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ORIGINAL ARTICLE

Pharmacognostic Evaluation of Seed of *Pterospermum acerifolium*(L.) Willd

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ABSTRACT
Pterospermum acerifolium (Sterculiaceae) is an herb distributed throughout the world. Plant is commonly known as Kanakchampa, Karnikara, Muchukunda and Matsakanda. The leaves of the plant are widely used for the treatment of diabetes and as a haemostatic in Indian proprietary medicines. The plant is documented to possess beneficial effects as antioxidant, antiulcer, anti inflammatory, analgesic, hypoglycaemic, immunosuppressive, wound healing, hepatoprotective, antihelmentic, antimitotic and anticancer activity. It is believed to be used in inflammation, abdominal pain, ascites, cures ulcers, leprosy, constipation, urinary discharges and tumours Pharmacognosy can be the first step in deciding the status of a plant organ as a crude medicine. Hence comprehensive Pharmacognostic study of Pterospermum acerifolium (L.)Willd seed was done. In the present investigation various aspects of pharmacognosy like macroscopy, microscopy, histochemical analysis, powder study, preliminary phytochemical screening, fluorescence analysis, and physicochemical constants were laid down.
Key-Words: *Pterospermum acerifolium,* Seed, Ethnobotanical uses, Pharmacognostic and Phytochemical evaluation

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INTRODUCTION

Herbal preparations have always been the principle form of medicine in India and presently becoming popular throughout the developed world. Hence it is necessary to identify and characterize the crude drugs well before the use. This can be easily and reliably done by the pharmacognostic study. Pharmacognosy is the developing science that deals with complete and systematic knowledge of a crude drug of herbal, animal or mineral origin.

Pterospermum acerifolium (L.) willd (Sterculiaceae) is a shrub distributed in India and found particularly in sub-Himalayan tract, outer Himalayan valley and hills up to 4000 ft [1].The plant is commonly known as Kanakchampa, Karnikara, Muchukunda and Matsakanda. It grows to a height of 60ft. The bark is grays, thin and smooth. The wood consists of red coloured heart wood and an outer cover of sapwood which is lighter in color. Even though hard and closely grained, it is easy to work with [2-3]. As per Ayurvedic text it has traditionally been used for haemostatic, anti-inflammatory, ear pain, stomach-ache, blood troubles, small pox, leucorrhoea, leprosy, ulcer, tumours, as laxative and anthelmintic [4-7].

However, the above plant part was studied for the first time. The present study is intended to bring the salient; morphological characters of these seeds so as to lay down the standards which are of utmost important to authentify a crude drug.

MATERIAL AND METHODS

Collection of Plant material

The seed samples were collected from wild with prior permission from various places within Bhopal. The sample was authenticated for its botanical identity from CSIR- NISCAIR (Delhi). A voucher specimen has

been deposited in Raw Material Herbarium And Museum, Delhi (RHMD) Ref.no: Niscair/Rhmd/Consult/2020/3669-70. The fresh mature seeds were used for Macroscopic, Microscopic and Phytochemical studies. Remaining seeds were dried and ground to powder.

Pharmacognostic Studies

Pharmacognosy of the seed was carried out using standard methodology-

Macroscopy:

The seeds were studied for its morphological characters using appropriate techniques [8]

Microscopy

Transverse hand cut sections were taken and made permanent with suitable stains [9-10].

Powder study

The dried seed powder was treated with chloral hydrate solution followed by staining in 1% saffranin for 5-10 minutes and mounted in 50% glycerine [10]

Proximate analysis

The physicochemical parameters like ash values (total ash, watersoluble- ash and acid insoluble ash) and extractive values (water, alcohol, petroleum ether chloroform extractives) were established using powdered drug [11]

Fluorescence analysis

The fluorescence response of powdered drugs exposed to U. V. radiations was studied [12-13]

Preliminary phytochemical screening

A known quantity of dried powder was extracted with chloroform, -alcohol and water. These extracts were tested for different constituents [14-17]

RESULTS

Macroscopy and Microscopy:-

The fruit has a very rough texture and is sometimes covered in brown hairs. Fruits can take a very long time to completely mature; up to an entire year. The capsule then splits open releasing a massive number of "winged seeds." Because it takes such a long period to reproduce. Seed is exalbuminous and exarillate. It is compressed, ovoid to ellipsoid in shape, light to dark brown in color, faint odour and mucilaginous taste. It's size is about 0.5-1.2cm board and 1.2-2cm long (Figures 1).

The seed coat has two layers, an outer testa and inner tegmen. Testa is the outer part of the seed coat, with polygonal epidermal cells, followed by lignified sclerids. The sclerids are 4-6 layers with starch grains and oil globules. Next layer is the tegmen which is 2-3 layered dark brown, pigmented sclerenchymatous cells with vascular bundle. Nucellus is in the form of collapsed cells, leading to the formation of perisperm. Perisperm Endosperm is absent. Cotyledons shows outer and innerepidermis, followed by compactly arranged parenchymatous cells, gradually decreases on the lateral sides, poorly developed vascular bundles larger at the centre and smaller ones placed laterally. Oil globules and calcium oxalate crystals were observed (Figures 2-4).

Powder study

The seed powder on treatment with chloral hydrate solution- followed by staining in 1% saffranin for 5-10 minutes- and mounted in 50% glycerine exhibited fragments of sclerides. Starch grains, cotyledon (parenchy-matous) with oil globules.(Figures 5-6).

Physicochemical evaluation

The physicochemical constants such as ash values showed total ash 14.5% w/w, water soluble ash 0.5 % w/w, water insoluble ash 14.5w/w and acid insoluble ash 10.5% w/w (Table 2).Thus the acid insoluble ash value states the presence of least amount of silica in seed powder. The extractive value of water and alcohol 2 % w/w, petroleum ether and butanol 4.8% w/w and chloroform 4.2% w/w (Table 1). The above extractive values determine that more chemical constituents are soluble in the solvent ethanol.

Fluorescence analysis

The seed powder treated with different chemicals exhibited various colours in the UV light. The predominant colour was green in most of the test (Table 3).

Preliminary phytochemical studies

The Preliminary phytochemical studies revealed the presence of Alkaloids, Glycosides, Flavonoids, Steroids, Saponins and Tannins (Table 4)

DISCUSSION

It was relevant to study the seed of *Pterospermum acerifolium (L.) Willd*. from pharmacognostical angle so as to prove its status as a herbal medicine. It was found that, morphological characters like colour, odour, taste etc are useful in gross identification. Microscopical characters such as scleridsin testa, collapsed cells

of nucellus, absence of endosperm and presence of cotyledon etc. are of important to distinguish authentic drug from an adulterant or a substitute. Preliminary phytochemical screening gives general idea regarding the nature of chemical constituents of the seed. Powder study can be used in identification of authentic plant. The physicochemical parameters like ash values, extractive values, as well as the fluorescence analysis were put forth for the seed are beneficial for efficient assessment of authentic drug before use. The Pharmacognosti-cal standards put forth can add valuable information about the plant. Detailed phytochemistry and pharmacological studies are in progress.

Fluorescent studies of powder drugs

A lot of herbs show fluorescence when the cut surface or powder is exposed to UV light and this can be useful in their identification. The fluorescence character of the plant powders (40 mesh) was studied both in daylight and UV light (254 nm and 366 nm) and after treatment with different reagents like sodium hydroxide, hydrochloric acid, nitric acid and ferric chloride etc.(Table-3) [18].

Phytochemical Screening

The seeds were collected and dried in shade and reduced to coarse powder. The powdered seeds (600g) were subjected for successive extraction with Petroleum ether, Chloroform, Ethyl acetate, Ethanol and Water in Soxhlet apparatus. The extracts were filtered and solvent removed by distillation under reduced pressure. The percentage yields were calculated and the extracts were further subjected to phytochemical tests for Alkaloids, Glycosides, Flavonoids, Steroids, Carbohydrates, Saponinsand Tannins (Table-4) [19-20].

Extraction yield of seeds extract of *Pterospermum acerifolium (L.) Willd*are shown in Table 1. The extraction yield of different solvents varied from 2 to 4.8 in cold maceration process and could be ranked from high to low i.e. petroleulm ether>butanol> chloroform > methanol > aqueous. The percentage of extraction yield will increase with the ratio of solvents, temperature and sample extraction [21]. The crude extracts of *Pterospermum acerifolium (L.) Willd* have exhibited a wide range of colour. Similarly the nature of these extracts varies from oily (petroleum ether), waxy (chloroform), resinous (ethanol) and sticky (aqueous) respectively.

The physico-chemical constant evaluation of the drug is an important parameter in detecting adulteration or improper handling of drugs [22].The total ash is particularly important in the evaluation of purity of drug i.e. the presence or absence of foreign organic matter such as metallic salts or silica [23]. The total ash content of the *Pterospermum acerifolium (L.)Willd* seed was 14.5%, whereas the water insoluble ash was more than that of acid insoluble ash at 14% and 10.5% respectively (Table 2). In the present investigation considerable amount of total ash was noticed in seed. Findings can be employed as quality parameter to evaluate *Pterospermum acerifolium (L.) Willd* biomass for any adulteration.

The fluorescence analysis is adequately sensitive and enables the precise and accurate determination over a satisfactory concentration range. The fluorescence colour is specific for each compound. A non fluorescent compound may fluoresce if mixed with impurities that are fluorescent. The colour of the extracts from organic and inorganic solvents was observed both ordinary and UV light [24]. The Fluorescence analysis of *Pterospermum acerifolium (L.)Willd*seed treated with different chemical reagents are tabulated in (Table 3).

Phytochemical screening of Sucessive extracts of *Pterospermum acerifolium (L.) Willd*seed was done with petroleum ether, chloroform, ethyl acteate, ethanol and water. The percentage yields were calculated accordingly.Main attraction of phytochemical screening is presence of Alkaloids, Glycosides, Flavonoids, Steroids, Saponins and Tannins in maximum of extracts. The Phytochemical screening of chemical constituents in *Pterospermum acerifolium (L.)Willd* study showed that seeds were rich in Alkaloids, Glycosides, Flavonoids, Steroids, Saponins and Tannins(Table 4). They were known to show medicinal activity as well as exhibiting physiological activity.

Table 1: The Extractive values of the seeds powder of*Pterospermumacerifolium (L.) Willd*by cold maceration.

S.no	Nature of extract	Values (%w.w)
1	Petroleum	4.8
2	Chloroform	4.2
3	Butanol	4.8
4	Methanol	2
5	Water	2

Table 2: Ash value of *Pterospermum acerifolium (L.)Willd* seeds

S.no	Physical contents	Value (%w/w)
1	Total Ash value	14.5
2	Acid insoluble ash	10.5
3	Water soluble ash	0.5
4	Water insoluble ash	14

Table 3: Fluorescent studies of powder of *Pterospermum acerifolium (L.)Willd* seeds

S.No.	**Solvents Treatment**	**Visible light**	**Short UV (252 nm)**	**Long UV (366 nm)**
1	Drug as such	brown	Green	Purple
2	Drug + KOH 50% Soln.	Light brown	Green	Purple
3	Drug + Ammonia soln.	Light brown	Colourless	Colourless
4	Drug + Picric acid	Yellow	Yellowish green	Light yellow
5	Drug + $FeCl_3$ 5% soln.	Yellow	Light Green	Black
6	Drug + Iodine soln. (5%)	Brown	Dark green	Dark yellow
7	Drug + Petroleum ether	orange	Light green	colourless
8	Drug + Chloroform	colourless	Green	Purple
9	Drug + Methanol	colourless	Light blue	Colourless

Table 4:- Phytochemical screening of successive Seed extracts of *Pterospermum acerifolium (L.)Willd*

S.N.	Plant constitutes	Test/reagent	Petroleum ether extract	Ethyl acetate extract	Ethanol extract
1	Steroids	Salkowski reaction Libermann-burchad test	+ +	+ +	+ +
2	Alkaloids	Dragendroff 's reagent Mayer's reagent Hager's reagent Wagner's reagent	- - - -	+ + + +	+ + + +
3	Flavonoids	Shinoda test	+	+	+
4	Anthraquinone glycosides	Brontrager test Modified brontrager test	+ -	+ +	+ +
5	Cardiac glycosides	Killer-killani test Legal test Baljet test	- - -	+ - -	+ - -
6	Tannins	Ferric chloride test Lead acetate test	+ +	+ +	+ +
7	Carbohydrates	Molish test Barfoed test	- -	- -	- -
8	Proteins	Biuret test Xanthoproteic test	+ -	- -	- -
9	Saponins	Foam test Haemolysis test	- -	- -	- -

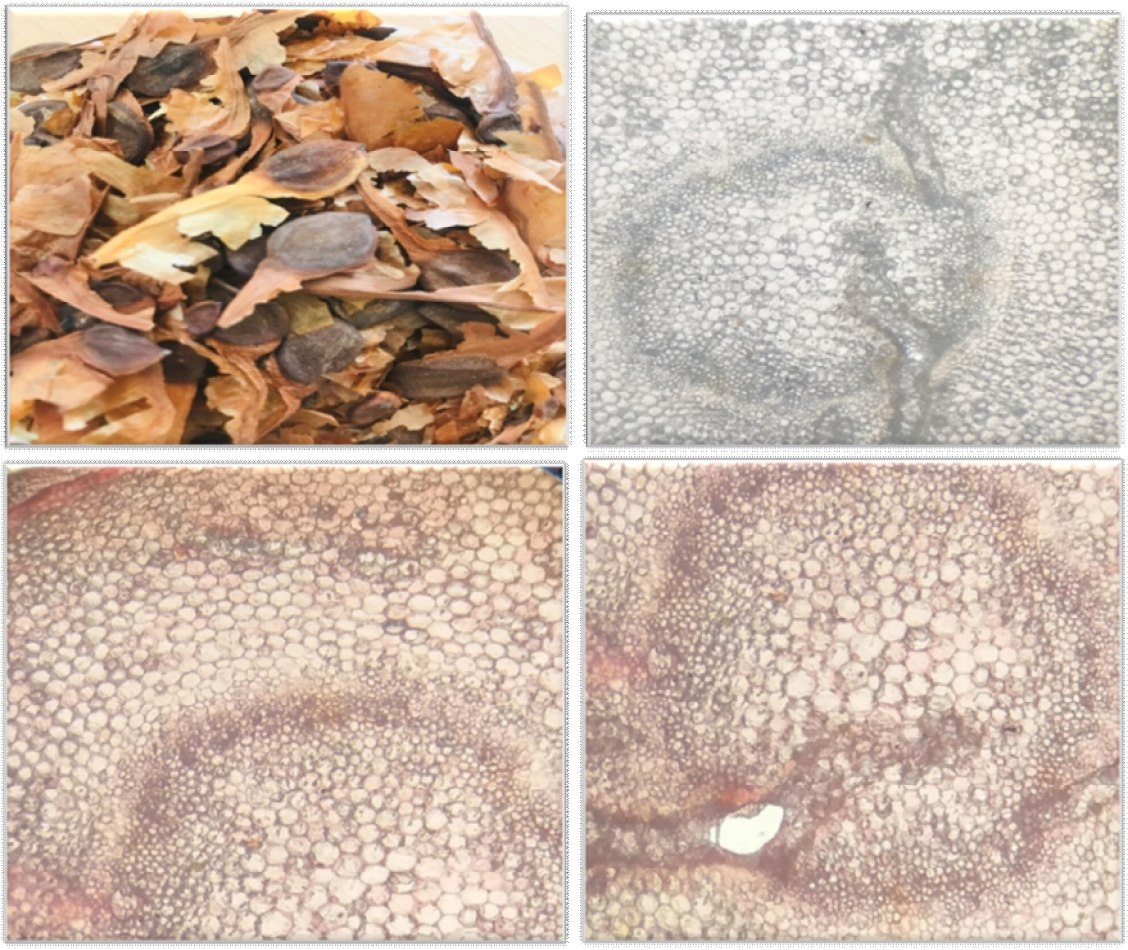

Figure 1 to 4: Macroscopy and Microscopy *study of Pterospermum acerifolium*(L.)Willd

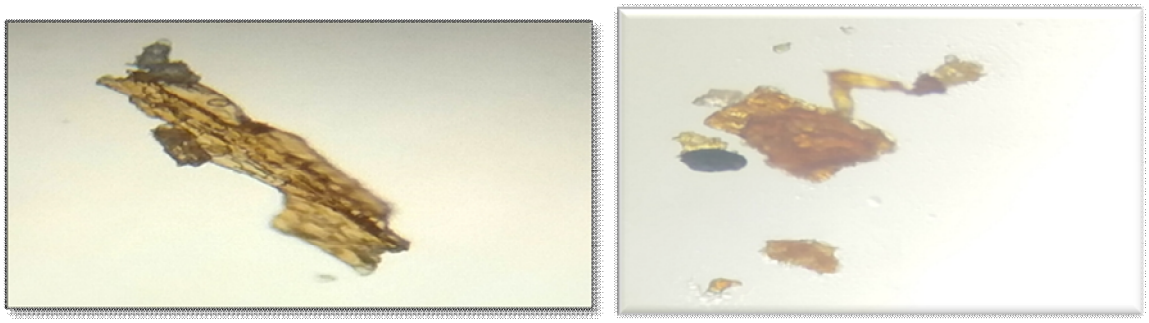

Figure 5-6: *Powder study of Pterospermum acerifolium*(L.)Willd

CONCLUSION

The Pharmacognostical, Physico-chemical and Preliminary Phytochemical analysis on the seeds of *Pterospermum acerifolium (L.)Willd* evolved from the present investigation provide useful information and authentication of the plant. The Phytochemical investigation can further be isolated and undergo further pharmacological evaluation of the active principles present in the seeds of *Pterospermum acerifolium (L.) Willd* which will be of massive use for the researchers and also in the field of Indigenous system of medicine.

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