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Review Article

A Brief Review On Pterocarpus Marsupium

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INTRODUCTION

In India, Ayurvedic medicine extensively employs the huge tree Pterocarpus marsupium to treat diabetes mellitus. In English, Pterocarpus marsupium is referred to as the Kino or Malabar tree. It is also referred to as Bija or Vijayasar in Hindi, and Asana in Sanskrit throughout India(1,2) Pterocarpus Marsupium is included in the Ayurvedic rasayans group (5,6). The Pterocarpus marsupium plant is used to treat a variety of ailments, including antihyperglycemic, skin conditions, stomach discomfort, headaches, and sores. Flowers are used to treat fever, gum kino is used to treat diarrhea, fluor Albus, flux, and bark are used to treat toothaches and act as an

ABSTRACT The extracts obtained bark and leaf of P. marsupium. Hexane, ethyl acetate and methanol were found to be effective against antibacterial activity. In the Ethyl and methanol extracts were more sensitive to the bacteria than that of hexane extracts. In vitro studies have shown that PM inhibits Pseudomonas aeruginosa, Streptococcus pyrogens and Staphylococcus aureus. Methanolic extract which is obtained from bark covering of Pterocarpus marsupium possesses hepatoprotective activity.

> astringent. It is mostly used for its bark, which is medicinal, and its wood (3,4). Diabetes mellitus has been treated with P. marsupium for thousands of years. In Sri Lanka, the latex derived from P. marsupium is a commonly used medication for diabetes. An effective dosage of one teaspoon of gum per day is thought to exist. The tree's heartwood, or centre wood, possesses antiinflammatory and anti-diabetic properties. Heartburn is treated with the barks. In Madhya Pradesh, people with diabetes mellitus receive traditional medicine in the form of heartwood from P. marsupium, which is used to make tumblers in which water is kept overnight. It is hypothesised that P. marsupium's anti-diabetic effect leads to

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decreased absorption of glucose from the gastrointestinal tract, improving blood levels of pro- and insulin in, as well as aiding in β -cell regeneration (7,8,9)

	Pterocarpus Marsupium
Kingdom	Plantae
Sub Kingdom	Tracheophytes
Super Division	Angiosperms
Division	Eudicots
Class	Rosids
Order	Fabales
Family	Fabaceae
Sub Family	Faboideae
Genus	Pterocarpus
Species	P.Marsupium

TAXONOMICAL CLASSIFICATION:

GEOGRAPHICAL SOURCE:

Large trees like Pterocarpus marsupium are primarily found in mountainous areas of Nepal, Sri Lanka, and India, including Maharashtra, Madhya Pradesh, Bihar, Uttar Pradesh, Orissa, Gujarat, Kerala, and Tamil Nadu. The Western Ghats are where it typically happens. It is primarily found in the Deccan Peninsula of India. At elevations of up to 1000 meters, it can also be found in sub-Himalayan regions. the natural However, population has significantly decreased, and the forest zones no longer contain any offending young saplings. The tree grows in the sun in tropical regions with moderate rainfall of 80 to 200 cm. It likes well-drained, rich, deep clayey loam soil. In the summer, it can withstand high temperatures as well (10,11,12).

MACROSCOPIC ATTRIBUTES:

- Grey-Ish brown hue.
- Taste: Sharp.

P. Marsupium grows from medium to enormous sizes. The tree typically reaches a height of between 14 and 30 meters and a width of 2.3 meters. Strong and somewhat bent, the stem has widely dispersed branches. The tree's stem is sturdy and ranges in colour from dark brown to grey. The bark on the outside is rough, scaly, Gray, and deeply cracked. The tree outside sapwood is a pale-yellow colour, while the interior heartwood is a golden yellow hue. The compound, odd-pinnate leaves have a stunning golden yellow bloom composed of three leaflets. Typically, there are five to seven leaflets, which are hairless on both the front and back surfaces and wrinkled, oblong, serrated, or even bilobed at the tip. There are no stipules, and the stalks are spherical, smooth, and wave from leaflet to leaflet, ranging in length from three to five inches. The majority of panicles (Cluster) are big, terminal, and grow similarly to leaves. Similar to Peduncles, they are round and tender. The months of April through July and August through October are when flowering and fruiting are typically noted. The blossoms have a slight hint of yellow tinting their otherwise white colour (12,13,14,15).



Fruit of Pterocarpus marsupium



Leaves of Pterocarpus marsupium





Bark of Pterocarpus Marsupium

AYURVEDIC PROPERTIES:

Vipaka – Katu Rasa - Kashaya Veerya – Ushna Guna - Laghu,Ruksha Prabhava - Shwitra Veerya - Ushna Doshaghnata – Kaphapittashamaka (16).

CHEMICAL COMPOSITIONS:

The major phytochemicals of PM are following:

- 1. Pterosupin
- 2. Kinotonic acid
- 3. Pterostilbene
- 4. Isoliquiritigenin
- 5. Kinoin
- 6. Liquirtigenin
- 7. Kino red
- 8. Carsupin
- 9. Marsupol
- 10. Beta-eudesmol

The components isolated from different parts of PM are:

From the Aq. extract of Pm heartwood are few flavonoids C-glycosides:

3-(a-methoxy-4-hydroxybenzylidene)-6- hydroxy benzo-2(3H)-furanone-7-C-b-d-glucopyranoside, 2-hydroxy-2-p-hydroxybenzyl-3(2H)-6 hydroxybenzo furanone-7-C-b-dglucopyranoside, 2,6hydroxy-2-(4hydroxybenzyl)-benzofuran-7-C-b-dglycopyranoside, 8-(C-b-d-glucopyranosyl)-7,30,40-trihydroxyflavone, 1,2-bis (2.4dihydroxy,3-Cglucopyranosyl)-ethanedione, C-bd-glucopyranosyl-2,6-dihydroxyl benzene and sesquiterpene.

Some new phytochemicals are:

Catechin, epicatechin, triterpene alcohol, pterosuprin, erythrodiol-3-monoacetate, stilbene, β- eudesmol, retusin 7-glucoside, 5,4'-dimethoxy-8-methylisoflavone, irisolidone7-rhamnoside, sesquiterpene alcohol, carpucin, 4,4'dihydroxy-Lmethylhydrobenzoin, 2-hydroxy-2benzylcoumaranone, propterol, isoliquiritigenin, garbanzol, 5- deozykaempferol, Liquiritigenin, phydroxybenzaldehyde chalcone. aromatic dihydrochalcone, 7, 4'aldehyde, 3. tetrahydroxyflavone, 8-C-D-glucopyranosyl-3, 7, trihydroxyflavone, 4-3. 7, 4'tetrahydroxyflavone; 3'-C-D-glucopyranosylhydroxydihydrochalcone and some phenolic compounds (17,18,19,20,22,23,24).

Phytochemicals obtained from flowers are:

Two aurone glycosides obtained which are 4, 6, 4'- trihydroxyaurone 6-O-rhamnopyranoside and 4, 6,4'- trihydroxy-7-methylaurone 4-Orhamnopyranoside (21).

And glycosides obtained from heartwood are: 6, 4'- dihydroxy-7-methylaurone 6-O rhamnopyranoside and 4, 6, 3',4'tetrahydroxyaurone 6-O-rhamnopyranoside.

The roots of PM yields two flavone glycosides: 7-hydroxy-6, 8-dimthyl flavanon-7-O- α -L-arbinopyranoside and 7, 8, 4'-trihydroxy-3', 5'-dimethoxyflavanone-4'-O-beta-D (25).



The screening for the levels of inorganic contents of PM bark yields following: Nitrogen (1.50-3.13%), magnesium (0.21-0.339%), calcium (0.60-1.848%), Phosphorus (0.023-0.163%) and

some trace elements such as zinc (1.98-3.62mg/100gm), iron (11.38-44.34mg/100gm), cobalt (0.68-3.2mg/100gm), manganese (2.0-4. 94mg/100gm) (25,26).



FIG 03 : Chemical structure of some phytochemicals obtained from PM (27).

PHARMACOLOGICAL PROPERTIES:

1. Antidiabetic Activity:

Pterocarpus marsupium is an ayurvedic plant that has been used extensively for thousands of years to treat diabetes mellitus is one of many medicinal plants used to cure diabetes. It usually has regenerative, beta cell-protective, and blood glucose-lowering qualities. By healing the damage to the beta cells and repopulating the islets, PM fully restores normal insulin secretion. It was discovered that alcoholic extract and other PM components helped to reduce blood glucose levels (28,29,30,31,32,33,34).

2. Anti-tumor Induced Activity (Anti-Cancer):

It has been discovered that Pterostilbene and Stilbene exhibit anti-cancer properties. Certain studies revealed that Pterostilbene enhanced the mitochondrial apoptotic signals, such as Bax and the caspase series, and inhibited cell proliferating factors, such as Akt and Bcl-2. Additionally, it was shown that they inhibited two significant inducers of metastasis: α -Methyl Acyl CoA racemose and Matrix Metalloproteinase 9. Pterostilbene can be utilized to treat both prostate and breast cancer because it has several target locations for inducing apoptosis (35,36,37,38).

3. Anti-Inflammatory Activity (Reducing Inflammation):

Strong promise for P. marsupium's antiinflammatory properties is also evident. The pterostilbene-containing P. marsupium extract has been tested for its ability to selectively inhibit COX-1/2 and suppress PGE2 in LPS-stimulated PBMC. It was discovered that aqueous extract of PM at dosages of 100 mg or 200 mg/kg decreased the elevated inflammatory cytokine. The PM stem bark methanolic and aqueous extract exhibits a favourable reaction to the anti-inflammatory action. Bacterial growth was suppressed by the Pterocarpus marsupium aqueous extract (39,40,41,42).

4. Anti-Fungal Activity:



Pterocarpus marsupium showed beneficial effects as a topical agent against Tinial infection such as T.cruris and T.corporis. Good response was obtained within first 3 to 4 days after application. The antimicrobial activity of Pterocarpus marsupium was evaluated against pathogenic bacteria Staphylococcus aureus, Pseudomonas aeruginosa and Klebsiella pneumonia in an in vitro condition The aqueous extract of Pterocarpus marsupium inhibited growth of bacteria (43,44).

5. Cardiotonic Activity:

The cardioprotective effect of P. marsupium heartwood is mainly demonstrated by its aqueous extract. Strong antioxidants 5,7,2-4 tetrahydroxy isoflavone 6-6 glucoside, which are thought to have cardioprotective properties, make up the pharmacological composition of this plant (45,46).

6. Antibacterial Activity:

Using the paper disc diffusion method, the antibacterial or antimicrobial activity of PM stem methanolic extract was evaluated against gramnegative bacteria, Escherichia coli, and grampositive bacteria, Bacillus coagulants.

The bark and leaves of P. marsupium were extracted. It was discovered that methanol, ethyl acetate, and hexane were efficient against antibacterial activity. Compared to hexane extracts, methanol and ethanol extracts showed greater sensitivity to the bacterium According to in vitro research, PM inhibits Staphylococcus aureus, Streptococcus pyrogens, and Pseudomonas aeruginosa (47,48,49,50).

7. Hepatoprotective Activity:

There is hepatoprotective action in methanolic extract that is derived from Pterocarpus marsupium bark (51,52).

CONCLUSION:

Since ancient times, herbal medicines have been utilized as natural cures. Many are turning to Ayurveda since it is a less expensive and side effect-prone treatment approach. It has been demonstrated that PM possesses a wide range of pharmacological properties, including analgesic, antimicrobial, anti-cancer, anti-hyperlipidaemic, anti-inflammatory, antioxidant, cardiotonic, and hepatoprotective effects. diverse plant sections provide diverse phytochemicals with varying activities. Some of the basic phytochemicals that are extracted include epicatechin, pterostilbene, marsupin, pterosupin, and liquirtigenin.For centuries, Pterocarpus M has been utilized to treat a wide range of human illnesses. The wooden tumblers, considered as a miracle cure for diabetes, are still used to manage the disease. They are constructed from the bark of the PM tree. After filling the tumbler with water and leaving it overnight, people with diabetes have demonstrated positive results from drinking this water twice a day for thirty days. According to Ayurvedic scriptures, PM can lower blood sugar, cleanse the blood, detoxify the body, and revitalize the body's numerous cells. Additionally, PM has been touted as a natural means of managing high blood pressure, obesity, and joint pain.

Components Isolated from Pterocarpus Marsupium:

- Flavonoids C-glycosides found in heartwood extract include 3-(a-methoxy-4hydroxybenzylidene)-6-hydroxy benzo-2(3H)-furanone-7-C-b-d-glucopyranoside.
- Other components include 2-hydroxy-2-phydroxybenzyl-3(2H)-6 hydroxybenzofuranone-7-C-b-dglucopyranoside.
- Medicinal Properties of Pterocarpus Marsupium:
- Used for diabetes treatment for thousands of years.
- Heartwood has anti-diabetic and antiinflammatory properties.
- Bark is used for heartburn and toothache.
- Therapeutic Activities:
- Cardiotonic activity: Cardio protective effects.



- Antibacterial activity: Effective against grampositive and gram-negative bacteria.
- Anti-inflammatory activity: Contains pterostilbene with PGE2-inhibitory properties

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