

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. This species found in India, Southeast Asia, southern China, Japan and Korea to northern Australia and New Guinea. This distribution pattern in circum-east Indian and west Pacific Oceans raises an intriguing biogeographic question about how this pattern originated. This species is occurred intemperate regions worldwide. The *Lagerstroemia indica* L. plant is a folk remedy for excoriations, gonorrhoea and skin ailments [1,2].

Ayurveda prescribe the leaf juice for eye ailments, wood and bark are abortifacient, anthelmintic, antipyretic, aphrodisiac, expectorant and refrigerant. They use the wood and bark for anal disorders, blood diseases, burning sensations and dysentery, dyspepsia, leucoderma and skin ailments [3, 4, 5].

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 [6].

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

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°52', 31.2" Longitude E075°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, Pratishtan Mahavidyalaya, 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 followed. Physical constant, behaviour of powder with chemical reagents and preliminary tests for extracts were also carried out [2,7].

Pharmacognostic evaluation

Organoleptic evaluation

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 Kay[8] Evans [9].

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 [8, 10, 11, 12, 13]. 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°C 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 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°C to a constant weight [12].

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 [14].

Results

Organoleptic Evaluation

The organoleptic characters such as touch, colour, taste, and odour are discussed in (Table 1).

Macroscopic Evaluation

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.

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 |

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°C | 38.09 |
| 7 | Alcohol soluble extractive value | 6.50 |
| 8 | Water soluble extractive value | 7.35 |

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 | - | + | - | - | + |

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

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-Chemical 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 [15]; 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 [16].

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.

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 physicochemical 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.

Conflicts of interest: The authors stated that no conflicts of interest.

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