Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 401-403
Received: 13-01-2018
Accepted: 14-02-2018

Navreet Kaur
Department of Pharmaceutical Sciences, Guru Nanak Dev University, Amritsar, Punjab, India

Sarabjit Kaur
Assistant Professor, Department of Pharmaceutical Sciences, Guru Nanak Dev University, Amritsar, Punjab, India

Correspondence
Sarabjit Kaur
Assistant Professor, Department of Pharmaceutical Sciences, Guru Nanak Dev University, Amritsar, Punjab, India

Pharmacognostic and phytochemical evaluation of *Gmelina arborea* Roxb

Navreet Kaur and Sarabjit Kaur

Abstract
Gmelina arborea is an important medicinal plant indicated in the traditional Indian medicine. *Gmelina arborea*, is the most widely cultivated species of the family Verbenaceae having potential medicinal values. *G. arborea* have been used traditionally for abdominal pain, burning sensation, antihelmintic, laxative and as stomachic. Any plant which is used medicinally requires detailed study prior to its use for the purpose of identification of the plant, to avoid adulteration with other drugs and also for its therapeutic efficacy. Therefore, the present study was undertaken to lay down pharmacognostical and physicochemical standards for *Gmelina arborea.* Microscopic evaluation showed the presence of phellogen, cork, cortex and phelloderm. Physicochemical studies on *G.arborea* showed that acid insoluble ash was five times and water soluble ash was about three times less than the total ash. Phytochemical screening showed the presence of alkaloids, carbohydrates, anthocyanins, tannins and flavonoids. TLC fingerprinting of petroleum ether, chloroform and ethanol extract was carried out to determine the presence of various phytoconstituents. These findings will be useful towards establishing pharmacognostic standards on identification, purity and quality on this plant which is gaining relevance in plant drug research.

Keywords: *Gmelina arborea*, macro-microscopic, physicochemical standards, phytochemical investigation, TLC fingerprinting

1. Introduction
Ayurveda, the ancient Indian system of medicine, strongly believes in polyherbal formulations and scientists of modern era often ask for scientific validation of herbal remedies. Medicinal plant materials are characterized according to microscopic, physicochemical and phytochemical characteristics. Taking into consideration the variation in sources of crude drugs and their chemical nature, they are standardized by using different techniques. The basis of analysis by evaluation of physical and phytochemical characters is that there are always sufficient differences in the same type or different types of plants as far as the physicochemical characteristics are concerned. This study is an attempt to establish the standardization parameters for *Gmelina arborea*.*Gmelina arborea* is popularly known as candahar tree, white teak, gamhar, and kaashmari. It has been used in traditional Indian medicines enlisted in all ancient scriptures of Ayurveda [1]. Leaves of *G. arborea* are used for treatment of headache and stomach ulcers [2-4], flowers are useful in leprosy, fruits are used as diuretic and for the treatment of anaemia, leprosy and sexual debility in males [5, 6]. The bark of *Gmelina arborea* is reported to be used as stomachic, galactogogue, laxative, hypoglycemic, anthelmintic, appetizer and it prevents abdominal pains and piles [7].

2. Plant Material
The bark was obtained from Madurai district of Tamil Nadu in May 2011 and authenticated by Department of Botanical and Environmental Sciences, Guru Nanak Dev University, Amritsar. A voucher specimen (voucher no. S.R. Bot Sci/96) was deposited in the Department of Botanical and Environmental Sciences, GNDU.

2.1 Pharmacognostic studies
Organoleptic and microscopic evaluation
Organoleptic and microscopic analysis was done for estimation of colour, odour, taste and internal structure of drug [8]. Microscopic evaluations of tissues were supplemented with micrographs. Photographs of different magnifications were taken with Pentax MV1 microscopic Unit. For normal observations bright field was used.

2.2 Physiochemical analysis
The dried powdered bark material was subjected to physiochemical analysis including extractive value, total ash and loss on drying [9]

2.3 Phytochemical screening
Petroleum ether, chloroform and methanol extracts were prepared by subjecting powdered bark to soxhlet apparatus. All the extracts were subjected to phytochemical screening to detect the presence of various phytochemicals viz. alkaloids, flavonoids, tannins, anthocyanins and saponins [10-11].

2.4 TLC fingerprinting
Precoated TLC plates were used for development of chromatogram. Chromatograms were observed in visible light, then under short wave and long wave ultraviolet light.

3. Results
3.1 Pharmacognostic studies
3.1.1 Organoleptic, microscopic and physiochemical characters
The bark is yellowish brown in colour, odourless with bitter and astringent taste. The surface was smooth with minute fissures. The transverse section of stem bark consists of multiple layers below the epidermis i.e. phellogen, cork, cortex and phelloderm reported below in figure 1. Microscopy of powdered bark showed the presence of pholem parenchyma containing parenchymatous cells which are square shaped and have no pits. Presence of medullary rays, stone cells and calcium oxalate crystals were also observed (figures 2, 3 and 4). Physiochemical parameters have been tabulated in Table1.

3.1.2 Phytochemical screening
The phytochemical screening of petroleum ether, chloroform and methanol extracts of the bark *Gmelina arborea* revealed the presence of alkaloids, carbohydrates, proteins, amino acid, phytosterols, saponins, flavonoids, terpenoids and tannins (Table 2).

3.1.3 TLC fingerprinting
TLC fingerprinting analysis was done for petroleum ether chloroform and methanol extract. Petroleum ether and chloroform extract showed the presence of five and two components while in methanol extract seven spots are observed as shown in figure 5(A,B,C).

4. Discussion
The plant authenticity can be obtained by observing diagnostic microscopic and numerical standards to identify and differentiate from other crude drugs. The improvement in the quality control and standardization of herbal drugs has led to the development of effective quality medicines from plants. The present study provides standards for stem bark of *Gmelina arborea* with the help of modern techniques. The physicochemical characterization will be useful towards establishing standards on identification, purity and quality of the plant which is gaining relevance in plant drug research. It will also help in checking adulteration of the drug. Phytochemical screening and TLC fingerprinting will help in isolation of active constituents which can be useful in treatment of ailments.

5. Acknowledgment
The authors are grateful to Department of Pharmaceutical sciences, Guru Nanak Dev University, Amritsar for providing the financial assistance.

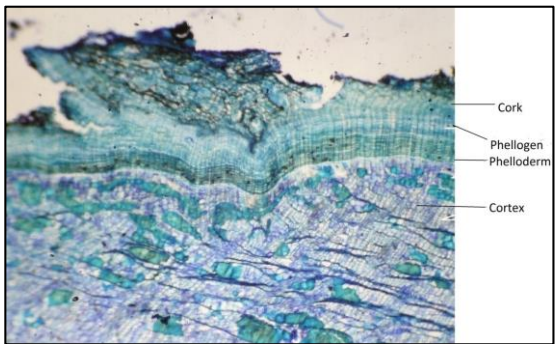

Fig 1: Transverse section of bark

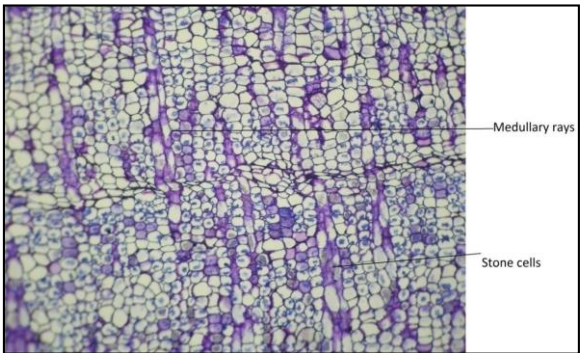

Fig 2

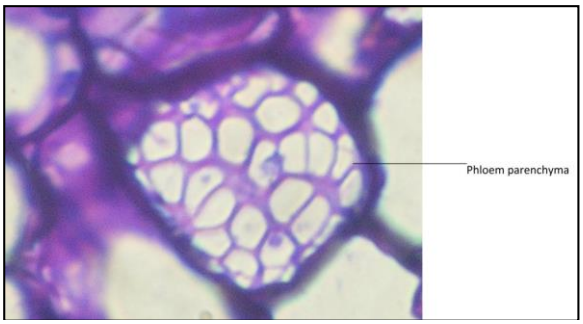

Fig 3

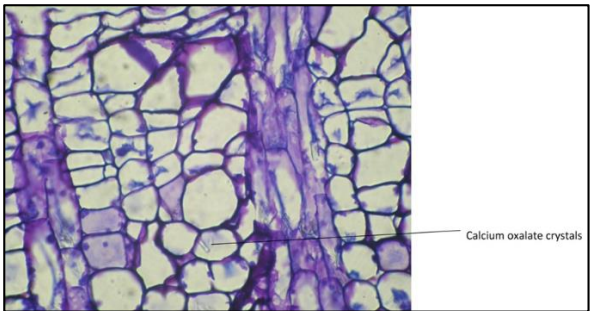

Fig 4

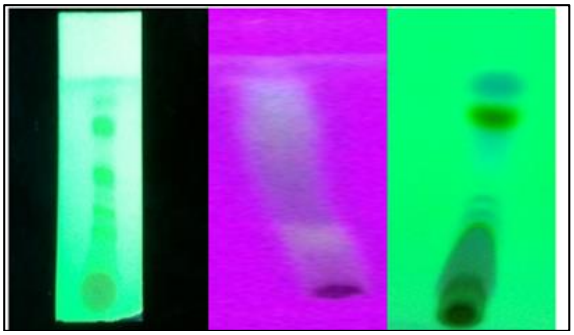

Fig 5: (A, B,C): TLC fingerprinting

Table 1: Physiochemical parameters of bark of *Gmelina arborea*

Physiochemical parameter	% (with reference to air dried drug)
Alcohol soluble extractive	8.32
Water soluble extractive	12
Ether soluble extractive	2.5
Chloroform soluble extractive	2.5
Total ash	8
Acid insoluble ash	1.5
Water soluble ash	3.0
Loss on drying	10

Table 2: Phytochemical screening

Plant extracts → Tests ↓	Petroleum ether extract	Chloroform extract	Methanol extract	Aqueous extract
1. Alkaloids				
Hager's reagent	-	-	+	+
Wagner's reagent	-	-	+	+
Mayer's reagent	-	-	+	+
Dragendroff's reagent		-	+	+
2. Carbohydrates				
Molisch reagent	+	-	+	-
Fehling solution	-	-	+	-
Benedict solution	+	-	+	-
3. Proteins and amino acids				
Ninhydrin reagent	-	-	-	-
Biuret test	-	-	-	-
Millon's test	-	-	-	-
4. Phytosterols				
Libermann-Burchard's test	+	-	+	-
5. Saponins				
Foam test	-	-	+	-
6. Flavonoids				
Lead acetate test	-	+	+	+
Shinoda test	-	+	+	+
7. Terpenoids				
Liebermann-Burchard's test		-	-	-
8. Tannins				
Ferric chloride test	-	+	+	+

6. References

1. Khare CP. The Ayurvedic Pharmacopoeia of India: Expanded therapeutics. 2008; 4:290.
2. http://www.bsienvis.nic.in/medi.htm#Gmelina%20arborea.
3. Khare CP. Indian herbal remedies: rational Western therapy, ayurvedic, and other traditional usage, botany. Springer. 2004, 236.
4. Khare CP. Indian Medicinal Plants: An Illustrated Dictionary, Springer. 2007, 291.
5. Chkraborty M, Kaswala R, Patel V, Kamath JV. Phytochemical and Pharmacological profile of *Gmelina arborea*: An overview. IRJP. 2012; 3:61-64.
6. Unnikrishnan KP, Raja S, Remashree AB, Balachandran I. Occurrence of gmelinol in stem bark of *Gmelina arborea* Roxb: Aryavaidyan. 2007; 21:34-37.
7. Khare CP. Encyclopedia of Indian Medicinal Plants: Springer-Verlag Berlin-Heidelberg, Germany. 2007, 290.
8. Aswatha H, Kaushak U, Lachake P, Shreedhara CS. Standardisation of Avipattikar Churna- A Polyherbal Formulation. Pharmacognosy Res. 2009; 4:224-227.
9. Khandelwal KR Practical Pharmacognosy India: Nirali prakashan. 2004; 11:149-153 and 157-159.
10. Trease GE, Evans WC. Pharmacognosy London: Bailliere Tindal. 1996; 11:683-684.
11. Tiwari P, Kumar B, Kaur M, Kaur G, Kaur H. Phytochemical screening and Extraction: A Review. IPS. 2011; 1:98-106.