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Review Article

Pharmacological activity of *Mimosa pudica* by different fractions

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ABSTRACT

Tannins and flavonoids fractions of *Mimosa pudica* leaves were screened for phytochemical constituents. Phytochemical analysis of the extract revealed that the antimicrobial activity of the plant materials is due to the presence of active constituents like tannins or flavonoids. *Mimosa pudica* is used in disease related to blood and bile, bilious fever, piles, jaundice, leprosy, ulcer and smallpox. In the present study tannins and flavonoids fractions of *Mimosa pudica* leaves sample were obtained using maceration process. Phytochemical studies revealed that tannin and flavonoids are present in the sample.

Keywords: Tannins, Flavonoids, Jaundice, Maceration.

INTRODUCTON

Many plants have the medicinal values by the presence of active constituents and other substances. By the presence of this value they are named as medicinal plants. Since ancient times most of the products are obtained from the natural plants to cure the diseases. Due to the natural way of curing a disease, people look forward for a natural treatment. This phenomena has expanded the research on plants to cure different diseases .Now a days, most of the people are still unaware of this natural way of treating a chronic disease by natural plant products (Yang et al., 2011). Our aim is to spread the knowledge of different medicinal values of the natural plant products to the people to cure a chronic disease.

Mimosa pudica is commonly known as the sensitive plant, humble plant, touch-me-not plant it is a very popular plant around the world because it is enjoyed by many people due to its sensitivity nature (Okazaki et al., 1993). The leaves are of medicinal importance, the leaves are pulped into a paste which is then rubbed on to people as the treatment for them suffering pains.

Tannins

The term tannins or tannoids was first time coined by Seguin in 1976. Tannins are polyphenolic substances, tannins are found in many plants. Leaf, bud, seed, root, and stem tissues. Such as secondary phloem and xylem and the layer between the cortex and epidermis. Tannins are phenol glycosides It is applied to large phenolic compounds.

Definition:

Tannins are a class of astringent, polyphenolic biomolecules that bind to and precipitate proteins and various other organic compounds. Including aminoacids and alkaloids. Tannins have molecular weights ranging from 500 to over 3000 (gallic acid esters) and upto 20,000 (proanthocyanidins)

Classification of Tannins

1. True tannins

- Hydrolysable tannins
- Condensed tannins
- Complex tannins

2. Pseudo tannins

- Hydrolysable tannins

The hydrolysable tannins are hydrolyzed by acids and other enzymes to produce gallic acid with ellagic acid. Tannins are derived from gallic acid is known as gallitannins and ellagic acid are known as gallitannins.

Condensed tannins

These type of tannins are produce to hydrolysis and they are derived from the catechins and flavan-3, 4-diols and flavonols. These tannins are called as catechol tannins. Condensed tannins are found in wild cherry bark, cinchona bark, tea leaves and areca seeds, bahera fruits, amla etc. They produce green colour with ferric chlorides.

Complex tannins

These are known as mixtures of both hydrolysable and condensed tannins hydrolysable tannins are mostly a c-glucoside ellagitannin with (flavono-ellagitannin) and condensed tannin.

Pseudo tannins

These are low molecular weight compounds which do not show the gold beaters`s skin test. They are found in nux-vomica and catechu etc.

Catechins:- Acacia, Catechu

Chlorogenic acid:- Nux-vomica

Properties of tannins

- These are freely soluble in water, alcohol, glycerol and acetone.
- These are precipitated in number of metallic salts and lead acetate.
- They have molecular weight ranging from 500 to over 3000.
- These are asgtringent taste.
- These are sparingly soluble in chloroform and ethyl acetate.

Uses

- It is used in wine industry.
- It is used as aroma ingredient.
- It is used as uterine tonics.
- It is used as astringent.
- It can be used for production of anti-corrosine.

Flavonoids

Flavonoid was named from the latin word flavus which means yellow, their colour in nature are a class of plant secondary metabolites. They from one of the largest nutrient families. They are mainly known for their anti-oxidant and anti-inflammatory properties. They are polyphenolic compounds that are soluble in water and are

found ubiquitously in higher plants and also in lowere plants like mosses and liver worts. Over 6000 flavonoids have been found so far, Dietary sources that are rich in flavonoid content include parsley, berries, bananas, all citrus fruits*, Gingko biloba*, peanut skin, sea buck thorns, red wine, tea and dark chocolate.

Flavonoids are classified into:

- Bioflavonoids or flavonoids
- Isoflavonoids
- Neoflavonoids

Chemistry of flavonoids

Flavonoids comprise of 15 carbons. They contain two phenyl rings (A and B) connected by a three carbon bridge (C6-C3-C6).

Their base structure is formed by a series of condensation reactions between malonyl residues and hydroxyl cinnamic acid (Restivo et al., 2005). The former produces a ring while the letter contributes B ring and carbon atoms 2, 3 and 4 of C-ring. C ring is formed by the cyclization of 3 carbon bridge between A and B ring. They are complex and highly evolved moieties demonstrating intricate chemical variation. Flavonoids attached to one or more saccharides are called flavonoid glycosides. They are present in 2 forms viz., O and C glycosyl flavonoids. Among monosaccharides, glucose is most commonly attached. Arabinose, galactose, rhamnose and xylose are also present. Allose, apiose, fructose, mannose, glucuronic acid, galacturonic acid are present but rarely. Among disaccharides neohesperidose and rutinose are most commonly present. Tri and even tetrasaccharides were occasionally reported (Mahanta and Mukherjee, 2001).

Anti-bacterial activity of tannins and flavonoids fraction of leaf of *Mimosa pudica* leaves have been used as herbal medicine for the treatment of Anti-bacterial Activity (Charles and Sugito, 2016).

Plant profile:

Botanical source: *Mimosa pudica*

Family: Fabaceae

Common name: touch-me-not plant

Parts used: Leaves

Figure 1: Whole plant.

PHYTOCHEMICAL STUDIES COLLECTION AND AUTHENTICATION

The plant specimen (Leaves) for the proposed study was collected during the month of July 2017 from the garden of Vaageswari College of Pharmacy. It was identified and authenticated by L. Rasingam**,** scientist incharge of Botanical Survey of India (BSI), Hyderabad. A voucher specimen No. BSI/DRC/2017-2018/Tech/470 has been deposited for further reference.

EXTRACTION

The leaves of *Mimosa pudica* were shade dried and coarsely powdered. About 300 g of powdered drug was extracted with Acetone + Water (7:3) by cold maceration method (Bendgude et al., 2012). After 72 hours of maceration it was filtered. To this filtrate, Petroleum Ether (it is generally used to remove waxy substances in leaf extract followed by acetone for removal of chlorophyll) is added in a separating funnel to remove the chlorophyll (Geetha et al., 2015). After removal of chlorophyll, petroleum ether layer was decanted. Again to this filtrate add a saturated solution of sodium chloride (salt water works to pull water from organic layer to water layer) and vitamin-C or Ascorbic Acid (methods used for bioactive compound extraction like flavonoids, tannins and phenolic acids), once again filter the solution (Joseph et al., 2017). To the filtered solution add Ethyl Acetate solvent (flavonoids separated in these solvent) in a separating funnel once again. After gradual shaking of both these solvents in a separating funnel, decanted ethyl acetate solvent gives the flavonoid (Ganesh et al., 2015). The separating funnel contains aqueous layer. After complete extraction, the extract was concentrated by distilling off the solvent and then evaporated to dryness under reduced pressure using vaccum flash evaporator which gives tannins (Azmi et al., 2011). The results are shown in Table 1.

PHYTO CHEMICAL SCREENING

The preliminary phytochemical screening of crude extract has been done to detect the presence of active chemical constituents these phytochemicals are present in different parts of plants which have been utilized by both animals and humans (Ahmad et al., 2012).

The leaves of tannins and flavonoids fractions were subjected to qualitative phytochemical test for identification of constituents (Muhammad et al., 2015). The results are shown in Tables 2 & 3.

PHARMACOLOGICAL STUDIES ANTIBACTERIAL ACTIVITY

Disc diffusion method

Staphylococcus aureus was incubated in sterile nutrient broth for 24 h at 37°C and adjusted to yield approximately 1.0 × 10-7 CFU/ml. A prepared inoculum was added to molten agar, mixed and poured over the surface of the nutrient agar medium in sterile petri dishes and left to solidify (Yusuketemmei et al., 2005). A sterile paper discs 6 mm in diameter were impregnated with specified concentrations (25, 50, 75, 125 µl/disc) of *Mimosa pudica* ethanolic extract and its Tannin Leaf Fraction (TLF), Flavonoid Leaf Fraction (FLF) individually each with standard (Erythromycin 5 µl/disc) the discs were placed on the surface of agar plates (Zhang et al., 2011). Following the same procedure, sterile discs were impregnated with specified concentrations (Erythromycin 5 µl/disc) were placed on the surface of agar plates (Bagirath and David, 2009). A disc without test material was used as control. The plates were left for 1 hr at room temperature as a period of pre incubation diffusion to minimize the effects to variation in time between applications of the different solutions (Kaiser and Thorsten, 2006). The plates were incubated at 37°C for 24 h under aerobic conditions and observed for antibacterial activity (Sia et al., 2011). All disc diffusion tests were performed in four separate experiments and the antibacterial activity was expressed as the mean of inhibition diameters (mm).The results are shown in Table 4 & Figure 2**.**

Agar well diffusion method

The extract and its fractions were examined for their antimicrobial activities against the toothache bacteria named above using the micro dilution method described by Amsterdam (1996) with some modifications. Briefly, each tested compound was added into a microtiter plate containing appropriate broth to obtain the concentration ranging from 10 to 200 g/ml (Dhanya and Thangavel, 2015). The bacteria to be tested were added to the wells containing the compound to obtain a final concentration of 104 CFU/ml. A positive control (without tested compounds) and negative control (without tested bacteria) were included for each plate. After incubation atoptimal temperature, bacterial growth was inspected at 24 h. (Claudio et al., 2004).The results are shown in Table 4 & Figures 3 & 4.

RESULTS

The present work covers study on an antibacterial activity of the leaves of *Mimosa pudica* Linn.

Table 1: Isolation of flavonoid and tannin leaf fraction

Extract/Fraction	Percentage Yield (% w/w)	Color	Consistency
Flavoniod Leaf Fraction (FLF)	8.8	Light green	Greasy
Tannin Leaf Fraction (TLF)	9.6	Brownish	Hard

Table 2: Chemical tests for Tannins:

S.no	TEST	RESULT
1	Ferric Chloride	+
2	Lead Acetate	+

Table 3: Chemical tests for Flavonoids:

S.no	TEST	RESULT
1	Schinoda	+
2	Ferric Chloride	+

Table 4: Antibacterial activity of *Mimosa pudica* and its leaf fractions of flavonoid and tannin against *Staphylococcus aureus.*

Fraction	Concentration	Zone of Inhibition
Flavonoid Leaf Fraction (FLF)	25	20
	50	23
	75	29
	125	38
Tannin Leaf Fraction (TLF)	25	15
	50	19
	75	22
	125	25

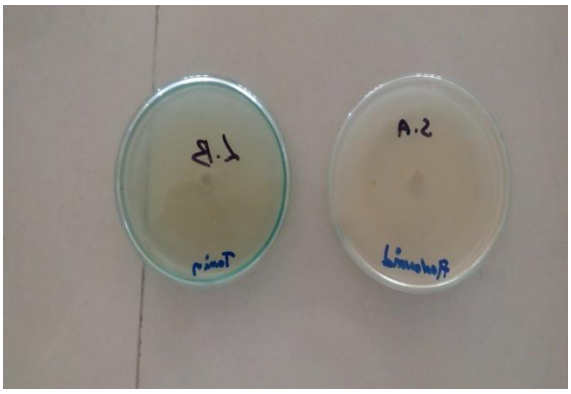

Figure 2: Tannin leaf fraction and flavonoid leaf fraction (disc diffusion method)

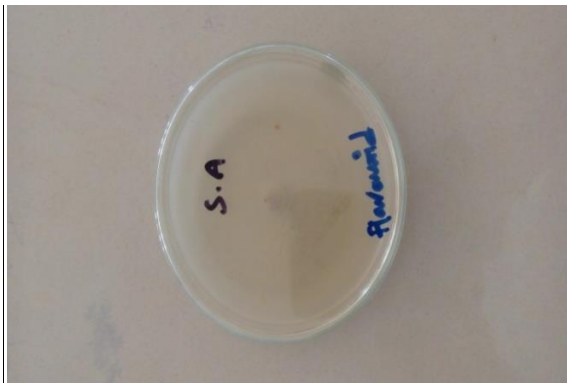

Figure 3: Tannin leaf fraction and flavonoid leaf fraction (agar well diffusion method)

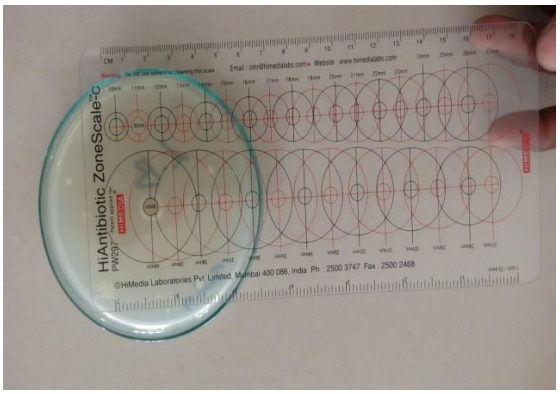

Figure 4: Standard

DISCUSSION

Antibacterial Activity:

Staphylococcus aureus is an anaerobic bacteria which is prone to normal skin infections in the nostrils and genital parts of human. Tannins and flavonoids extract shows the antibacterial activity which act at the target site which provides a potential treatment.

The antibacterial activity of tannins and flavonoids can be evaluated by agar well diffusion method and disc diffusion method. The comparison of control and zone of inhibition (mm) with test had shown the concentration dependent which was found to be significant.

CONCLUSION

From the above studies it has been concluded that *Mimosa pudica* leaves have the tannins and flavonoids

fraction which have a significant antibacterial activity. By comparison, it was evaluated that the zone of inhibition of FLF was found to be greater than that of TLF. It is confirmed by the significant percentage of test and zone of inhibition (mm) with control concentration.

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