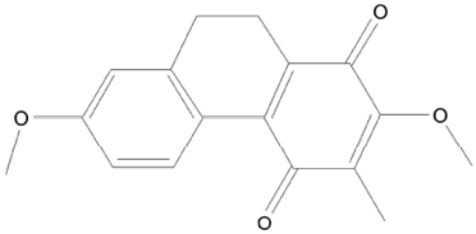
Kaempferol-3-glucoside



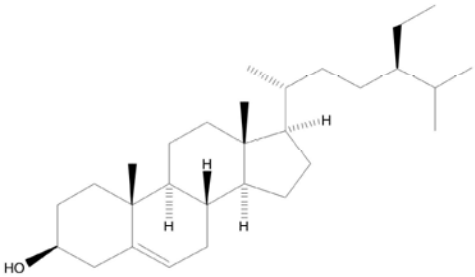
Lupeol



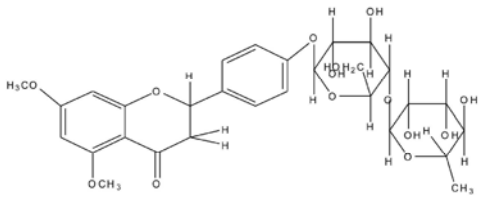
Octacosanol



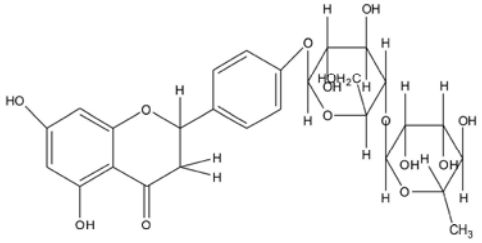
2,7-dimethoxy-3-methyl-9,10-dihydrophenanthrene-1,4-dione



β-sitosterol

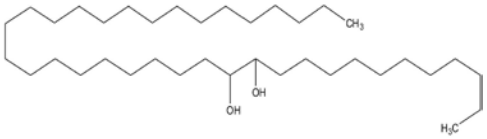


5,7-dimethoxyflavanone-4'-O-α-L-rhamnopyranosyl-β-D-glucopyranoside

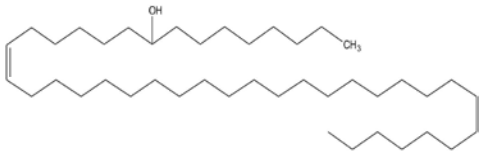


5,7-dihydroxyflavanone-4'-O-α-L-rhamnopyranosyl-β-D-glucopyranoside

Leaves: Phytochemical studies [24,25]of leaves yielded a two new long chain compounds, heptatriacontan-12,13-diol and dotetracont-15-en-9-ol.

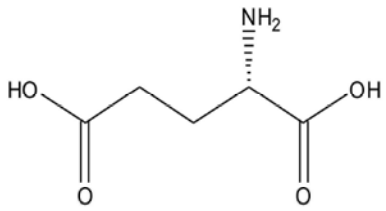


Heptatriacontan-12,13-diol

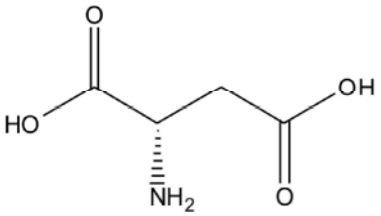


Dotetracont-15-en-9-ol

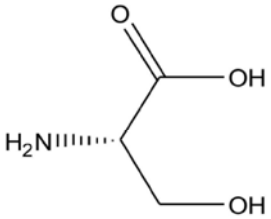
Buds: Phytochemical studies [26] of buds show the presence of α-alanine, aspartic acid, glycine, serine, glutamic acid, phosphoenolpyruvic acid, oxaloacetic acid and α-ketoglutaric acid.



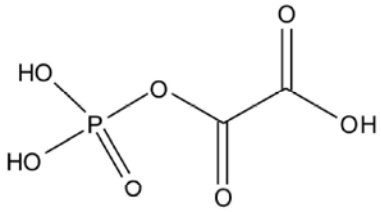
Glutamic acid



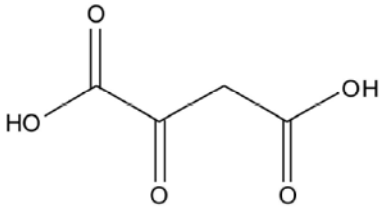
Aspartic acid



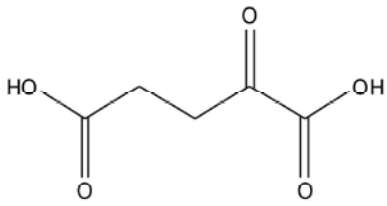
Serine



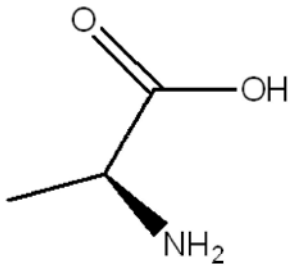
Phosphoenolpyruvic acid



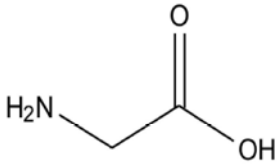
Oxaloacetic acid



α-ketoglutaric acid



Alanine



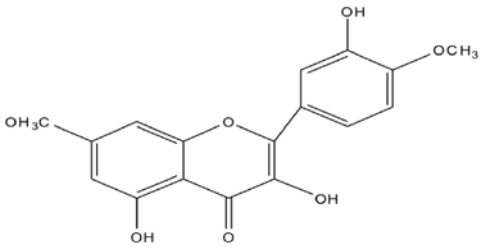
Glycine

Pharmacological Activities:

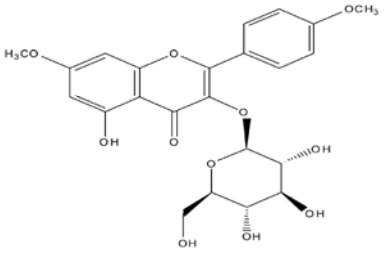
Antibacterial: Parekh *et al.* evaluated the preliminary antibacterial property from the different extract of this plant against some important bacterial strain such as gram-positive bacteria (*Bacillus cereus, Staphylococcus aureus*), gram-negative bacteria (*Klebsiella pneumonia, E. Coli, Pseudomonas pseudoalcaligenes*). The antibacterial activity of bark was determined at three different concentrations i.e. 10 mg/ml, 5 mg/ml and 2.5 mg/ml in different solvents with increasing polarity by agar well diffusion method. It was concluded from this result that defatted extracts had shown better activity than those without defatting extracts and activity was concentration dependent and polarity of the solvent plays an important role in imparting antibacterial property and it justifies the traditional use of this plant [27].

Anti-inflammatory: Yadava *et al.* investigated the anti-inflammatory activity of a novel flavanol glycoside isolated from the ethyl acetate soluble fraction of the ethanolic extract of the roots of this plant in albino rats. The isolated compounds show all the characteristics of flavanol glycoside, has molecular formula $C_{28}H_{32}O_{16}$, melting point is 214-218°C. Its structural elucidation was analysed by spectral analysis and chemical degradations. Evaluation of anti-inflammatory activity of this novel flavanol glycoside was assessed by carrageenan induced hind paw oedema method i.e. measuring the volume of paw. Administration of this compound intraperitonially (i.p.) at the tested dose level of 40 mg/kg into a male or female rats weighing between 140-180 g. Acetyl salicylic acid (ASA) was used as a standard drug to correlate the inflammation inhibitory activity. The results of these studies showed that administration of ethyl acetate soluble fraction of this plant produced moderate anti-inflammatory activity on albino rats. The percentage of inflammation inhibition was 62% as compared to ASA [16].

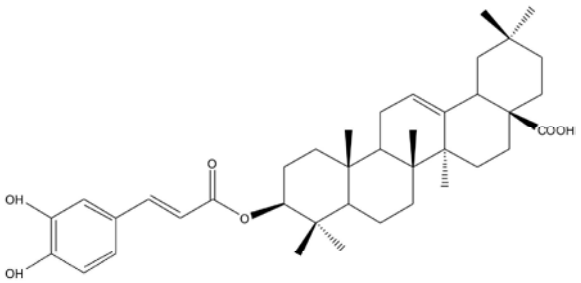
Rao *et al.* also investigated the anti-inflammatory activities of the constituents isolated from the non-woody aerial parts of the plant. Effects of these constituents namely, kaempferol (1), ombuin(2h), kaempferol 7,4 dimethyl ether 3-O-β-D-glucopyranoside (3), kaempferol 3-O-β-D-glucopyranoside (4), isorhamnanetin 3-O-β-D-glucopyranoside (5), hesperidin (6), in addition to triterpenecaffeate and 3β-trans-(3,4-dihy droxy cinnamoyloxy) olean-12-en-28-oic acid (7) were evaluated as a inhibitor of some macrophages functions i.e. the production of nitric oxide (NO), cytokines such as tumor necrosis factor (TNF), interleukin (IL)-12, involved in the inflammatory process. The result of these studies showed that these compounds significantly inhibited the lipopolysaccharide (LPS) and interferon (IFN-ã) induced production of NO and cytokines (TNF, IL-12) dose dependently and all the compounds isolated from the plant could be ranked according to their inflammatory inhibitory activity as 7> 1> 2> 5> 6> 3> 4. Compounds 1, 2 and 7 showed dose dependently 50% inhibition (IC_{50}) of NO, TNF, ILF-12 at a concentration of 30, 50 and 10 µm respectively, while compounds 3, 4, 5 and 6 showed very less inhibitory effect even at higher concentration compared to murine peritoneal macrophages. On the other hand, when the inhibitory effect of these isolated compounds were determined for 24 h on the NO synthesis by LPS/IFN-ã pre-activated murine macrophages, the compounds 1, 4 and 6 inhibits the NO synthesis by 10-20%, while compounds 3 and 7 failed to inhibit NO synthesis. It was concluded from this finding that compounds present in this plant can be used in the management of inflammatory conditions [28].



Ombuin



Kaempferol-7,4-dimethylether-3-O-β-D-glucopyranoside



Triterpenecaffeate

Cytotoxic: Rajkapoor *et al.* investigated the chemo preventive and cytotoxic effect of ethanolic extract against N-nitrosodiethylamine induced experimental liver tumours in rats and human cancer cell lines [29]. The EBV was administered orally at the dose level of 250 mg/kg for 16 weeks in DEN induced liver tumours in rat. At the end of 16 weeks, rats were sacrificed and various biochemical parameters such as serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), alkalinephosphatase (ALP), total bilirubin, gamma glutamate transpeptidase (GGTP), lipid peroxidise (LPO), glutathione (GPx) and glutathione-S-transferase (GST) were studied for chemopreventive activity. The results of these studies showed that administration of EBV significantly brought down the increased level of SGPT, SGOT, ALP, total bilirubin content in DEN induced liver tumours in rats, which indicates the carcinogenic inhibitory activity. EBV was found to be cytotoxic against human epithelial larynx cancer (Hep2) and human breast cancer (HBL-100) cells. In another study, antitumour activity of EBV was also evaluated against Dalton's ascitic lymphoma (DAL) in mice, which resulted in a significant increase in a mean survival time of tumour bearing mice [30].

Antimutagenic: Pandey *et al.* reported the anti-mutagenic activity of methanolic extracts of stem bark of this plant against cyclophosphamide induced micronucleus formation in the bone marrow cells of Swiss albino mice at the tested dose level of 125, 250 and 375 mg/kg body weight to six animal, 24 hours before the intraperitonial administration of 50 mg/kg cyclophosphamide in 0.9% saline. The results of these studies showed that administration of this extract significantly prevented the formation of micronucleus in a dose dependent manner. Thus this finding showed a significant antimutagenic activity which might be due to individual or combination of constituents present in this plant [31].

Anti-Obesity: Balamurugan *et al.* investigated the anti-obesity effect of methanolic extracts of stem and root bark of this plant by oral administration of methanolic extracts at the tested dose level of 200 and 400 mg/kg in female rats feeded with hypercaloric diet for 40 days. At the end of 40 days, various parameters was evaluated such as body weight (BW), feed intake, high density lipoproteins (HDLP), low density lipoproteins (LDLP), triglycerides, total cholesterol, brain serotonin level. The results of these studies showed that administration of this extract significantly brought down the increased level of total cholesterol, triglycerides, LDLP and there was a increased in the level of HDLP, brain serotonin level. This was attributed to the presence of β-sitosterol in the stem and tendency to elicit the serotonin level in the brain. Thus this finding showed a significant anti-obesity activity [32].

Immunomodulatory: Patil *et al.* investigated the *in-vitro* immunomodulatory activity of different extracts (acetone-water, aqueous tannin) of stem bark on human neutrophils by evaluating various parameters such as nitrobluetetrazolium test, phagocytosis of killed *Candida albicans*, candidacidal assay, neutrophil locomotion and chemotaxis at the tested dose level of 10 µg/ml, 20 µg/ml, 50 µg/ml, 100 µg/ml and 1000 µg/ml. From this study, it was concluded that the acetone: water and isolated tannin of stem bark showed significant immunomodulatory activity on *in vitro* human neutrophils in all parameters [33].

Anti-arthritic: Rajkapoor *et al.* investigated the anti-arthritic activity of ethanol extract of this plant by the oral administration of ethanolic extract at the tested dose level of 250 mg/kg on complete Freund's adjuvant (CFA) induced arthritis in rat for 15 days. At the end of 15 days, the rats were sacrificed, their blood was collected and then serum was separated. After that various parameters such as alanine aminotransferase (ALT), serum aspartate transaminase (AST), alkaline phosphatise (ALP), total cholesterol and triglycerides were estimated. In this study, level of various antioxidant enzymes were also evaluated in liver and kidney of normal, arthritic control and extract treated rats such as catalase, glutathione peroxidase (GPx), superoxide dismutase (SOD) and lipid peroxidase (LPO). The results of these studies showed that administration of this extract significantly inhibits paw oedema volume in rats and altered the biochemical parameters and also the levels of various antioxidant enzymes which got affected in arthritic rats. From this study, it was concluded that the ethanolic extracts of this plant showed significant antiarthritic effect in rats [34].

Hepatoprotective: Bodakhe *et al.* investigated the hepatoprotective property of extract of *Bauhinia variegata* bark (EBV) by oral administration of EBV at the tested dose level (100 and 200 mg/kg) in carbon tetrachloride (CCl_4) intoxicated male *Sprague-Dawley* rats weighing between 100-120 g. In this study, liver damage was induced by subcutaneous administration of CCl4 in a suspension of liquid paraffin in the ratio of 1:2 in lower abdomen of each tested animals. At the end of 13 weeks, the rats were sacrificed by decapitation method, their blood was collected and then serum was separated and subjected to biochemical estimation of parameters such as alanine aminotransferase (ALT), serum aspartate transaminase (AST), alkaline phosphatise (ALP), total lipids, total proteins and gamma glutamyltranspeptidase (ãGTP). The results of these studies showed that administration of EBV significantly altered the biochemical parameters which got affected in CCl_4 intoxicated male *Sprague-Dawley* rats. From this study, it was concluded that the extracts of this plant showed significant hepatoprotective activity [35].

Anti-ulcer: Rajkapoor *et al.* studied the anti-ulcer activity of alcoholic extract of *Bauhinia variegata* (EBV) by oral administration of alcoholic extract against pyloric ligation and aspirin induced gastric ulcer in rats. In this study, the stomach of rats was incised to examine the various parameters for evaluating anti-ulcer activity of EBV such as volume of gastric secretion, total free acidity and ulcer index. From this study, it was concluded that this extract showed significant anti-ulcer activity [36].

Trypsin Inhibitor: Ciero *et al.* isolated and characterized the candida trypsin inhibitor (BvcTI) and lilac trypsin inhibitor (BvlTI) from the two varieties of seeds of this plant. These trypsin inhibitors (BvcTI and BvlTI) are proteins having molecular mass of about 20,000 and constituents relatively high percentage of aspartic acid, glutamic acid, serine and glycine and a low percentage of histidine. In this study, three isoforms for each varieties were 4.85, 5.00 and 5.15 and their trypsin inhibitory activity (K_i value for BvcTI and BvlTI) was 6.9 and 1.2 Nm respectively. In this investigation author also determined the N-terminal sequences of the three isoforms for each varieties and the complete amino acid sequence of isoform

3 of BvcTI-3 by the automated Edman degradation of the reduced and carboxymethylated proteins. This degradation resulted from the trypsin digestion and by Staphylococcus aureus protease. The results of these studies showed that BvcTI-3 belongs to Kunitz family, has a molecular mass of 18,529 and is composed of 167 residues [37].

Fang *et al.* also isolated and characterized the new Kunitz-type *Bauhinia variegata* var. *variegata* trypsin inhibitor (BvvTI) from the *Bauhinia variegata* seeds. This novel inhibitor (BvvTI) shows same N-terminal amino acid sequence as other trypsin inhibitors. It has highest trypsin inhibitory activity i.e. K_i, 0.1 Nm. In this study, this BvvTI also has a medical application i.e. it exhibits anti-HIV-1 reverse transcriptase activity, inhibits the proliferation of nasopharyngeal cancer (CNE-1 cells) in a selected way[38].

Antigoitrogenic: Veena *et al.* reported the antigoitrogenic activity of the extracts of this plant against neomercazole induced goiter. From these studies, it was concluded that EBV showed significant antigoitrogenic activity at the dose of 200 mg/day [39].

Insecticidal: Its insecticidal activity against *Dysdercuscingulatus* nymphs also has been reported by Srivastava *et al.* [40].

Ayurvedic Description:

Lymphocare (Ayurvedic Formulations): According to Ayurveda, it is an astringent tonic useful in scrofula (swelling of lymph nodes of the neck), tumours, skin diseases and ulcers. Kanchnar is a safe and effective herb known for its anti-inflammatory and healing properties which makes it a natural choice against conditions like fistula, fissures and haemorrhoids. It has special affinity towards lymphatic system as it is found to be useful in infective and inflammatory conditions of lymph glands. It is especially effective in swelling of lymph node.

Marketed Formulation: 1000 mg each tablet in blister packing.

Ingredients: *Commiphoramukul, Asphaltum, Bauhinia variegata, Spheranthusindicus, Pravalapanchamrit*, pearl, *Mytilusmargaritiferus, Turbinellarapa, Cypraeamoneta, Acacia catechu, triphala, Terminaliabellerica, trikatu, Piper longum, Piper nigrum, Cinnamomumzeylanicum, Cinnamomumtamala, Amomumsubulatum*.

Prescription: One or two tablet to be taken twice a day with warm water usually after meal for 3-6 months[41].

Prostabliss (Ayurvedicformuation): It is an ayurvedic formulation which helps in treating the distressful condition such as repeated and frequent urge of urination, obstruction and dribbling of urine. It helps in strengthening the muscles of urinary bladder and urethra, thereby helps in normalizing the flow of urine.

Marketed Dosage Form: 1000 mg each tablet in blister packing.

Ingredients: *Commiphoramukul,* Asphaltum, *Bauhinia variegata, Spheranthusindicus, Terminaliachebula*, zinc oxidum, *Asparagusracemosus, Saxifraga granulate, Smilexglabra, Curcuma longa.*

Prescription: One or two tablet to be taken twice a day with warm water usually after meal for 3-6 months and one tablet twice a day for only two months in a year for maintaining prostate health in case of men aged above 50 years[41].

Devakanchanum: A teaspoon of flower paste is to be taken twice a day in asthma [42].

Kanchnarguggul (Ayurvedic Formulation): It is an ayurvedic formulation for the treatment of glandular disease especially thyroid (for hypo and hyper thyroid). It is also used in the treatment of swollen lymph nodes, cervical adenitis, scrophularia, sinuses.

Marketed dosage form: 40 g each tablets.

Ingredients: Guggul, Dalchini, Varuna, Vibhitaki, Kanchanara, Tejpatra, Elaichi, Haritaki, Amalki, Vayuvidhanga, Pippali, Marich, Ginger.

Dosage: Two tablets to be taken thrice a day with a spoon of honey.

Contraindication: Pregnancy or any dryness in the body[43].

Herbal Powder for Cancer:

Ingredients: *Azadirachtaindica, Holarrhen aantidy senterica, Tinospor acordifolia, Bauhinia variegata, Crataevanurvala, Terminaliachebula, Terminali abellirica*.

Dosage: 3-4 g powder to be taken with honey or lukewarm water, two times a day (morning and at bedtime).

CONCLUSION

Bauhinia variegata is one of the traditional plant used for the treatment of a large range of diseases such as dysentery, diarrhoea, haemorrhoids, piles, oedema, laxative, anthelmintic, astringent, antileprotic, wound healing, antigoitrogenic, antitumour, antidote for snake poisoning, in dyspepsia and carminative etc. Its some of the traditional value in curing number of diseases has been confirmed by pharmacological screening of various parts of this plant. There is still a lack of clinical data for its efficacy and clinical trials are warranted to justify its traditional use. It also possess many hidden medicinal properties which can be further evaluated in the future.

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