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A review article: a surpass effect of pterocarpus marsupium on peptic ulcer disease

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ABSTRACT

The Pterocarpus marsupium belong to family Fabaceae and is widely distributed in central, western and southern regions of India. The role of Pterocarpus marsupium as anti-diabetic has been very well established. Its extract has been prepared using many methods like infusion, maceration, decoction and percolation. Several chemical constituents like pterostilbene, (-)-epicatechin, pteropines, marsupinol, etc., have been identified and isolated. Pterocarpus marsupium extract also shows promising results in cataract and hypertriglyceridemia. This plant also finds its use as cardiotonic and hepatoprotective agent. Studies have also been reported to demonstrate its ability as a specific COX- 2 inhibitor. The present review explores its description, traditional uses, extraction methods, chemical constituents, pharmacological activity and commercial significance so that its potential as a multipurpose medicinal agent can be understood and appreciated.

INTRODUCTION

Plants are indispensable to man for his life. All Phyto of plants viz. Thallophytes, Bryophyta, Pteridophytes and Spermatophyte, contain species that yield official and unofficial products of medicinal significance. The history of herbal medicine is as old as human civilization. Endowed with a wide variety of agroclimatic situations, India is practically herbarium of the world. The significance of medicinal and aromatic plants has been highlighted from time to time. It is trusted that the drugs of natural origin shall play a crucial role in healthcare specially in the rural areas of India [1]. In deciduous, evergreen forests of central and southern regions of India Pterocarpus marsupium Roxb. are grown. It is found majorly in the few areas of Gujrat, Madhya Pradesh, Bihar and Orissa [2, 3].

Taxonomical Classification

Domain : Eukaryota
Kingdom: Plantae
Subkingdom: Viridaeplantae
Phylum : Magnoliophyta
Subphylum: Euphyllophytina
Infraphylum: Radiatopsis
Class: Magnoliopsida

Subclass : Rosidae
Superorder: Fabanae
Order : Fabales
Family : Fabaceae
Genus : Pterocarpus
Species : marsupium [4].

Botanical Description

They are of moderate size to large trees. The height scales from 15 to 30 meters. The stem is fleshy and recurved with widely broadened branches. The crust is grey and dark brown. The leaves are sophisticated and imperial. Leaves 5-7, pine, chronic, obese, embarrassed, or even bi lob-like, and are glued to both surfaces. Rounded and smooth petioles and wavy from leaflet to leaflet, 5 or 6 inches elongated and there is no stalk. Panicles are very broad and extreme; The leaves, like leaves, will be bilateral. Peduncles and pedicels are globular and a little fuzzy. Small Bracts, caduceus, solitary beneath each distribution and subdivision of panicle. The flowers are truly populous, white, with a small tone of yellow. Long Vexillum, slight claw, very expansive; sides are reflexed, waved, twisted and veined; keel is two pestles, stick a little slightly near the middle, waved, like vexillum. 10 Stamens, concerted near the base, although soon breaking into two parcels of 5 each; anthers are bulbous and Bi-lobed. Ovary is elliptical, pedicelled, generally Bi-celled; transverse cells and 1-seeded. Ascending Style. The legume, borne on a long petiole, is 3/4th orbicular, the upper detritus, that broadens from the pedicel to the detritus of the style that's straight, the gross is covered with a waved, weeny, downy, aerial wing, swelled, rouges, woody in the interiors, where lodged seeds are present and without opening; commonly one but frequently bi-celled. Single seeds and reniform [3, 5].

Description of Drug

The drug composed of a wood core of Pterocarpus marsupium. It composed of irregular pieces of different size and thickness. Golden yellowish- brown in colour with murky streaks. Actually, hard and crisp. When disperse in water it imposes yellow coloured solution with blueish blossoming. Alternating bands of larger and compact polygonal cells are defined by transverse section which consists of tracheids, few fibre tracheids, some xylem parenchyma and crossed by xylem rays. Founded that Xylem vessels are all over dispersed.

Tyloses replete with tannins are commenced. Tracheids are elongated, thick walled with pointed ends and smooth pits. Wood texture parenchyma cells are rectangular with simple etch and wood texture rays are mono to biseriate. Presence of calcium oxalate crystals and absence of starch is observed [2].

Synonyms

Sanskrit : Bijaka, Pitasara, Asanaka, Bijasra
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 [2].

Ethnomedical Uses

The genus is commonly dispersed on the Earth and the drug from this genus is recognized as 'kino'. The phloem of stem consists red astringent fluid commenced in secretory cell which emanate after given laceration. Odourless Kino has an astringent taste and strips in the teeth, shading the saliva red in colour [6]. As an astringent it is idolized in diarrhoea, dysentery and many more. Crushed leaves are used for skin diseases, deep sores and boils. Diabetes is treated through woods [7, 8].

Extraction Methods

Infusion

Since ages the Pterocarpus marsupium heartwood has been utilized to treat diabetes. The beakers constructed from heartwood are loaded with water and left to rest during the night to furnish 'Beeja Wood Water' [8]. Mohire et al. From the dried heartwood of Pterocarpus marsupium aqueous extract was produced by keeping in a beaker having 100 ml. of distilled water for approx.

12 hours. In the morning brown coloured aqueous extract possessing light blue shade on surface was collected and finally concentrated on the water bath. Using rotary evaporator, the product was dried, eventually dried using sunlight and converted into powder [9]. Central hard wood which was dried and crumbled into coarse powder. The aqueous extract was prepared using 24 hours infusion (strength 1:8) prepared daily and absorbed. They also prepared 7 days infusion in the same strength [10]. By Absorbing 50 grams of saw dust of the wood in distilled water measuring 500ml for whole night at room temperature aqueous infusion of Pterocarpus marsupium was adapted. As a result, 10ml of infusion represented to 1gm of the crude drug when the supernatant liquid was collected and the final volume was adjusted. For the purpose of subsequent use, the infusion was stock pilled in a sealed container in refrigerator at 4^{o} c [11]. A fine powder is derived after the dried bark was grinded by Vats et al. and afterwards soaked in equal volume of water, stirred occasionally and left overnight. The aqueous extract was collected when the pulp obtained was filtered, the filtrate dried at reduced temperature and then after final procedure of lyophilization takes place [12Afterwards the bark of Pterocarpus marsupium was grinded in an electric grinder by Grover et al. and Vats et al. The it was left overnight after soaking the powder in equal amount of water and stirred immediately. The filtrate derived after filtering the pulp through a coarse sieve was the dried at a reduced temperature [13, 14]. An aqueous extract was derived in the form of powder when the bark of Pterocarpus marsupium was grinded in the electric grinder and then after wards that powder was soaked in 1500ml of distilled water and stirred intermittently and then left stationary. And this whole procedure is done by Grover et al. A filtrate obtained when the mixture was filtered through a sieve lined with muslin cloth after 36 hours and the filtrate thereafter was completely lyophilized to dry powder. At low temperature this dried powder was stored [15].

Decoction

According to Ayurvedic Pharmacopoeia (1990) 50-100 grams of the drug is recommended for decoction process [2]. Studies defines the procedure as, heartwood of Pterocarpus marsupium was dried and then pulverized, distilled water was used for simmering until the volume dropped to less than 100 ml, then only strained, and adjustment was done to 100 ml in order to get an extract, Correspondence was defined as 1 ml to 1 gram of the drug [16]. Suri et al. Decoction of powdered Pterocarpus marsupium heartwood was prepared in boiling water and dried through Spraying [17].

Maceration

Ahmed et al. Converted the wood of Pterocarpus marsupium into small pieces and absolute ethanol was used for extraction for approx. 1 week [18]. Joshi et al. silted the wood into small pieces after collection. For maceration methanol was used for 7 days. The process of vacuum dried was used for extract and stockpiled in a refrigerator until future use [19]. In some study, cold double maceration was used for the preparation of alcoholic extract of the bark of Pterocarpus marsupium. The concentration of extract was done using a rotary flash evaporator and a desiccator was used to dry it [20].

Percolation

Sepaha and Bose placed centre of heartwood, which is dried and bruised into coarse form of powder. With the addition of 95 % alcohol, the extract was processed using percolator (1:6) [10]. Chakravarthy and Gode ripped the fresh growl into levy chips and petroleum ether (60-80 ° C) in a Soxhlet apparatus was used for extraction for 24 hours [21].

v) Hot Water Extraction: Maurya et al. and Handa et al. exhaustive extraction of powdered heartwood (5 Kg) was performed with boiling water (4x16 ml). Suspension of concentrated extract was done using water (2.0 litre) and consecutively partitioned applying ethyl acetate and n-butyl alcohol [22, 23] .

Phytochemistry

Heartwood of Pterocarpus marsupium was dried and extracted using ethyl which revealed the existence of following constituents: pterostilbene, (2S)-7-hydroxyflavanone, isoliquiritigenin, liquiritigenin, 7,4'-dihydroxyflavone, marsupsin, pterosupin, p-hydroxybenzaldehyde, (2R)-3-(p-hydroxyphenyl)-lactic acid and pm-33 [24]. Tripathi and Joshi confined 3 compounds from the fraction of ethyl acetate of Pterocarpus marsupium,

retusin-8-O-α-L-arabinopyranoside, naringenin, lupeol [25]. The Pterocarpus marsupium extract of the dried heart tree decoction of the ethyl acetate extract was dissolved and the solution was given to the poker in the other compounds. [16]. Handa et al. confined and acknowledged an isoaurone C-glucoside called as pterocarposide [23]. Suri et al. deserted an odd C-glucoside, 1-(2', 6'-dihydroxyphenyl)-β-D-glucopyranoside using the aqueous extract of crumbled dried heartwood of Pterocarpus marsupium [17]. Maurya et al. Pterocarpus prepared the algae essence of marsupium and confined five new flavonoid C-glucosides: pteroisoauroside, pteroside, flavon C-glucoside, vijayosin, marsuposide and two familiar compounds, sesquiterpene, C-β-D-glucopyranosyl-2,6-dihydroxyl benzene 22]. In different study, Extraction was performed adopting percolator using bark of Pterocarpus marsupium adding ethanol and the phenolic constituent was diagnosed as (-)-epicatechin. Sterols named as sitosterol and stigmasterol were also confined [21]. Tripathi and Joshi deserted 2 new flavonoid glycosides using the roots of Pterocarpus marsupium, 7, 8, 4'-trihydroxy-3', 5'-dimethoxy flavanone-4'-O-beta-D-glucopyranoside and 7-Hydroxy-6, 8-dimethyl flavanone-7-O-alpha-L-arabinopyranoside [26].

PHARMACOLOGY

Antidiabetic/Antihyperglycemic/Hypoglycaemic activity

Grover et al. abstracted the medicinal plants composing anti diabetic activity and found Pterocarpus marsupium to be one of the encouraging plants [37]. Dhanabal et al. Alcoholic extract of Pterocarpus marsupium bark was prepared and subsequently extricated with toluene, chloroform, ethyl acetate and butanol. Beneficial effects was observed on blood glucose levels [20]. In Oct 1995 a, multicentre randomized controlled trial was undertaken using flexible dose double blind and concluded that Malabar Kino is a highly competent blood glucose lowering agent in January 1998, even tolbutamide was even compared with this plant for its treatment of type 2 diabetes [38]. In different study, for hypoglycaemic activity on alloxan induced diabetic rats an aqueous essence of Pterocarpus marsupium wood was cloistered which shown statistically significant results [39]. Vats et al. Extraction was performed on the bark of Pterocarpus marsupium and assessment was done on the grounds of anti-hyperglycemic and hypoglycaemic efficacy of Pterocarpus marsupium in controlled and alloxan cajoled diabetic rats. Study derived that the extract presented a small but important hypoglycaemic effect in normal rats which is compelling and clear dose dependent anti-hyperglycaemic effect [14]. Manickam et al. the anti-hyperglycaemic potential of phenolics from Pterocarpus marsupium was evaluated. Both the drugs pterostilbene and Marsupsin naturally reduced the blood glucose level of rats having hyperglycaemia [40]. For treating non-obese diabetes, it is already proved through clinical study on Pterocarpus marsupium [41]. Ahmad et al. Extraction of Pterocarpus marsupium wood with absolute ethanol and then ethyl acetate soluble fractions were taken which when checked upon alloxan induced diabetic rats considerably reduced the blood sugar level with a comparable increase in blood insulin level [18].

Anti-hyperinsulinemia and anti-hyper triglyceridemic activity

The aqueous essence of Pterocarpus marsupium bark extensively interrupted insulin resistance (hyperinsulinemia) and hypertriglyceridemia [15]. In different study, Jahromi and Ray for 14 consecutive days directed the ethyl acetate essence of heartwood of Pterocarpus marsupium in rats. The results proved that there is a noticeable reduction of total cholesterol, serum triglyceride, LDL- and VLDL- cholesterol without any important activity on the level of HDL- cholesterol [16].

Cardiotonic activity

In a very high dilution in the study, it was found that the aqueous extract of the heart tree of Pterocarpus marsupium has a negative chronotropic and positive inotropic effect on frogs. Results displayed that an excellent cardiotonic activity is possessed by aqueous extract of Pterocarpus marsupium [9]. In different study, extraction from the bark of Pterocarpus marsupium was done with result (-)- epicatechin that is studied and it proved cardiac stimulant potential in per put frog hearts creating an increase in force along with enhancement in rate. Thus (-)-epicatechin showed a cardiac stimulant property [21].

Anti-cataract activity

Vats et al. established the anti-cataract potential of the aqueous essence of Pterocarpus marsupium bark. A decrease in the opacity index of alloxan induced diabetic rats makes it evident [12].

COX-2 Inhibition

Hougee et al. A study demonstrating a PGE2 inhibitory effect of a commercially available extract of Pterocarpus marsupium characterized by pterostilbene. Pterocarpus marsupium extract reduces PGE 2 production, indicating COX-2-specific inhibition [42}.

Hepatoprotective activity

In a study, it was derived that the methanolic extract of stem bark from Pterocarpus marsupium acquires hepatoprotective potential [43].

CONCLUSION

Within developing countries, offering modern healthcare dexterity is still in infancy. Because of economic complusion, it is frugal to look for alternative in herbal medicines. Pterocarpus marsupium has been put as anti-diabetic since time old-age. Water was filled in the beaker made from heartwood that was conceded to stand through-out the night to provide "Beeja Wood Water". In commercial pharmaceutical preparations, Pterocarpus marsupium is being used. Also, this paper acknowledges that by various methods like infusion, decoction, maceration and percolation the Pterocarpus marsupium has been extracted. Many chemical ingredients like pterostilbene, pterosupin, marsupsin, (-)-epicatechin etc. have been diagnosed and isolated. It conceded that Pterocarpus marsupium can be employed in variety of pharmacological disorders, although many more investigations must be carried out to examine the MOA of its active principles so that it's potential can be entirely employed.

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