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Review Article

KANCHNAR (BAUHINIA VARIEGATA LINN.) AS A THYROID GLAND PROTECTING DRUG

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ABSTRACT

Ayurveda is a science of life or art of longevity which encompasses far more than mere therapeutic art. The paragon of beauty of Ayurveda is that it always emphasizes preventive over cure. *Kanchnar* mentioned as *Gandmalanashak varga* by Priyavrat Sharma in his book *Dravyagun* Vigyana part-2. *Bauhinia variegata* Linn (Family- Caesalpiniaceae) is the botanical name of *Kanchnar* or syn. *Gandaari. Kanchnar* is the *Galgandnashka* by *Guna Prabhava*. Nowadays, the use of herbal drugs for treatment of various diseases is developing all over the world. In Ayurveda *Galganda* and *Gandmala* are co-related with the disorder caused by Thyroid gland dysfunction. The diseases like *Galganda* and *Gandamala* are now days become more prevailing condition because of sedentary lifestyle, diet, stress and because of hormonal imbalance. In contemporary system of medicine advices Thyroxin and carbimazole for long standing, may lead to complication and adverse effect on the body. Hence it is necessary to explore safe treatment modalities. *Kanchnar* used as *Ekala dravya* in the treatment of thyroid gland dysfunction on the basis of its immunomodulator activity, anti-tumor and anti- cancer activity. *Kanchnar* is considered as drug of choice for all kind of *Granthies.* Ayurvedic medicine has the potential to make an important therapeutic contribution. This review article contain spectrum of information about *Bauhinia variegata*.

INTRODUCTION

In Ayurveda, *Gandmala* and *Galganda* are co-related with the disorder caused by Thyroid gland dysfunction. The diseases like *Galganda* and *Gandamala* are now-a-days become more prevailing condition because of sedentary lifestyle, diet, stress and because of hormonal imbalance. It is necessary to explore safe treatment modalities. *Kanchnar* is used as *Ekala dravya* in the treatment of *Galgand* or Thyroid gland dysfunction on the basis of its immunomodulator activity, anti-tumor and anti-cancer activity. *Kanchnar* is considered as drug of choice for all kind of *Granthies.* In Ayurvedic *literature, Galganda* is formed by the distribution of *Meda* and *Majja dhatus*, when there is vitiation of *Vata* and *Kapha doshas*, predominantly *Kapha*. *Dushti* of *Rasa dhatu* plays major role in pathogenesis. Because of the *Laghu, Ruksha, Sukshma guna, Sheeta virya* and *Katu vipak*, *Kachnar* is effective in the management of *Kapha-medas* predominant disorder like thyroid dysfunction.

General Information

Taxonomical Classification [1]

Kingdom	**Plantae**
Division	Magnoliophyta
Sub- division	Spermatophyte
Sub class	Rosidae
Class	Magnoliopsida
Order	Fabales
Genus	*Bauhinia*
Family	Caesalpiniaceae
Species	*Variegata*

Regional and other Names-

Language	Vernacular name
Hindi	*Kachnar, Kaniar*
Bengali and Marathi	*Rakta- Kanchan*
English- Buddhist	Bahuhinia, Mountain Ebony, Orchid Tree
Gujrati	*Kovidara*
Telugu	*Devakanchanamu*

Flower part Fruits Leaves resemblance with thyroid gland

Habit and Habitat

A medium sized tree, found throughout India, ascending up to an altitude, 1300 m in the Himalayas.

Ayurvedic Description

Sanskrit name- *Kanchnara*

Synonyms- *Gandari*, *Yugmpatra*, *Camarika*, *Swalp Kesari*, *Karbudar*

Properties[2]

Rasa- Kasaya, Guna- Ruksa, laghu, Virya- Sita, Vipaka- Katu: Prabhava- Gandmalanashak

Action- *Grahi, Dipana, Vranaropana, Visaghna*, [Fowers- *Grahi*]

Therapeutic Uses- *Gandamala, Mutrakracchra, Gudabhramsa, Kustha, Arsa, Krmi*

Flowers*: Kasa, Raktapitta*

Therapeutic Uses Mentioned in Ayurvedic Pharmacopoeia

The stem bark is used in *Krmiroga* (worm infestation), *Gandmala* (scrofula), *Apaci* (cervical lymphadenitis), *Gudabhramsa* (prolapsus-ani), *Varna* (wound) (A.P.I 1989).

Properties and uses Ascribed

The root is used in dyspepsia, carminative, and flatulence. A decoction is reported to be effective in obesity. The bark is reported as an astringent, tonic and anthelmintic. Bark is also used in scrofula, skin disease, ulcer and leprosy. Dried buds are reported to prevent of dysentry, diarrhoea, haemorrhoids, tumours and worms. A decoction of the buds is given in the cough, piles, haematuria and menorrhagia. The Flowers are laxative (Nadkarni, 1954; Chopra et al., 1956; wealth of India, 1988)

1. The gum is useful as a tonic and in colic disease (Badhe and Pandey, 1990).
2. The bark is used in the treatment of fever, as tonic, astringent (Kapoor and Kapoor, 1980) antiulcerogenic (Bhatnagar et al., 1973, Kapoor and Kapoor, 1980; sahu 1981) in the skin problem and wound healing (kapoor and Kapoor, 1980, Chauhan and Chahuan 1988), as antidiarrhoeal and antidysentric (Bhatnagar et al, 1973) in scrofula(Kapoor and Kapoor, 1980, Sahu,1981); syphilis, as blood purifier (Sahu, 1981; Mohan and Singh, 1993); antileprotic (Sahu, 1981), in cough and sore throat (Ahmad and Chaghtai, 1982); as antimalarial (Singh and Singh,1992); in stomachache (Sikarwar and Kaushik, 1993); as antitumor, in epistaxis, uterine bleeding (Singh and Aswal, 1992; Singh1993), for oedema and piles (Gopakumar et al.,1991); as astringent, in glandular inflammation and skin disease (Bhatnagar et al., 1973) and in haemorrhoids(Ahmad and Chaghtai,1982; Rajwar, 1983.[3]
3. The root is reported as an antidote to snake bite poison (Bhatnagar et al., 1973; Kapoor and Kapoor, 1980, Badhe and Pandey, 1990); as antitumor agent, in obesity (Shah and Joshi, 1971) in flatulence, dyspepsia, as carminative (Bhatnagar et al., 1973, Kapoor and Kapoor,, 1980; Nautiyal and Nautiyal,1983).[4]

Pharmacogonastic Studies

1. **Flowers**- The flowers are bisexual, irregular and light magenta in colour. Microscopic studies show uni to multicellular covering trichomes broad at the apex and thin walled multicellular balloon shaped glandular trichomes. Spheroidal pollen grains in equatorial view, not comparable, long extending almost from pole to pole. Superior ovary with marginal position of placenta is present. (Dey and Das, 1988).[5]
2. **Stem**- A freshly collected bark is shown to be greyish brown in colour from externally and internally cream coloured. On drying, the bark becomes curved and channelled. Transverse section of bark reveals 12-20 cork cells layer present. Sieve tubes, phloem parenchyma, companion cells, phloem fibers, stone cells, and crystal fibers are characteristics of phloem. Medullary rays are transverse, uni to biseriate. Starch grains are simple, spherical to oval and cluster of prismatic crystals of Calcium oxalate are present in many parenchymatous cells of the bark. Tannin is present throughout the bark, resin as yellowish amorphous mass is found in many parenchymatous cells of phelloderm and phloem. Besides deep red coloured amorphous mass is filled in the cork cells. The secondary phloem is a wide zone composed of fibres besides the soft element and a few stone cells. Cambium is presented by 8-14 layers of cells. The secondary xylem is represented by comparatively wide zones. Xylem fibers are wider than the

phloem fibers and vary in shape and size.[6] The pith cells are slightly thick walled, circular to polygonal in shape. Simple starch grains and tannins are present in the cortex, pith and medullary rays of the phloem region. Resinous mass dissolving in alkalies and alcohol is filled in some of the cells of cortex and pith. (Prakash et al.,1978).[7]

Chemical Studies

The plant has been reported to contain protein, fiber, calcium and phosphorus (Sharma et al., 1966).

1. **Non woody aerial parts:** The non-woody parts have six flavanoids namely ombuin, kaempferol, kaempferol-3-o-β-D-glucopyranoside, dimethylether-3-o-β-D-glucopyranoside,3β trans-(3, 4 dihydroxycinnamoyloxy) olean-12-en-28-oic acid, 7, 4'-isorhamnetin-3-o-β-D-glucopyranoside & hesperidin together with one triterpene caffeate. [8]
2. **Root-** A novel flavonol glycosides 5,7,3,4 tetrahydroxy-3-methoxy-7-o-α-L-rhamnopyranosyl (1→3)–o-β-d-galactopyranoside is present in the roots. Phytochemical analysis of root barks shows the presence of a new flavonone (2S)-5, 7-dimethoxy-3,4 methylene dioxyflavonone and dihydrodibenzoxepin,. Phytochemicals 5, 6b dihydro-1, 7-dihydro-1, 7-dihydroxy-3, 4-dimethoxy-2- methyldibenz, oxepin, are also reported in the roots.[9]
3. **Stem-** The main chemical compounds isolated from the bark of *B. variegata* are myricetol glycoside isoquercitroside, kaempferol glycoside, quercitroside, and rutoside, are main phytochemicals reported in the stems. Lupeol, naringenin 5, 7 dimethyl ether 4–rhamnoglucoside, and β-sitosterol, are also present. Bauhinione, a new phenanthraquinone has also been isolated. The spectral analysis of phenanthraquinone is illustrated as 2,7-dimthoxy-3-methyl-9,10 dihydrophenanthrene-1, 4-dione.[10]
4. **Flower**- Chemical constituents of flowers are malvidin-3-glucoside, ynidin-3- glucoside, malvidin-3-diglucoside, peonidin-3-diglucoside, peonidine-3-glucoside, kaempferol-3-rhamnoglucoside and kaempherol-3-galactoside.[10]
5. **Seed-** Petroleum ether extraction of seed shows 16.5% of pale yellow fatty oil, and 6.1% when expressed in a hydraulic press. The main components of fatty acids are as follows; oleic (31.8%), palmitic (17%), linoleic acid (35.9%), stearic (13.4%), behenic and arachidic (1%), myristic (1%), and lignoceric. Myricetal glycosides are also reported. All essential amino acids are threonine, lysine, methionine, leucine, valine, phenylalanine, and isoleucine. Along with these, semi essential amino acids, histidine and arginine are also present. The other amino acids found are tyrosin, aspartic acid, serine, alanine, glutamic acid, proline, and glycine.[11]

Pharmacological Studies

1. **Antidiabetic activity:** Hypoglyceminc activity is shown by leaves' ethanol extract of leaves with concentration of 100, 86, 92, 67mg/100ml respectively. The percentage reduction was obtained as 9, 21.8, 16.3 and 39.[12]
2. **Anti-inflammatory activity:** The chemical constituents of non woody parts have anti-inflammatory activity against inhibiting the lipopolysaccharides and interferon γ induced nitric oxide (NO) and cytokines. A novel flavonol glyycoside obtained from ethanolic extract of root 5, 7, 3' 4' tetrahydroxy-3-methoxy- 7-o-α-L-rhamnopyranosyl (1→3) –o-β-d-galactopyranoside, has anti-inflammatory property.[13]
3. **Immuno-modulatory activity:** Phytochemical constituents of the stem bark are reported to have immunomodulatory activity. Nonspecific immune response phagocytic activity and neutrophil activation. Increase in phagocytic index and percentage neutrophil adhesion at the doses of 250 and 500mg/kg/p.o. has been found.[14]
4. **Anti-tumour activity:** Ethanolic extract of stem has been evaluated to have anti-tumor activity. It is shown to increase the count of peritoneal exudates cells. From $5.8±.4×10^6$ (normal mouse) to $9.7±1.2×10^6$ (ethanol extract treated mouse).[15]
5. **Chemopreventive and cytotoxic effect:** At the dose of 200mg/kg, ethanol extract stem is reported to have chemopreventive and cytotoxic effect against N- nitrosodiethylamine induced experimental liver tumour in rats and human cancer cell lines. When orally administered, ethanolic extract has suppress the liver tumour induced by N-nitrosodiethylamine. It was confirm by examining the decrement in the level of nitrosodiethylamine induced elevated level of the following biomarker, serum glutamate oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), lipid peroxidase (LPO), gamma glutamate transpeptidase (GGTP), glutathione peroxidase (GPX), glutathione-s-transferase (GST), alkaline phosphatase (ALP), and total bilirubin. It was also found to be cytotoxic against human breast cell

line (HBL-100) and epithelial larynx cancer cells. [16]

6. **Hepatoprotective activity:** Oral dose of 100 and 200mg/kg, stem bark extract have been reported to have hepatotoxicity activity against carbon tetra chloride induced hepatotoxicity in Sprague-Dawley rats. It decreases the level of ALT, AST, ALP, GGT, and total lipids but increase the level of total protein. [17]
7. **Antibacterial activity:** Aqueous and methanolic extract of stem bark is reported to have antibacterial activity against bacterial strains such as *Klebsiella pneumonia, Escherichia coli, Staphyllococcus aureus*, *Pseudomonas pseudoalcaligenes, and Bacillus cereus.* Although it is observed that methanolic extract is more efficient than aqueous extract.[18]
8. **Haemagglutinating activity:** Crude seed of *B. variegata* is reported to have haemagglutinating activity.[19]
9. **Haematinic activity:** Ethanolic extract of the stem bark is reported to have haematinic activity on haemolytic anaemic rats.[20]
10. **Antimicrobial activity:** Antimicrobial activity against *P. aeruginosa, S. aureus, S. dysenteriae, V. cholerae, S. typhi, B.* subtilis is reported by ethanol extract of stem bark. It is found to be more effective against gram positive bacteria.
11. **Antiulcer activity:** Ethanol extract of stem is reported to have antiulcer activity against gastric ulcer induced by aspirin induced ulcer and pyloric ligationmodel in rats. It decreases the volume of gastric secretion, free acidity, ulcer index. [22]
12. **Anticarcinogenic activity:** When methanolic extract of stem bark was used in skin papilloma model in swiss albino mice against 7, 12-dimethylbenz (a) anthracene (DMBA) and croton oil induced skin carcinogenesis in mice, it reduced the tumor growth. So it is reported to have anticarcinogenic activity. It is shown to be effective at a dose of 500 and 1000mg/kg. The depleted concentration of glutathione was found to be restored in *B.variegata* bark extract treated groups.[23]

Table 1: Table shows the reported activity and Model used

S. No.	Reported activity	Useful parts	Model used
1.	Anti-diabetic	Leaves	Glucose induced diabetes
2.	Anti-inflammatory	Non woody aerial parts	Carrageenan induced hind paw edema
3.	Immuno-modulatory	Stem bark	
4.	Anti-tumour	Stem	Produce Dalton's ascetic lymphoma
5.	Chemoprevention & Cytotoxic Effects	Stem	N-nitrosodiethylamine induced experimental liver tumour in rats
6.	Hepatoprotective	Stem bark	CCl4 induced hepatotoxicity
7.	Anti-bacterial	Stem bark	Against bacterial strains
8.	Haemagglutinating	Crude seed	
9.	Haematinic	Stem Bark	Phenylhydrazine administration
10.	Anti-microbial	Stem Bark	Against Bacterial strains
11.	Anti-Ulcer	Stem	Gastric ulcer induced by pyloric ligation & aspirin induced ulcer model
12.	Anti-carcinogenic	Stem Bark	DMBA & croton oil induced skin carcinogenesis in mice

CONCLUSION

This review article contains spectrum of information about Bauhinia variegate under major heads general information, pharmacognostic, chemical, Pharmacological, clinical studies with references.

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