



Original Research Article

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Pharmacognostic Studies and Phytochemical Screening of *Pterospermum acerifolium* Leaves

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Abstract

Pterospermum acerifolium (Sterculiaceae family) is traditionally used for ear pain, Small pox, leucorrhoea, inflammation, ulcers, leprosy, blood disorders, tumours, diabetics. In present investigation, the detailed pharmacognostic study of leaf of *Pterospermum acerifolium* is carried out to lay down the standards which could be useful in future experimental studies. The study includes macroscopy, microscopy, preliminary phytochemical screening and physicochemical evaluation.

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Keywords

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Introduction

It is not unreasonable to believe that the plant kingdom should yield safe and effective drugs for most of the human ailments. Though India has a rich tradition in the use of medicinal plants, the effort to develop drugs from plants has had limited success. Hence, plants have returned to the fore front in drug development as medicines, as source of active molecules and as lead to the discovery of new drugs. The use of medicinal plants to treat various diseases in India dates back to the times of Rig-Veda (3500-1800BC). Later, the monumental Ayurveda works like Charak Samhita and Sushruta Samhita followed by other Ayurveda drugs entering in to several medicinal preparations were in the management of health care. In fact these systems have been in practice even in remote areas of our country for centuries. World Health Organization (WHO) estimates that 80% of the people living in developing countries almost exclusively using traditional medicine and about 119 secondary metabolites of plants are used globally as drugs (Kumar et al., 2006)

Herbal drugs constitute only those traditional medicines, which primarily use medicinal plants preparation for therapy. The earliest recorded evidence of their use in Indian, Chinese, Egyptian, Greek, Roman and Syrian text dates back to about 5000 years. The classical Indian texts include Rigveda, Atharvaveda, Charak Samhita and Sushruta Samhita. The herbal medicines/traditions of ancient civilization and scientific heritage (Kamboj, 2000)

Pterospermum acerifolium (Sterculiaceae family) is well distributed in India, particularly in sub-Himalayan tract and outer Himalayan valleys. Common name is kanakchampa or muchukunda. Externally the leaves are variable in shape and size, 25-35 cm (l), 15-30 cm (w), orbicular or oblong, entire or various lobed, cordate, glabrous above and clothed beneath with whitish floccose tomentum (Kirtikar, 1996). Flavonoids in the leaves include luteolin-7-O- β -D glucuronide, luteolin-7-O- β -D glucoside, kaempferol-3-O- β -D galactoside, friedeline, barurenol (Gunase, 1979). Traditionally it is used for ear pain, Small pox, leucorrhoea, inflammation, ulcers, leprosy, blood disorders, tumours, diabetics (Chandra, 2005).

Materials and methods

Collection of plant material

Fresh leaves of *Pterospermum acerifolium* (Sterculiaceae family) collected in the month of August 2010 from Bhopal, dried under shade and powdered in a mixer grinder. The powdered leaves were packed in air bags and stored in air tight containers until use.

Authetification

The botanical identity was confirmed by department of Botany, Safia College of Science, Bhopal (M.P) where voucher specimen number (148/BOT/SAFIA/2010) has been deposited for further references.

Pharmacognostic evaluation

Stomatal number: It is the average number of stomata per square mm of the epidermis of leaf which has been counted microscopically.

Stomatal index: It is the percentage which the number of stomata forms to the total number of cells, each stomata being counted as one cell. Stomatal Index can be calculated by equation:

$$I = \frac{S}{E+S} \times 100$$

Where,

I= Stomatal Index; S= No. of stomata per unit area; E= No. of epidermal cells in the same unit area.

Palisade ratio: It is the average no: of palisade cells beneath one epidermal cells of a leaf. It is determined by counting the palisade calls beneath four continuous epidermal cells.

Vein-islet: It is the average number of vein per square millimeter. It is determined by counting number of Vein-islet in the area of 4 sq.mm of the central part of leaf between midrib and margin

Vein-islet number: It is defined as number of vein termination per square millimeter of leaf surface, midway between midrib and margin (Khandelwal, 2005).

Results

Phytochemical screening: The preliminary phytochemical screening was done by standard

qualitative chemical tests for the hydroalcoholic leaf extract and chloroform extract and showed the presence of tannins, phenolics and flavonoids (Table 1). The evaluation and standardization parameters of the leaves of *Pterospermum acerifolium* are given in Tables 2 and 3. The observations on the transverse section of leaf of *Pterospermum acerifolium*, collenchyma, trichomes and mucilage cells are given in Figs. 1-5.

Table 1. Phytochemical screening of *Pterospermum acerifolium*.

Constituents	Chloroform extract	Hydroalcoholic leaf extract
Alkaloids	-	-
Carbohydrates	-	-
Tannins and phenolics	+	+
Glycosides	-	-
Flavonoids	+	+
Saponins	-	-
Steroids	-	-

- Indicate absence of chemical constituents; + Indicate presence of chemical constituents.

Table 2. Evaluation parameters of leaf of *Pterospermum acerifolium*.

Sl. No.	Evaluation parameter	Range
1.	Stomatal number (upper peel)	15-17
2.	Stomatal Index	25.2-26.6
3.	Palisade ratio	1:6
4.	Vein islet number	28-30
5.	Vein termination number	60-65

Table 3. Standardisation parameters of leaf of *Pterospermum acerifolium*.

Sl. No.	Evaluation parameter	Value
1.	Moisture content	8.44
2.	Total ash	4.67
3.	Acid insoluble ash	0.33
4.	Water soluble ash	2.67
5.	Crude fibre analysis	18
6.	Water soluble extractive	3.25
7.	Alcohol soluble extractive	5.75

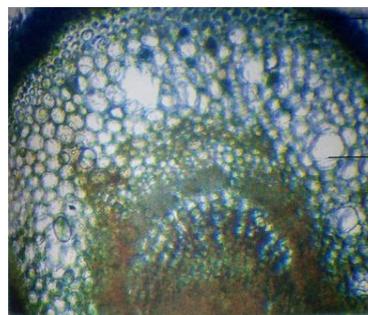


Fig. 1: Transverse section of the leaf.

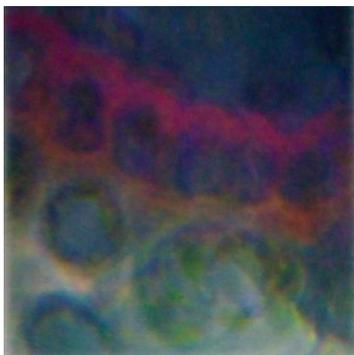


Fig. 2: Collenchyma.



Fig. 3: Covering trichomes.

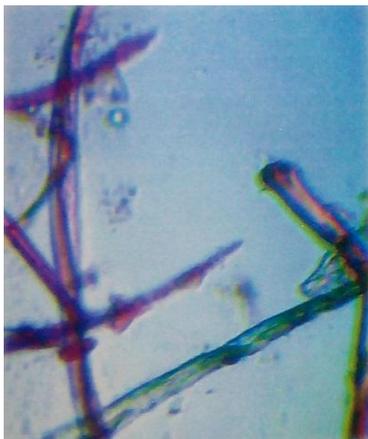


Fig. 4: Lignified trichomes.

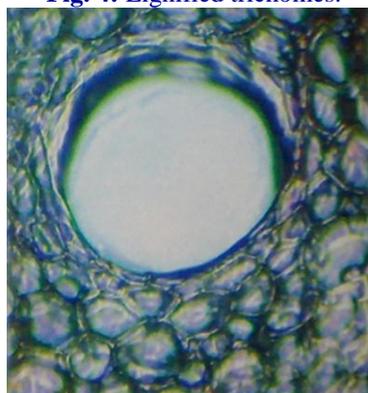


Fig. 5: Mucilage cells.

Organoleptic studies: The results obtained for the organoleptic studies for *Pterospermum acerifolium* is given hereunder.

Colour	-	Green
Odour	-	Characteristic
Taste	-	Bitter
Surface	-	Rough

Macromorphology: The results obtained for macromorphological features of *Pterospermum acerifolium* is given below.

Colour	-	Upper surface-dark green, glabrous
Lower surface-	-	silvery to rusty pubescent
Size		
Lamina	-	25-35 cm (l) 15-30 cm (b)
Petiole	-	5-15 cm (l)
Margin	-	wavy to distantly coarse toothed or irregularly lobed
Venation	-	pinnate reticulate
Incision	-	palmatifid
Apex	-	acuminate
Base	-	asymmetrical

Transverse section of different parts of *Pterospermum acerifolium*

Midrib:

Epidermis	-	single layer covered with cuticle
Hypodermis	-	contain 6-7 layers of collenchyma
Cortex	-	several mucilaginous glands in parenchyma
Vascular bundle	-	conjoint, collateral
Pith	-	large with oil canals. Vascular bundle scatters in pith

Trichomes: Three types of trichomes were observed in *Pterospermum acerifolium*.

1. Unicellular long simple trichomes
2. Stellate with long arms
3. Glandular trichomes

Lamina:

Upper epidermis	-	Thick walled polygonal cells, stomata absent.
Lower epidermis	-	Thin walled cell with anomocytic stomata and glandular trichomes.
Mesophyll	-	Not clearly differentiated between spongy tissue and palisade cells. 2-3 layers of palisade cells below the upper epidermis.

Conclusion

The results of the study can serve as a valuable source of information and provide suitable standards for identification of *Pterospermum acerifolium* (Sterculiaceae family) in future investigations and applications.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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