



Review Article

REVIEW ARTICLE ON VIJAYSAR (*PTEROCARPUS MARSUPIUM ROXB*): A MULTIDIMENSIONAL HERB

Mahakal Nilesh^{1*}, Gulhane Harshad²

¹Assistant Professor, Department of Rasashastra and Bhaishajya Kalpana, Shri Gurudeo Ayurved College, Gurukunj Ashram, Amravati, Maharashtra.

²Associate Professor, Dept. of Kayachikitsa, Dr. Rajendra Gode Ayurveda college, Hospital & Research Center, Amravati, Maharashtra, India.

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ABSTRACT

Vijaysar is a traditional Indian medicinal plant commonly known as *Asan* or *Bijaka*, Indian kino, Malabar kino related to the family Fabaceae (Leguminosae) and its commonly distributed in India and Srilanka. *Vijaysar* is one of the important medicinal plant describe in Indian system of medicine literature and has been used for various medicinal purposes. Heartwood and bark of *Pterocarpus marsupium* is used as a anti-diabetic remedies since thousands of years. The extract of this plant has been shown many pharmacological compound which are used in various diseases. *Pterocarpus marsupium* is clinically established herb as a potent anti-diabetic drug. *Pterocarpus marsupium content* many chemical constituents like pterostilbene, -epicatechin, pterosupin, marsupsin, etc. Several research study shows its efficacy in cataract and hypertriglyceridemia. The extract of this plant is also use as a cardiac tonic, anti-diarrheal, skin disorders, rejuvenator, and hepatoprotective. Ancient classical Ayurvedic literature have detailed description of *Vijaysar* (*Pterocarpus marsupium*). The aim of present review article is to study its pharmacological activity, cultivation, occurrence, distribution, botanical description, traditional medicinal uses, phytoconstituents, chemical constituents.

INTRODUCTION

Plant is the essential part of human life. Until the emergence of chemical medicine in 16th to 17th century, plants had been the source of medicine and prophylaxis.^[1] It is estimated that up 80% of the world's population living in the developing countries which directly or indirectly depend on traditional therapies like herbal medicinal products which is the primary source of healthcare and traditional medical care.^[2] the Indian holy books *Vedas* mention treatment with plants, which are abundant in the country. Numerous spice plants used even today originate from: nutmeg, pepper, clove etc.

In Indian healthcare system most of the people uses *Ayurveda* as a primary treatment. In *Ayurvedic* classic literature about 2000 species are found.^[3] *Vijaysar* (*Pterocarpus marsupium* Roxb.) is a plant drug belonging to the group called Rasayana (Rejuvenator) in Ayurvedic system of medicine.^[4] *Rasayana* drugs are immunomodulators and relieve stress in the body.^[5] In Ayurveda, bark and heart-wood of *P. marsupium* is used as a antidiabetic.^[6] *Asana* consists of heart-wood of *Pterocarpus marsupium* Roxb. (Fam. Leguminosae); a moderate to large sized, deciduous tree, upto 28 m high and 2.3 m in girth, found mostly throughout the Indian states like Bihar, Madhya Pradesh, Gujrat and Orissa.^[7] The colour of inner layer of heartwood is yellowish golden the outer layer called as sapwood is light yellow. The structure of leaves are compound and colour of flowers are yellow. Fruits have a flat circular wing. Latex (gum), which looks like dried blood comes out through the bark when an incision is made up to the cambium^[8]. Ayurvedic medicine is proven for its curative and lenitive properties. In disease condition

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like fever its flowers are used as a antipyretic, its heartwood as is used to stop the blood (Haemostatic) and rejuvenating, its wood is used for generalized body ache as well as indigestion, etc. The gum called as kino is used as a anti-diarrheal and also used in pyrosis and toothache. The various skin diseases, boils, sores like conditions, bruised leaves of this plant is used as a external local application. The water kept in round piece made out of the wood of this plant is beneficial for chest pain and diabetes. The bark of *P. marsupium* is very effective in preventing cataract formation and reducing hyperglycemia in alloxanized diabetic rats and the heartwood is useful as hypoglycemic agents^[9].

Methodology

For this review article data was collected systematically from Ayurvedic classical text, Pub Med, Google scholar, Scopus and Web of Sciences using a combination of Boolean operators. Peer reviewed papers in English on the keyword *Pterocarpus marsupium* were retrieved and evaluated based on titles and abstracts.

Taxonomical Classification

Domain: Eukaryota
Kingdom: Plantae
Subkingdom: Viridiplantae
Phylum: Magnoliophyta
Subphylum: Euphyllophytina
Infraphylum: Radiatopsis
Class: Magnoliopsida
Subclass Rosidae
Superorder: Fabanae
Order: Fabales
Family: Fabaceae
Genus: *Pterocarpus*
Species: *marsupium*^[10]

Botanical Description

It is of moderate size to large tree. The height ranges from 14 to 30 meters. The stem is strong and bended with widely spreading branches. The covering of plant is thick and dark brown to grey in colour. Leaves are compound and imparipinnate. Leaflets are 5-7, coriaceous, oblong, obtuse, emarginated or even bilobed at the apex and glabrous on both surfaces. The petioles i.e. stalk of plant are round, smooth and waved from leaflet to leaflet, 3 or 5 inches long and stipules are absent. Panicles are terminal and very large; development are bifarious, like the leaves. Peduncles and pedicels are round and a little soft. There are many flowers, white, with a small tint of yellow. Stamens are 9- 10, united at the base, but soon dividing into two parcels of 5 each; anthers are globose and 2-lobed. Ovary is oblong, pedicelled, hairy, generally 2-celled; cells are transverse and 1- seeded. Style is ascending. The legume, which is borne on a long petiole, is three-fourths orbicular, the upper remainder, which extends

from the pedicel to the remainder of the style, is straight, the whole surrounded with a waved, veiny, downy, membranous wing, swelled, rugose, woody in the center, where the seed is lodged and not opening; generally one but sometimes 2-celled. Seeds are single and reniform ^[11].

Synonyms

Sanskrit: *Bijaka, Pītāsara, Asanaka, Bījasāra*
Assamese: *Aajar*
Bengali: *Piyasala, Pitasala*
English: Indian Kino Tree
Gujrati: *Biyo*
Hindi: *Vijyasara, Bija*
Kannada: *Bijasara, Asana*
Kashmiri: *Lal Chandeur*
Malayalam: *Venga*
Marathi: *Bibala*
Orissi: *Piashala*
Punjabi: *Chandan Lal, Channanlal*
Tamil: *Vengai*
Telugu: *Yegi, Vegisa*
Urdu: *Bijasar* ^[11]

Ayurvedic Properties

Rasa- Kashaya, Tikta
Guna- Laghu, Ruksha
Veerya- Ushna
Vipaka- Katu
Prabhava- Hridya
Doshagnata- Kaphapittashamaka
Rogagnata- Madhumeha, Prameha, Sthoulya, Kustha, Udarda, Visarpa, Shwitra, Shotha, Palitya, Abhigataja Vedana, Bhagna, Atisar, Pravahika, Krimi, Dantashoola, Raktapitta, Raktavikara. ^[12]

History of *Pterocarpus Marsupium*

Alternative medicine is the branch to study their role in health and diseases. *Pterocarpus marsupium* (PM) is one such plant that has been used for over thousands of years as a treatment of different diseases. In classic Ayurvedic classical text *Vijaysar* is used as a potent Rejuvenator and for the management of various metabolic disorders. As per the traditional claim heartwood of *Pterocarpus marsupium* is the potential source of drugs used as an astringent, anti-inflammatory, anthelmintic, leprosy, fungal infection, gastrointestinal infection, bronchial asthma, bronchitis and whitening of hairs. It has been scientifically proved for antilipidemic, hepatoprotective, anti-ulcer, anti-inflammatory, and anti-diabetic activity. Extensive phytochemical studies have been carried out for this plant. Phytochemical testing showed that the methanol extract of *P. marsupium* contains carbohydrates, glycosides, saponins, tannins and flavonoids ^[13].

Phytochemistry

The bark contains l-epicatechin and a reddish brown colouring matter. The bark is occasionally employed for dyeing. The heartwood yields liquiritigenin, isoliquiritigenin, a neutral unidentified component, alkaloid and resin. The wood contains a yellow colouring matter and an essential oil and a semi-drying fixed oil. The primary chemical components of *P. marsupium* are pterosupin, pterostilbene, isoliquiritigenin, liquiritigenin, epicatechin, kinotannic acid, kinoin, kino-red beta-udesmol, marsupol, carpusin and marsupinol,. Some new flavonoid C-glucosides: 6-hydroxy-2-(4-hydroxybenzyl)- benzofuran- 7-C-beta- d-glucopyranoside, 3-(alpha-methoxy-4-hydroxybenzylidene)- 6- hydroxybenzo-2 (3H)-furanone-7-C-beta-d- glucopyranoside, 2-hydroxy-2-p- hydroxybenzyl-3 (2H)- 6- hydroxybenzofuranone-7-C- beta- d-glucopyranoside , 8- (C-beta- d-glucopyranosyl)- 7,3',4'- trihydroxyflavone and 1,2-bis(2,4-dihydroxy,3-C-glucopyranosyl)-ethanedione and two known compounds: C-beta-d-glucopyranosyl-2,6-dihydroxyl benzene and sesquiterpene , were

isolated from an aqueous extract of the heartwood of *P. marsupium* tree .^[14]

Pharmacological Activity

Anti-diabetic and antioxidant activity

Grover et al. reviewed the medicinal plants having anti diabetic potential and found *Pterocarpus marsupium* to be one of the promising plants ^[15]. *Dhanabal et al.* prepared the alcoholic extract of the bark of *Pterocarpus marsupium* and successively extracted with toluene, chloroform, ethyl acetate and butanol. These fractions were found to have beneficial effects on blood glucose levels ^[16]. A flexible dose double blind multicenter randomized controlled trial undertaken from October 1995 till January 1998 concluded that *Vijayasar* is an effective blood glucose lowering agent, its glycaemic effect being comparable to that of tolbutamide in treatment of naïve patients with Type 2 diabetes . In another study, an aqueous extract of *Pterocarpus marsupium* wood was screened for hypoglycemic activity on alloxan induced diabetic rats and the results were found to be statistically significant ^[17]. Many of the studies have addressed the mechanism of action (Fig. 1) and toxicity of the extracts as well

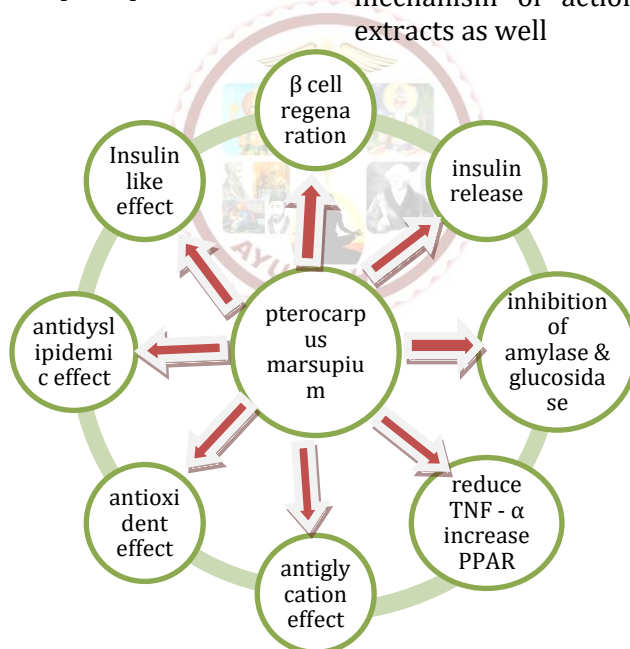


Fig 1: Scientifically proven anti-diabetic effects of Pterocarpus marsupium

Anti-inflammatory Activity

P. marsupium has also shown strong potential for its anti-inflammatory activity. In this study, an extract of *P. marsupium* containing pterostilbene has been evaluated for its PGE2- inhibitory activity in LPS-stimulated PBMC. In addition, the COX-1/2 selective inhibitory activity of *P. marsupium* extract was investigated.^[18]

Cardiotonic Activity

The aqueous extract of heartwood of *P. marsupium* shows Cardio protective activity. The

pharmacological content of this plant are 5,7,2-4 tetrahydroxy isoflavone 6-6 glucoside which are potent antioxidants and are believed to be cardioprotective. Calcium free Ringer solution was used as vehicle for administration of aqueous extract of *P. marsupium* as a test extract and digoxin as a standard.^[19]

Antibacterial Activity

Antimicrobial activity of bark and leaf extracts from *P. marsupium*. Hexane, ethyl acetate and methanol extracts were tested against four selected

Gram positive and Gram negative bacteria. In vitro, it inhibits *Pseudomonas aeruginosa*, *Streptococcus pyrogens* and *Staphylococcus aureus*. Ethyl and methanol extracts were more sensitive to the bacteria than extracts made out of hexane. Both the extracts exhibited concentration dependent variation in their anti bacterial activity. Similar observations have been reported where it has been showed that ethanol extracts of *P. marsupium* exhibited significant antiulcer and antioxidant properties in rats.^[20]

Anti-cataract activity

Aqueous extract of *Pterocarpus marsupium* bark showed anti-cataract activity. This study was proved and evident from the decreased opacity index in the alloxan induced diabetic rats.^[21]

Hepatoprotective activity

The methanol extract of stem covering of *Pterocarpus marsupium* possesses hepatoprotective activity.^[22]

Anti-Fungal Activity

Pterocarpus marsupium showed beneficial effects as a topical agent against Tinea infection. Good response was obtained within 3 days after first application. The antimicrobial activity of *Pterocarpus marsupium* was evaluated against pathogenic bacteria *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* in an in vitro condition. Aqueous extracts from barks of *Pterocarpus marsupium* were tested for antimicrobial activity using the zone of inhibition method. The aqueous extract of *Pterocarpus marsupium* inhibited growth of bacteria with the minimal inhibitory concentration ranging from 0.04 mg to 0.08mg^[23]

Anti-diabetic Preparations in India Containing *Pterocarpus Marsupium*

Some of the popular anti diabetic preparations, marketed in India, containing *Pterocarpus marsupium* among other ingredients are given in

Brand name Manufacturer

D-Fit cap.: *Dhanwantri* Herbals, Solan.

Diabecon tab: Himalaya Drug Company, Karnataka.

Hyponidd tab.: *Charak* Pharma Pvt. Ltd., Solan.

Madhumehari granules: *Baidyanath Ayurved Bhawan* Pvt. Ltd., Jhansi.

Standardization of *Pterocarpus Marsupium*

Drug occurs as irregular pieces of variable size and thickness, golden yellowish brown with darker streaks are present on the surface; Monographs water it gives yellow coloured solution with blue fluorescence. Powder of the *Pterocarpus marsupium* shows vessels with bordered pits, fibre, tracheid, fragments of xylem rays and few crystal fibres, starch absent

Identity, Purity and Strength^[24]

Foreign matter Not more than 2%	Total ash Not more than 2%
Not more than 18 % 5,	Acid insoluble Not more than 0.5 %
Foreign matter Not more than 2%	Total ash Not more than 2%
ash	Not more than 1.5%
Alcohol soluble extractive	Not less than 7% Not less than 7.5%
Water soluble extractive	Not less than 5% Not less than 11.5%
Moisture content %w/w	0.0 + 0.17
Bitter value	7.08%
Heavy metal analysis	Lead (Limit-10 ppm): 2.2238 Cadmium (Limit-0.3ppm): 0.0641 Arsenic (Limit-10ppm): 0.4243
Solvent system	Ethyl acetate: Glacial acetic acid: Formic acid: Water (10:1.1:1.1:2.6)

CONCLUSION

Herbal medicines have been used since thousands of years as natural remedies. Peoples are looking hopefully toward Ayurveda as a cost effective better side effect free healthcare system. The plant has been studied for its pharmacological activities and regarded as universal multidimensional treatment in Ayurvedic medicines and finds its position as a multifaceted plant having a wide spectrum of medicinal activities. *Pterocarpus marsupium* is being used commercially in pharmaceutical preparations. As the medical science is now continuously changing towards the use of nontoxic herbal products having traditional medicinal properties and uses, development of modern drugs from *P. marsupium* should be emphasized for the control of various diseases. In fact, time has come to use modern science, scientific research based knowledge, on *P. marsupium* through modern approaches of drug development. For the last few years, there has been an increasing interest and awareness in *P. marsupium* research. Since last few decades a significant amount of research has already been carried out in exploring the chemistry of different parts of *P. marsupium*. Several pharmacies made useful preparations and compounds have also been marketed, which generates enough encouragement among the researcher in exploring more information about this medicinal herb. The literature review revealed that *Pterocarpus marsupium* can be used in variety of pharmacological disorders, however more investigations must be carried out to evaluate the mechanism of action of its active principles so that it's potential can be fully utilized.

REFERENCES

1. Bilijana B Petrovska, Historical review of medicinal plants usage, Pharmacognosy Reviews, wolter kluwer-Medknow publication, 2012- Jan-Jun; 6(11): 1-5, doi: 10.4103/0973-7847.95849
2. Martins Ekor, The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety, frontier in pharmacology, 10 January 2014 doi:10.3389/fphar.2013.00177
3. Kousar Begum et al, Pterocarpus Marsupium Extraction And Evaluation For Diabetic Neuropathy, Indo American Journal Of Pharmaceutical Sciences, IAJPS 2017, 4 (07), 1888-1897
4. Agnivesha, Prameha Chikitsa, Charaka Samhita. 5th ed. Varanasi: Choukamba Sanskrita Samsthana; 2001. pp. 446-
5. Antioxidant approach to disease management and the role of 'Rasayana' herbs of Ayurveda. Govindarajan R, Vijayakumar M, Pushpangadan P J Ethnopharmacol. 2005 Jun 3; 99(2):165-78
6. Rajasekharan S, Tuli SN. Vijayasara, *Pterocarpus marsupium* in the treatment of madhumeha (diabetes mellitus)- A Clinical trial. J Res Indian Med Yoga Homeo. 1976; 11: 9-14.
7. The Ayurvedic Pharmacopia of India, Part-1, Vol-1 controller of Publication, Civil Lines, Delhi, 1990, page no. 12-13
8. Badkhane Y, Yadav AS, Sharma AK, Raghuvanshi DK, Uikay SK, Mir FA et al, pterocarpus marsupium Roxb- Biological activities and medicinal properties, International journal of Advances in Pharmaceutical Sciences, 2010 1(4): 350-357
9. Dhyaney Vijayan and Sibi G, Pterocarpus Marsupium for the treatment of Diabetes and other Disorders, Journal of Complementary and alternative Healthcare , volume 9 Issue 1 -March 2019, DOI: 10.19080/CMAH.2019.09.555754
10. Yogesh Badkhane et al, *Pterocarpus marsupium* Roxb- Biological activities and medicinal properties, International Journal of Advances in Pharmaceutical Sciences 1(2010)
11. Manish Devgun, Arun Nanda and S. H. Ansari, Pterocarpus marsupium Roxb. - A Comprehensive Review, Phcog Rev. Vol, 3, Issue 6, 359-363, 2009
12. Sharma, P.V., 2015. Introduction to Dravyaguna (Indian Pharmacology). Vol. 2. Chaukhamba Publication Varanasi, India. page-682-684.
13. Venkatesh P., Dinakar A., Senthilkumar N. Hepatoprotective activity of an ethanolic extract of stem of anisochilus carnosus against carbon tetrachloride induce hepatotoxicity in rats. International Journal of Pharmacy and Pharmaceutical Sciences, 2011, 3: 243-245
14. Badkhane, Y. and lone, S. (2010). Perocarpusmarsupium: biological activities and medicinal properties. International journal of research in pharmaceutical science, 1(1) pp. 350-357
15. J.K. Grover, S. Yadav and V. Vats. Medicinal plants of India with anti-diabetic potential. J Ethnopharmacol. 81: 81-100 (2002)
16. S.P. Dhanabal, C.K. Kokata, M. Ramanathan, E.P. Kumar and B.Suresh. Hypoglycaemic activity of Pterocarpus marsupium Roxb. Phytother Res 20(1): 4-8(2006)
17. H.M. Mukhtar, S.H. Ansari, M. Ali, Z.A. Bhatt and T. Naved. Effect of aqueous extract of Pterocarpus marsupium wood on alloxan-induced diabetic rats. Pharmazie 60(6): 478-479 (2005)
18. Sander A, Smit HF, Garssen J, Fabar J, Hoijer M.A. Pterocarpus marsupium extract exhibits antiinflammatory activity in human subjects. Planta Med. 2005, 71(5): 387-392.
19. Devgun M, Nanda A, Ansari S. Pterocarpusmarsupium Roxb- A comprehensive review. Phcog Rev 2009; 3(6): 359-363.
20. Joshi MC, Dorababu M, Prabha T, Kumar MM, Goel RK et al. Effects of *Pterocarpus marsupium* on NIDDM-induced rat gastric ulceration and mucosal offensive and defensive factors. Indian journal of pharmacology 2004; 36(5); 296-302
21. V. Vats, S.P. Yadav, N.R. Biswas and J.K. Grover. Anticataract activity of Pterocarpus marsupium bark and Trigonella foenum-graecum seeds extract in alloxan diabetic rats. J Ethnopharmacol. 93 (2-3): 289-294 (2004).
22. K.L. Manikani, V. Krishna, B.K. Manjunatha, S.M. Vidya, S.D.J. Singh, Y.N. Manohara, A.U. Raheman and K.R. Avinash. Evaluation of hepatoprotective activity of stem bark of Pterocarpus marsupium Roxb. Indian J Pharmacol. 37(3): 165-168 (2005)
23. Gayathri M, Kannabiran K, Antimicrobial activity of Hemidesmus indicus, Ficus bengalensis and Pterocarpus marsupium roxb. IJP 2009; 71(5): 578-581.
24. The Ayurvedic Pharmacopia of India, Part-1, Vol-1 controller of Publication, Civil Lines, Delhi, 1990, page no. 12-13

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*Address for correspondence

Dr. Mahakal Nilesh

Assistant Professor,
Department of Rasashastra
and Bhaishajya Kalpana,
Gurudev Ayurved College,
Gurukunj Ashram, Amravati,
Maharashtra, India.

Email: nilesh.mahakal@gmail.com

Mob: 08149807710