International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 105-109 www.ijprajournal.com ISSN: 2249-7781

Phytochemical and Physicochemical evaluation of Raktachandana

Dr. Chitrarekha S. Uike[1], Dr. Priya D. Indurkar [2] and Dr. S.T. Landge[3]
Assistant Proffessor[1,] Assistant Proffessor [2] and HOD & Assistant Proffessor [3]
Department of Dravyaguna, Shri Ayurved Mahavidyalaya,Nagpur.

Submitted: 01-11-2023 Accepted: 12-11-2023

ABSTRACT: -
Pterocarpus santalinus, Linn. is Red sandalwood which is possessed with the characteristics of timber quality and exquisite color. In Ayurveda it is referred to be as Raktachandana. It is an endangered species due to its slow growth and rarity. Presently 80 medicinal plant species are now considered threatened. Pterocarpus santalinus is among the threatened species due to over exploitation. The species is endemic to India and considered globally endangered with illegal harvest being a key threat. Now its demand is increasing, commercial application is yet to be started due to lack of reliable information on various aspects of the plant. It has various uses mentioned in our classics. Also, various Phytochemical studies has been done on it. But this species is still pharmacologically unexplored. The present paper reviewed botanical uses, explored phytochemical and phytophysiological properties of Pterocarpus santalinus Linn.

Keywords: - Raktachandana, Red sandalwood, Phytochemical, Physicochemical etc.

I. INTRODUCTION: -

Pterocarpus santalinus Linn. (Family-Fabaceae) also known as Red sanders or red sandalwood. This is because it is possessed with characteristic timber quality and exquisite color with beauty. Pterocarpussantalinus, with the common names red sanders, red saunders, YerraChandanam, Chenchandanam, red sandalwood, Raktachandana, and saunderswood, is a species of Pterocarpus endemic to the southern Eastern Ghats Mountain range of South India[1].

Due to its slow growth and rarity, Pterocarpus santalinus is listed as an Endangered species by the IUCN, because of overexploitation for its timber in South India[2].

The red wood of this plant consists of the natural dyecalled santalin, which is usedas colouring pharmaceutical preparations and foodstuffs. It also possesses anti-inflammatory, anti-helminthic, anti-pyretic etc. properties. The decoction has cooling effect therefore, used in treating eye diseases, ulcers, mental aberrations and in inducing vomiting. It is also used in case of haemorrhage, dysentery, aphrodisiac and diaphoretic activities[3]. Ethanolic extract of stem bark posses' anti-hyperglycaemic activity. Phytochemical screening of aqueous and ethanolic extracts of stem bark shows the presence of alkaloids, phenols, glycosides, sterols, tannins, flavonoids, triterpenoids, saponins along with isoflavoneglucosides and two anti-tumorlignans; Savinin& calocedrin[4]. However, this species has been remained unexplored pharmacologically. The present paper reviewed botanical uses, phytochemical and physicochemical properties of Pterocarpus santalinus, Linn.

VERNACULAR NAMES[5]
Hindi: Lalchandan, RagatChandan
Marathi: TambadaChandana or Raktachandan
Bengali: Raktachandan
Gujarati: Ratanjali
Kannada: Agslue, Honne
Malayalam: Patrangam, Tilaparni
Tamil: Atti, Chensandanam, Semmaram, SivaffuChandanam
Telugu: Agarugandhamu, Errachandanam, Raktachandanam, Raktaghandhamu

Description[6]: -

Pterocarpus santalinus is a light-demanding small tree, growing to 8 metres (26 ft) tall with a trunk 50–150 cm diameter. It is fast-growing when young, reaching 5 metres (16 ft) tall in three years, even on degraded soils. It is not frost tolerant, being killed by temperatures of −1 °C.
The leaves are alternate, 3–9 cm long, trifoliate with three leaflets.

The flowers are produced in short racemes. The fruit is a pod 6–9 cm long containing one or two seeds.
Nearly 80 medicinal plant species are now considered threatened. Pterocarpus santalinusis

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 105-109 www.ijprajournal.com ISSN: 2249-7781

among the threatened species due to over exploitation without commensurate replacement of natural stands. The species is endemic to India and considered globally endangered with illegal harvest being a key threat. Now its demand is increasing, commercial application is yet to be started due to lack of reliable information on various aspects of the plant.

OBJECTIVES

To determine the Phytochemical and physicochemical parameters of Pterocarpussantalinus, Linn.

MATERIALS AND METHODS

a) Physicochemical Parameters of powdered form of Pterocarpus santalinus,Linn. such as different ash content, extractive values, moisture content were performed.

b)

1. Moisture Content: -

2 g of each sample were placed in pre-weighed flat porcelain dish, dry in the oven at 100℃ ±5℃ till the constant weight was obtained. The loss of weight was calculated with reference to air dried material.

2. Total Ash Content: -

2 gm of air-dried powder was placed as a uniform layer in crucible silica and ignite gradually up to 500-600℃ until it was white indicating the absence of carbon, allowed to cool and weighed to determine the percentage of ash with reference to air-dried respective samples.

3. Acid Insoluble Ash Content: -

The ash was boiled with dilute HCL for 5 minutes and insoluble matter was collected in a sintered glass crucible washed, ignited, and cooled finally it was weighed to calculate the percentage of acid-insoluble ash with reference to the bone dried material.

4. Water-Soluble Ash Content: -

Total ash was boiled with water for 5 minutes and insoluble ash was collected in a sintered glass crucible washed ignited at a temperature not exceeding 45℃. Cool and weighed for the determination of water-soluble ash with reference to the bone dried drug.

5. Solvent Extractive Values: -

5gm of the air dried, powdered macerated with 100 ml of solvent for 24 hours, shaken frequently and allowed to stand for 24 hours. Thereafter, filtered, evaporated the filtrate to dried and weight was taken. The percentage of solvent soluble extractive with reference to bone dried sample must be calculated.

c) Preliminary Phytochemical Screening of Extracts of Pterocarpus santalinus,Linn. were done: -

Medicinal plants contain different compounds like glycoside,alkaloid, volatile oils, tannins, saponins, flavonoids etc. To check the presence or absence of primary and secondary metabolites, all the extract are subjected to chemical tests.

1. **Saponins Foam test-**

Samples were dissolved in distilled water and shaken vigorously, if a layer of foam on top forms which is stable, this indicates the presence of saponins in the sample.

2. Flavonoids NaOH Test-

1ml of the sample with 10ml of 1% NaOH solution is taken and gently shaken. Ifyellow colour is observed it denotes the presence of flavonoids.

3. **Glycosides Hansch Test-**

In aqueous extract conc. H2SO4 is added from the side walls and the formation of a brown ring suggests the presence of carbohydrate.

- Molisch's test- The filtrate was tested with alcoholic solution of _ napthol and sulphuric acid. A purple-coloured ring indicated the presence of carbohydrates.
- Fehling's test- The filtrate was treated with equal quantity of Fehling A (Copper sulphate) and Fehling B (Sodium potassium tartarate) and solution was heated. Brick red precipitate indicates the presence of sugars
- Barfoed's test- Formation of red colour within 2 min after addition of the reagent indicates the presence of monosaccharides.
- Benedict's test- The filtrate was heated with this reagent for 2 min. Formation of red precipitate indicates the presence of reducing sugars.
- Selwinoff's test- The filtrate was heated with this reagent for 1-2 min. The formation of red colour of the solution indicated the presence of ketohexose like fructose.

4. **Tests for non-reducing sugars**:-

The aqueous and hydroalcoholic Heartwood extracts which did not give response to Fehling's

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 105-109 www.ijprajournal.com ISSN: 2249-7781

and Benedict's tests confirmed the presence of non-reducing sugars. The presence of nonreducing sugars was also indicated by positive Fehling's and Benedict's tests by the hydrolysed test solution.

5. Tests for non-reducing polysaccharides:-

In this test, 3 ml of test solution of extract was mixed with few drops of dilute iodine solution. The blue colour of the solution confirmed the presence of non-reducing polysaccharides.

6. **Test for gums and mucilage**: About 1 ml of extract was added slowly to about 25 ml of alcohol with constant stirring. Formation of a precipitate indicates the presence of gums and mucilage 5. Test for resins the extract was dissolved in alcohol and diluted it 10 times with water, turbidity formed indicated the presence of resins.

7.

8. Proteins Xanthoprotein Test-

3 ml of extracts solution with 1 ml conc. H2SO4 is mixed and boiled. If yellow precipitate is obtained, it indicates the presence of proteins in it.

9. HPTLC:-

3 gm of coarsely powered drug of each batch is taken in 100 ml of distilled water & alcohol respectively. Extracted for 24 hours by cold extraction technique with occasional shaking. The extract was decanted and makes up to 100 ml in a volumetric flask. It was concentrated to 5-10 ml in a water bath & subjected to Chromatography.
Stationary phase: HPTLC Silica gel 60 plate (Alluminium Sheets, 20×20cm) Merck Pvt.Ltd, of 0.2 mm thickness.

Solvent system: Toluene: Ethyl Acetate (7:3) Volume of test solution applied: 4µl Distance travelled by solvent system: 8 cm Development chamber: Twin trough chamber with SS lid ranged from (5×5- 20×20 cm)

II. RESULTS AND DISCUSSION

Physicochemical characteristics of the crude drug. Various physicochemical characteristics of the powder drug of Heartwood were carried out.

Table 1: Physicochemical Parameters of Pterocarpus santalinus,Linn.

Sr. no.	Parameter	Average value
1.	LOD at 1050	4.3%
2.	Water soluble extract	7.4%
3.	Alcohol soluble extract	22.35%
4.	Acid insoluble ash	0.5%

Ash analysis and moisture contents: - In the present study ash analysis for crude powder drug of Heartwood was carried out. It was observed that highest value of total ash was recorded for Heartwood (6.5%). Acid insoluble ash was in the range of 0.5%, Water soluble ash was in the range of 7.4 % (Table 1).

Table 2: Preliminary Phytochemical Screening of Extracts of Pterocarpus santalinus,Linn.

Sr.No.	Constituent	Procedure	Observation	Result
1.	Alkaloid	1ml Alcohol extract+1.5% Hcl (4drops)+Wagner solution	A yellow colour ppt is formed.	Absent
2.	Flavonoid	0.5ml alcohol extract +5 to 10 drops Hcl + Mg	Pink radish colour is formed	Absent
3.	Resin	1ml extract+2ml Acetone	Turbidity is Formed	Absent
4.	Saponin	5ml aqueous solution + NaHO3 (1 drops)	Honey comb like is formed	Present
5.	Tannin	2ml extract + 5%fecl3(3drops)	Brown colour is obtained	Present
6.	Carbohydrate	2ml aqueous +1ml fecl3	Red or brick red ppt is formed	Absent
7.	Protein	1ml aqueous extract + 10% w/v NaOH (5 drops) + 3% CuSO4	A red or violet colour is obtained	Absent

International Journal of Pharmaceutical Research and Applications
Volume 8, Issue 6 Nov-Dec 2023, pp: 105-109 www.ijprajournal.com ISSN: 2249-7781

Phytochemical screening of the leaves revealed that Proteins, carbohydrates, and tannins were present in both aqueous and ethanolic extracts of all the parts. Alkaloids were detected in both aqueous and ethanolic extracts of leaf and stem. Flavonoids were present in both type of extracts of all parts except root. Saponins and glycosides were present in all extracts; however, Glycosides were not detected in Borntrager test. Phytosterol and tri-terpenoids were present in all the parts, while spot test for fixed oil gave negative result. The result showed that these plants rich in bioactive compounds and hence is a potential source of therapeutic properties (Table 2).

Table no.3: -
Secondary metabolites were taken into consideration: -

Sr. No.	Secondary metabolites	Methanol	Ethyl acetate	Ethanolic	Aqueous
1.	Steroids	+	+	+	+
2.	Triterpenes	++	++	+	-
3.	Saponins	+	-	+	+
4.	Tri terpinoidalsaponins	+	-	++	-
5.	Alkaloids	+	+	+	+
6.	Carbohydrates	-	+	+	-
7.	Flavonoids	++	+	++	+
8.	Tannins	++	+	+	+
9.	Glycosides	+	+	+	+
10.	Polyphenols	+	+	+	+

Table no. 4: -
High performance thin layer chromatography – Raktachandan

Sr. No.	Rf value	
1.	Rf 1 (yellow)	0.09
2.	Rf 2 (black)	0.14
3.	Rf 3 (light blue)	0.30
4.	Rf 4 (navy blue)	0.29
5.	Rf 5 (brick red)	0.35
6.	Rf 6 (blue)	0.49
7.	Rf 7 (Light blue)	0.69
8.	Rf 8 (light blue)	0.8
9.	Rf 9 (light yellow)	0.89

III. CONCLUSION: -

This study gives some bullet points on the brief description on the Phytochemical as well as physicochemical properties of Raktachnadana. The preliminary phytochemicals tests (Table 2) showed the presence of saponins, tannins and absence of alkaloid, flavonoids, resins, carbohydrates, and proteins. Physicochemical parameter such as loss of drying, ash value, acid soluble ash and water and methanol soluble extractive values, qualitative and quantitative test of Pterocarpus santalinus,Linn. were determined. Preliminary phytochemicals screening of methanol extract and aqueous extracts showed the presence of saponins and tannins. HPTLC were done for standardization of the medicine.

REFERENCES: -

[1]. https://en.wikipedia.org/wiki/Pterocarpus_santalinus
[2]. Kukrety S, Dwivedi P, Jose S, Alavalapati JRR. Stakeholders' perceptions on developing sustainable Red Sanders (Pterocarpus santalinus L.) wood trade in Andhra Pradesh, India. For Policy Econ 2013
[3]. Durgavati Yadav1,et al, Pharmacognostic evaluation of Pterocarpus santalinus Linn., © 2019 JETIR April 2019, Volume 6, Issue 4, www.jetir.org (ISSN-2349-5162), ttps://www.researchgate.net/publication/332735818_Pharmacognostic_evaluation_of_Pterocarpus_santalinus_Linn.

[4]. Kondeti VK, Rao BK, Maddirala DR, Thur SK, Fatima SS, Kasetti RB, et al. Effect of Pterocarpus santalinus bark, on blood glucose, serum lipids, plasma insulin and hepatic carbohydrate metabolic enzymes in streptozotocin-induced diabetic rats. Food Chem Toxicol. 2010;48:1281–
7. [PubMed] [Google Scholar] [Ref list].
[5]. Latheef SA, Prasad B, Bavaji M, Subramanyam G. A database on endemic plants at Tirumala hills in India. Bioinformation 2008.
[6]. https://en.wikipedia.org/wiki/Pterocarpus_santalinus