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PHARMACOGNOSTIC AND PRELIMINARY PHYTOCHEMICAL EVALUATION OF THE BARK OF *LAGERSTROEMIA INDICA* L.

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Abstract: -

Lagerstroemia indica it is reported to be useful in many conditions like fever, ulcers, and digestive disorders, anti diabetic and skin diseases. Bark of the plant is used in Ayurveda system of medicine. They require standardization before it enters into the market. The present study was aimed at Pharmacognostic and preliminary phytochemical evaluation of the bark of *Lagerstroemia indica*L.The pharmacognostic investigations were carried out in terms of organoleptic, microscopic and physical parameters,behaviour of bark powder towards chemical reagents,Physico-chemical Evaluations, Phytochemical screening. The dried bark powder was subjected to cold maceration using hexane, alcohol,petroleum ether, chloroform, benzene,methanol, ethanol and water. The bark powder was subjected to a preliminary phytochemical screening to detect the different chemical principle. The phytochemical evaluation revealed the presence of flavonoids, glycosides, tannins, phenols.

Keywords:*Lagerstroemia indica* L., Phamacognosy, Photochemistry.

INTRODUCTION

*Lagerstroemia indica*L.It is native to China and Korea. (USDA NRCS National Plant Data Center)This species found inIndia, Southeast Asia, southern China, Japan and Korea to northern Australia and New Guinea (Furtado &Srisuko, 1969; Graham, 2007). This distribution pattern in circum-east Indian and west Pacific Oceans raises an intriguing biogeographic question about how this pattern originated. (Yu-Sheng (Christopher) Liu et al., 2008).This species is occur intemperate regions worldwide (Cai et al., 2011 and Jing Wang et al., 2015). The *Lagerstroemia indica L.*plant is a folk remedy for excoriations, gonorrhea and skin ailments (Duke James A. 1981 and Josephin NR et al., 2012). Ayurveda prescribe the leaf juice for eye ailments, wood and bark are abortifacient, anthelmintic, antipyretic, aphrodiasiac, expectorant and refrigerant. They use the wood and bark for anal disorders, blood diseases, burning sensations and dysentery, dyspepsia, leucoderma and skin

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ailments(Kirtikar KR and Basu BD 1933; Josephin NR et al., 2012; Hajare SW et al., 2000 and Sharma PC et al., 2001).

Glabrous shrubs or tree with spreading or ascending branches, 2-3 m tall. Leaves opposite, subsessile, 2-5 x 1.5-2.5 cm, rounded or subcordate at base, obtuse; petioles very short or absent. Flowers in short axillary and terminal, 2-3-flowered paniculate cymes; peduncles up to 1 cm long, pilose; pedicels 3-5 mm long. Calyx campanulate, 8-10 mm long, reddish-green, glabrous; teeth 6, triangular-acute, 3-4 mm long, erect in fruit. Petals 6, rarely white or purple, broadly orbicular with crisped margins; limb 1.5 x 2 cm; claw slender, ca 1 cm long. Stamens many, half as long as the petals. Capsules globose, 1-1.5 cm in diam., acute at apex. Seeds compressed, winged at one end, brown (Naik, 1998).

Bioactive richness of the active constituents, potential therapeutic activities and absence of pharmacognostic studies and phytochemical action on bark of *Lagerstroemia indica L.*have promoted us to undertake the present study.

MATERIALS AND METHODS

1. Procurement of plant material

Plant material collection

The stem bark of *Lagerstroemia indica L.*was collected by self in the month of July Latitude N19^{o},52', 31.2" Longitude E075^{o},18',88.9" Altitude 465.5 m, from Jaykwadi, Paithan, Aurangabad and it was authenticated by Dr. M. A. Kare, taxonomist at Department of Botany, PratishthanMahavidyalaya, paithan. Bark was pulverized in the mechanical grinder to a fine powder to carry out different pharmacognostical and phytochemical evaluation and was stored in a well closed airtight vessel for further analysis. The present study involves anatomical study as well as preliminary phytochemical standardization of the bark of *Lagerstroemia indica L.*For anatomical investigation, customary technique of microtome was followed6. Physical constant, behaviour of powder with chemical reagents and preliminary tests for extracts were also carried out (Ansari SH 2005 and Josephin NR et al., 2012).

Pharmacognostic evaluation

Organoleptic evaluation

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In organoleptic evaluation, various sensory parameters of the plant material, such as size, shape, colour, odour, and taste of the barks were recorded. It includes conclusions drawn from studies resulted due to impressions on organs of senses.

Microscopical investigation

The histological features of the barks of *Lagerstroemia indica L.*were determined using the methods of Evans for quantitative study anatomical sections and the microscopy, chemo-microscopy of powdered samples were carried out according to methods by Kay and Evans (Evans WC. 1996 andKay LA. 1938).

Physical evaluation

In physical evaluation, ash values like, total ash, acid insoluble ash, water soluble ash, and extractive values in alcohol, hexane, petroleum ether, chloroform and water extractive values were determined (Kay LA. (1938,Goyal RK and Shah BS 2005,Heinrich M and Barnes J 2004, Mukherjee PK 2002 and Chase CR and Pratt R. 1949). The ash values represent the inorganic salts present in the drug. Extracts obtained by exhausting crude drugs are indicative of approximate measures of certain chemical compounds they contain, the diversity in chemical nature and properties of content of drug.

Determination of total ash value

Two gram of bark powder of *Lagerstroemia indica L.*was taken in a tarred silica crucible and incinerated at a temperature not exceeding 450^0C until free from carbon. The resultant ash was cooled and weighed. The percentage of ash was calculated with reference to the air-dried drug.

Acid-insoluble ash

The total ash obtained from 2g powder was boiled for 5 min with 25 ml of dilute hydrochloric acid and the insoluble matter was collected on an ash less filter paper. It was washed with hot water, ignited and weighed. The percentage of acid insoluble ash was calculated with reference to the air-dried drug.

Water soluble ash value

The total ash obtained from 2 g of leaf powder was boiled for 5 min with 25 ml of water and the insoluble matter was collected on the ash less filter paper. It was washed with

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hot water and weighed. The percentage of water soluble ash was calculated with reference to the air -dried drug.

Determination of alcohol soluble extractive value

Accurately weighed powder (5g) of leaf was taken and macerated with 100 ml of 95% alcohol for 24 hours. The content was frequently shaken during the first 6 hours and allowed to remain for 18 hours. The extract was filtered and 25 ml of the filtrate was evaporated and it was dried at 105^0C to a constant weight (Mukherjee PK 2002).

Determination of water soluble extractive value

Water soluble extractive value was determined using the procedure described for alcohol soluble extractive; instead of alcohol chloroform water was used as solvent.

Determination of hexane, petroleum ether and chloroform soluble extractive value

The procedure adopted under alcohol soluble extractive was followed using Hexane, petroleum ether and chloroform as a solvent instead of alcohol.

Preliminary phytochemical screening

The bark powder was subjected to cold maceration using alcohol for 8 hours and the extract was evaporated to dryness. The dried extracts were weighed, and the percentage yield was calculated. The extracts were used for preliminary phytochemical screening with a battery of chemical tests proteins, saponin, alkaline, flavonoids, tannins and phenols (Harborne JB 1994).

Results: -

Organoleptic Evalution: -

The organoleptic characters such as touch, colour, taste, and odour are discussed in (Table No: - 1).

Macroscopic Evolution:-

In Pharmacognosy the term “bark” is used to describe all the tissue found external to the cambium in the branch, stem or root. Barks consist following tissues: - Rhytidoma (dead tissues), cork, Phellogen (meristematic), Phelloderm, cortex and secondary phloem.

Shape and size: - no quelling very hard varies in length, 62-95cm in width and thickness of fresh bark is 6-20 mm and thickness of dried bark is 6-13 mm.

Outer Surface: - old stem bark is rough yellowish to blackish to brownish in colour, bark deeply spilt longitudinally and forming large rhytidome.

Inner surface: - Inner stem bark surface is smooth, creamy to dull red to light brown in colour

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Fracture: - Hard, longitudinally irregular.

Taste: - bitter.

Odour: - Characteristic.

Behavior of Bark Powder towards some Chemical Reagents

The observations are reported in the table 2.

Physico-Cemical Evaluation

The physicochemical studies and successive extractive values of stem of *Lagerstroemia indica L.*are summarized in table 3 and 4.

Phytochemical Screening

Inorganic substances (Ca, Fe, Mn, P, S, and K) were present. The results demonstrated presence of saponin, flavonoids, tannins, alkaloids mainly in the stem bark of *Lagerstroemia indica L.*The presences of various phytoconstitutes in various extracts are summarized in Table 5.

Discussion and conclusion

Establishing standards is an integral part of establishing the correct identity and quality of a crude drug. The microscopic characters, the physiochemical studies and fluorescence analysis can be used for the quality control of the crude drug and these are prime stem for this evaluation (Chanda S 2014); these are prime steps for pharmacognostic study. *Lagerstroemia indica L.*is traditionally used to treat many ailments and illness hence it is imperative to standardize it for use as a drug. Morphological and microscopic studies are reliable, simple and cheapest in establishing the identity of source materials (Shah G. et al., 2013).

*Lagerstroemia indica L.*is an important medicinal plant with many traditional uses; hence it becomes necessary to standardize it for using as a drug. The phytochemical analysis revealed considerable amount of flavonoids and tannins in bark were presence. Saponins were completely absent and other phytoconstituents were present in trace amounts bark powder. The ash values were determined by three different forms viz. total ash, acid-insoluble ash and water soluble ash. The total ash includes physiological ash and non-physiological ash.

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The physiological ash is derived from the plant tissue itself and non-physiological ash is the residue of the extraneous matter adhering to the plant surface. Low amount of total ash, acid insoluble ash and water soluble ash indicates that the inorganic matter and non-physiological matter bark. The physiocochemical parameters like ash values, moisture content ensures the purity of the drugs.

After present investigation it can be concluded that the pharmacognostic study of stem bark of *Lagerstroemia indica*L.have furnished a set of qualitative and quantitative parameters that can serve as an important source of information which may substantiate the existing pharmacogostic data to ascertain the identify and to determine and track the quality and purity of the plant material in future studies.

Table: 1 organoleptic characteristic of stem Bark of *Lagerstroemia indica*L.

parameters	
Condition	Dried
Colour	Outer surface –Outer surface of young stem bark is gray to silver- golden in colour; smooth, older stem bark is rough split longitudinally, forming large rhytidome. Inner surface – inner barks are separated, inner bark surface rough, whitish to purple in colour; longitudinally striated and fibrous; fracture difficult, fibrous irregular
Odour	Characteristic
Taste	Bitter to sweet
Texture	Hard, longitudinally irregular
Fracture	Fracture difficult, deeply spilt longitudinally.
Size	Length 58-83 cm Thickness 6-13 mm
Shape	No quilled

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Table: 2 Reactions of stem bark powder of *Lagerstroemia indica*L. with different chemical reagents.

Sr. No.	Chemical Reagents	Observation
1	Conc. Sulphuric acid	Brown
2	Conc. Hydrochloric acid	Dark red
3	Conc. Nitric acid	Dark yellow
4	Picric acid	Yellow
5	Glacial Acetic acid	Light red
6	Iodine solution	Blue
7	Sodium hydroxide solution (aq. 5%)	Red
8	Potassium hydroxide solution (aq. 5%)	Brownish red
9	Ferric chloride solution (aq. 5%)	Red
10	Powder as such	Pale red
11	Methanol	Reddish brown
12	10% NaOH	Red
13	Chloroform	Light green
14	Petroleum ether	Reddish brown
15	Distilled water	Light red

Table: 3 Physico-Chemical Properties of *Lagerstroemia indica*L. stem bark.

Sr. No.	Quantitative Standards	%w/w
1	Total ash	6.41
2	Acid soluble ash	5.38
3	Acid insoluble ash	1.03
4	Water soluble ash	4.51
5	Water insoluble ash	5.10
6	Loss of weight on drying 105^0C	38.09
7	Alcohol soluble extractive value	6.50
8	Water soluble extractive value	7.35

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Table- 4: Successive Extractive Values of the stem Bark of *Lagerstroemia indica*L.

Sr. No.	Solvent	Weight of Drug	Average Extractive Value (%w/w)
1	Methanol	10gm	8.62
2	Alcohol	10gm	6.80
3	Benzene	10gm	3.54
4	Petroleum ether	10gm	2.23
5	Chloroform	10gm	1.05
6	Acetone	10gm	1.68
7	Water	10gm	6.90

Table- 5: Observation of Quantitative analysis of organic of *Lagerstroemia indica*L.

Sr. no.	Test of organic mater	Petroleum ether	Chloroform	Acetone	Methanol	water
1	Tannin	+	+	-	+	+
2	Alkaloid	-	-	+	-	-
3	Saponin	-	-	-	-	+
4	Sterols	-	-	-	-	+
5	Flavonoids	-	+	-	-	+

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