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Preliminary Pharmacognostic and Phytochemical Evaluation of Stems of *Mimosa hamata (*Willd)

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ABSTRACT

Objective

The aim of the present study is to investigate the pharmacognostic and phytochemical investigation of the *Mimosa hamata* (Willd.) is a flowering shrub of Mimosaceae family which is used in various traditional medicines to cure various diseases. *Mimosa hamata (*Willd.) and *Mimosa pudica* are also known as Touch-me-not plant. A wide range of chemical compounds including 4-ethyl-gallic acid; triterpinicsaponin A, B; ethylgallate; mimonoside A, B, C; etc have been isolated from this plant.

Methods

Morphological and microscopic characters, powder analysis, and extractive values of ethanolic extract of stem of *Mimosa hamata* and qualitative estimation of phytochemicals were determined. The pharmacognostical parameters such as total ash value, acid insoluble ash value and water soluble ash value, alcohol soluble extractive and water soluble extractive were also determined.

Results

The results of pharmacognostic analysis of stem of *Mimosa hamata* (Willd) have revealed the total ash 8.5 % , water soluble ash 0.5 %, water insoluble ash 1.5%, Moisture content 2.5 %, alcohol soluble extractive value 14.29 % and water soluble extractive value 9.75%. The preliminary phytochemical analysis of stem of showed the presence of flavonoids, carbohydrates, tannins etc.

Conclusions

It signifies that results revealed the presence of various bioactive constituents which could be exploited for their biopotential for medicinal purposes.

Keywords : *Mimosa Hamata (*Willd.), Phytochemical Screening, Flavonoids, Ethanolic Extract.

I. INTRODUCTION

India possesses a rich biodiversity of the medicinal plants that were still not explored completely. Medicinal plants have been a valuable source of natural products for maintaining human health. Nowadays, the need for natural products for pharmaceutical purposes from the plant has attained

a great interest in the present research world due to the cost and the higher side effects that are associated with the chemically manufactured drugs [1, 2, 3, 4]. According to WHO (World Health Organization), 80% of the people rely primarily on traditional health care system and mostly on herbal medicines[5]. Plants are rich in a variety of secondary metabolites such as tannins, terpenoids, alkaloids, flavonoids, phenols, steroids, glycosoids, and volatile oils [6, 7]. It is necessary to identify that bioactive constituent of medicinal plants usually employed by herbalists in the treatment of infectious diseases. *M. hamata* (Mimosaceae), commonly known as Jinjani and hooked *Mimosa,* and mostly found in open sandy places, the arid zones of Rajasthan, Punjab, Delhi, Central and South India. Due to their notable pharmacological effects, *M. hamata* are widely used in traditional and modern medicine for preparation of tonics against general weakness, treatment of urinary complaints, applied to burn, over glandular swelling and also used in dressing for sinus, sores and piles[8]. Secondary metabolites from plants have important biological and pharmacological activities, such as anti-oxidative, anti-allergic, anti-inflammatory antibiotic, hypoglycemic and anti-carcinogenic [9, 10, 11]. Phenols and polyphenols are major secondary metabolites present in the plant kingdom. They have been reported to have multiple biological effects, including antioxidant activity and antimicrobial activity. They are imperative source in plant for normal growth development and defence against infection and injury. Isolation and identification of the bioactive compounds of plants have always been a challenging task for researchers [12, 13]. The aim of present study was to identify the qualitative estimation of phytoconstituents present in aqueous and ethanolic extracts of *M. hamata.*The preliminary qualitative phytochemical analysis was used to evaluate the presence of the biomolecules such as flavonoids, tannins and carbohydrates respectively.

PLANT PROFILE

*Mimosa hamata (*Willd)

Botanical name : Mimosa hamata
Family: Mimosaceae (Touch-me-not)
Synonyms: Mimosa armata
Kingdom : Plantae
(Unranked) : Angiosperms
(Unranked) : Eudicots
(Unranked) : Rosids
Order : Fabales
Family : Fabaceae
Genus : Mimosa
Species : hamata

Common name: Hooked Mimosa ·Hindi: Mundi, Bander-ki-Rakhi ·Marathi:Gulabi babul ·Telugu: Undrakampa ·Kannada:Sagarimullu.

Figure 1 : *Mimosa hamata (*Willd) Plant

*Mimosa hamata (*Willd.), a much-branched straggling shrub belonging to family Mimosaceae occurs in tropical areas and widely distributed in India and Pakistan. Traditionally the rural people use this plant to cure urinary complaints and make a tonic against sexual weakness in males. A paste of leaves is applied over glandular swellings and is used in dressing for sinus, sores and piles. Its roots possess contraceptive efficacy while seeds are used as a blood purifier. On phytochemical study, 4-ethylgallic acid from flowers, a triterpenicsaponin B (3-O-L-arabinosyl-D-glucosyl morolic acid) from roots, ethyl gallate and gallic acid

from leaves and mimonoside A, B, C, and saponin A (3-O-D-glucosyl-L-rhamnosyl morolic acid) from its roots have been reported. Various bioefficacies viz. antifungal activity of deproteinized leaf extract, antibacterial activity of alcoholic extract of aerial parts, and antiviral activity of the methanolic extract of roots have been studied. However, little information is available concerning the antioxidant potential of *M. hamata*. In particular, polyphenols in this plant have not been well characterized[10].

The leaf contains ethyl gallate and gallic acid. The flower extract contains 4-ethyl gallic acid, the seed contains moisture, 8.1: crude protein, 20.3: pentosan, 13.4: water soluble gum, 19.3: protein in gum 14.3: and pentosan in gum, 4.2%. They are probably source of gallactomannose (galactose: mannose = 2.3; viscosity 1100-2150)[16].The plant *Mimosa hamata* (Willd.) belonging to the family Mimosaceae is being selected for phytochemical investigations to pin point various pharmacological activities. The said plant has been reported to possess antibacterial, antiviral & antioxidant properties[11, 12, 13, 14]. It was found that no substantial work of the plant was carried out for its hepatoprotective/antihepatotoxic, anti-inflammatory, antiarthitic& anti-fertility activities. Hence, there is need for detailed phytochemical investigations & subsequent screening of the *Mimosa hamata* (Willd.) for hepatoprotective/antihepatotoxic, anti-inflammatory, antiarthitic & anti-fertility activities. Further, to pinpoint the phytoconstituent responsible for such activity.

II. METHODS AND MATERIAL

Collection and identification of plant

For the present study stems of M. hamata plant was collected from Methwade, Tal. Sangola, Dist. Solapur (Maharashtra) and is authenticated at Botanical Survey of India, Pune. The voucher specimen will be deposited in the institution and in 'Herbarium' Department of Botany, Solapur University, Solapur during the month of September 2015. The plant material was dried under shade at room temperature for about 15 days. The dried plant samples were powdered by mechanical grinder and sieved to give particle size 40- 100 mm. The powder was stored in polythene bags at room temperature before extraction.

The stem of *Mimosa hamata* was morphologically examined. A TS of boiled stem in water was prepared and mounted in glycerin on glass slide for identification of internal structures like vascular bundles, pith, cortex and other parts using with iodine and safranin solution. Powder of the dried root was used for the observation of powder microscopic characters. The powder drug was separately treated with phloroglucinol – HCL solution, glycerin and iodine solution to determine the presence of lignified cells, calcium oxalate crystals and starch grains as a part of quantitative microscopy.

Preparation of extracts

M. hamata dried and powdered plant materials (45 g) was also filled in the thimble and extracted with 95 % ethanol solvents in soxhlet extraction unit for 48 hours[15]. The plant extracts were filtered and then concentrated using rotary evaporator at 40 ºC and each extract were transferred to glass vials and kept at 4º C before use.

Yield of the extract obtained was calculated by formula as mentioned below:

$$\text{Extractive yield value} = \frac{\text{Weight of concentrated extract}}{\text{Weight of plant dried powder}} \times 100$$

Preparation of Alcoholic extract:

The collected stems were shade dried, reduced to a coarse powder in a mechanical grinder to obtain of desired particle size (40# sieve).About 200 gm of powdered material was subjected to exhaustive

extraction with 90% alcohol in a soxhlet extractor at a temperature of 60 – 70 ^{0}C, concentrated on a rotary flash evaporator at 50 ^{0}C (Superfit, India), and finally to dry powder. Some part of the total extract was reserved for phytochemical investigation and rest of the extract was used for biological activity. The percentage yield of the extract was found to be 14.29%w/w.

Preparation of Aqueous extract:

About 500 g of Shade dried coarsely powdered stem was subjected to cold maceration with chloroform water I.P. in a two litre conical flask, for about 14 days at room temperature. The flask was securely plugged with absorbent cotton and was shaken periodically till complete maceration. After maceration, the marc was pressed in a muslin cloth and the filtrate was concentrated to a dry residue at room temperature. Some part of the total extract was reserved for phytochemical investigation and rest of the extract was used for biological activity. In each case, all the extract were kept in desiccators until further use. The percentage yield of the extract was found to be **9.75%.**

Qualitative phytochemical analysis of plant extract

The different qualitative chemical tests were performed for establishing profile of given extracts for its chemical composition. The ethanolic extracts were reported the presence of various phytoconstituents such as carbohydrate, glycosides, tannins and flavonoids. All tests were done as per the procedure [16].

Qualitative Chemical Tests[17]

The alcohol extracts and aqueous extracts of both stem were subjected to qualitative chemical investigations for the identification of various plant constituents.

a. Tests for Flavonoids

a) *Shinoda test:* To the alcoholic solution of extract a few fragments of magnesium ribbon and concentrated hydrochloric acid was added. Appearance of magenta colour after few minutes indicates the presence of Flavonoids.
b) *Ferric chloride test*: Few drops of neutral ferric chloride solution was added to little quantity of alcoholic extract. Formation of blackish green colour indicates the presence of phenolic nucleus.

b. Test for Tannins

a) *Ferric Chloride test*: To the extracts a few drops of 1% neutral ferric chloride solution was added, formation of blue, green or brownish green colour indicates the presence of Tannins.
b) *Gelatin test: T*he extracts are treated with 1% solution of gelatin containing 10% sodium chloride. Formation of white precipitate indicates the presence of Tannins.

c. Tests for Carbohydrates

Small quantities of extracts were dissolved in little quantity of distilled water and filtered separately. The filtrates were used to test the presence of carbohydrates.

a) *Fehling's test:* Filtrates were hydrolysed with dilute hydrochloric acid, neutralized with alkali and heated with Fehling's A and B solution. Formation of red precipitate indicates the presence of reducing sugars.
b) *Molisch's test:* The extract was treated with Molisch reagent and concentrated sulphuric acid was added along the sides of the test tube to form a layer. A reddish violet ring shows the presence of carbohydrates.
c) *Barfoed's test*: To the filtrate, Barfoed's reagent was added and boiled on a water bath. Formation of reddish precipitate indicates the presence of monosacharides.
d) *Benedict's test*: Filtrates were treated with Benedict's reagent and heated on a water bath.

Formation of orange red precipitate indicates the presence of reducing sugars.

e) *Selivanoff's test*: (Resorcinol test for ketones) Resorcinol crystals were added to the filtrate and warmed on a water bath with an equal volume of concentrated hydrochloric acid. Formation of rose colour indicates the presence of ketose sugar.

III. RESULTS AND DISCUSSION

Morphological study

Stem is cylindrical in shape with brown branches, the branches possess pinkish stiff spines which are generally straight or curved near apex, young branches with longitudinal ribs and downy with dense growth of small hairs are present[18].

Microscopical Study

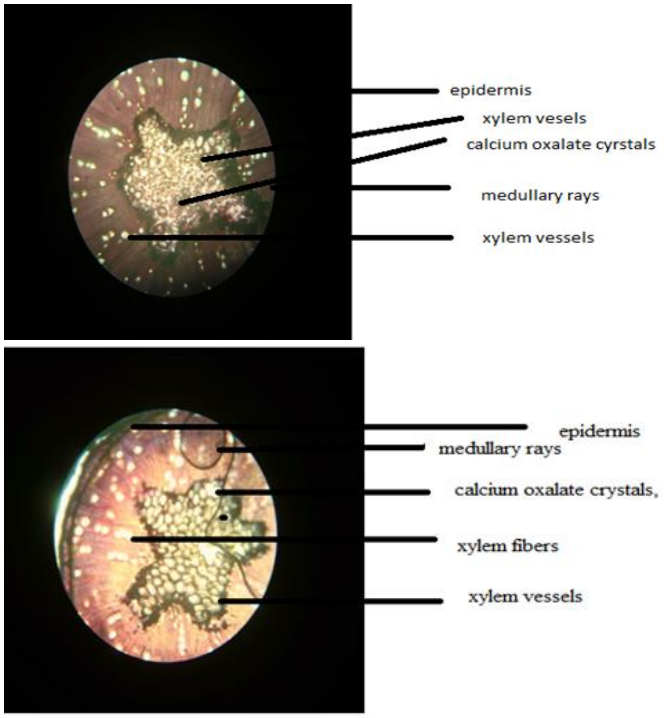

Figure 2: Microscopical study of *Mimosa hamata* (Willd.) Stem

Powder microscopy of stem was performed as per the standard procedures. The microscopic characters such as epidermis, medullary rays, xylem fibers, xylem vessels, calcium oxalate crystals, were observed and recorded as per the standard procedures[19].

Physico chemical Study

Physicochemical study involving determination of ash values of stem of *Mimosa hamata* such Total ash, acid insoluble ash & water soluble ash were determined. The stem of Mimosa hamata (Willd.) showed total ash 8.5 %, water soluble ash 0.5 %, water insoluble ash 1.5%, and moisture content 2.5 %.

Table 1 : Evaluation of stems of *M. hamata*

Sr.no.	Parameters	Values obtained in% on dry weight basis
1	Total ash	8.5%
2	Water soluble ash	0.5%
3	Water insoluble ash	1.5%
4	Moisture content	2.5%

Table 2 : Results of preliminary phytochemical screening of stem extracts

No.	CHEMICAL TESTS	EXTRACTS	
		Alc. Extr. (*M hamata*)	Aq.extract (*M. hamata*
1.	**Tests for Carbohydrates**		
	A) Fehling's test	+	+
	B) Molisch test	+	+
	C) Barfoed test	+	+
	D) Benedict's test	+	+
	E) Selvinoff's test	+	+
2.	**Tests for Tannins**		
	A) Ferric chloride test	+	-
	B) Gelatin test	+	-

3.	**Tests for Flavanoids** A) Shinoda test B) Ferric chloride test C) Lead acetate test D) Zinc-hydrochloric test	 + + + +	 - - - -

The preliminary phytochemical screening of stem of *Mimosa hamata (*Willd.*)* revealed the presence of flavanoids, tannins, as major constituents and carbohydrates as minor constituents and summarized in Table no. 2.

IV. CONCLUSION

In these present investigations, various pharmacognostical standization parameters such as macroscopy, microscopy, and preliminary phytochemical screening were carried out which could be helpful in pharmacological study of *Mimosa hamata (*Willd.)

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