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Extraction of Secondary Metabolites from *Mimosa pudic*a L. and Study of its Antimicrobial Activity

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Abstract— Now-a- days medicinal plants have high medicinal values and economic importance. The secondary metabolites are mainly involved in the protection but these are not necessary for a cell to live. During the adverse condition, the secondary metabolites are secreting from the plants to protect them from the infection of bacteria and insects. The present investigation emphasized on the extraction and antimicrobial potential of *Mimosa pudica* (*M. pudica*)plants. These plants are highly riched with alkaloids, flavonoids, terpene etc. They have great economic medicinal value due to its use in the treatment diabetes, bleeding piles, hepatitis, cancer etc. Here we collected the plants from GIET University campus and extracted the secondary metabolites from its leaf and investigated the antimicrobial potential against *E. coli* with different concentration of aqueous extract. We found the significant antimicrobial activity against *E. coli*. The diameter of inhibition zone was found 15mm, 13 mm, 12mm and 11 mm with concentration of 25µl, 50µl, 75µl and 100µl of extract respectively. This result confirms that *M. pudica*is possessing the tremendous antimicrobial activity against the *E. coli* bacteria.

Keywords— Seondary metabolites, Mimosa pudica, Antimicrobial activity, Zone of inhibition, Aqueous extract

I. INTRODUCTION

From ancient times, plants contributed valuable sources of natural products. In recent times plants are having different biological activities like antimicrobial, antiviral, antivenom, antioxidant used widely in pharmaceutical and food industries [1]. According to the WHO, traditional medicine was used by around 80% population of world. As per several research studies, it is seen that medicine derived from plants has low side effect on human health than synthetic substances [2]. The antimicrobial properties of compound extracted from medicinal plant have showing to be extremely important in medical field applications. These compounds such as flavonoids, terpenes, alkaloids, tannins, and essential oils are synthesized by the plants secondary metabolism. Alkaloids are natural, organic substance found mostly in plants that have at least one nitrogen atom in their chemical structure. Alkaloids act as a defence against animal or insect or bacteria [3]. Alkaloids are found a variety of plants including *M. Pudica L. M. pudica L.* is a perennial herb, compound leaves. It shows thigmonastic movement [4]. In some plant (Mimosa species) herbaceous to woody plant. *M. Pudica* diffuse under shrubs, the height of plant is 50-90cm. *Mimosa pudica* is a sensitive plant generally called as touch me not plant. It is closing its leaves when it will be touched. In behaving this way *M. pudica* demonstrate thigmonasty [4]. The turgor pressure of the cells causes the bending of *Mimosa pudica* leaves. Except seisomonastic movements, this plant also closes its leaves under higher temperature. The plant bends inward due to a series of bioelectrical and biochemical changes occur under external stimuli. The movement of leaves and stems starts at pulvinus which is a swelling pad like petioles. Pulvins contain two types of cells called as extensor cells and flexor cells which are present oppositely. Under physical touch, stretch occurs in flexor cells while the extension occurs in extensor cells. The turhor pressure of extensor cells cause the bending [4, 5]. For healthcare purpose many developing and developed countries are using plants and natural products. *M. pudica* leaves have antimicrobial, anticancer, anti diuretic actions. It helps the gut by absorbing toxin, heavy metals, parasites, bacteria. It facilities the excretions of the body remove the toxin material from the body. It's keep the digesting process less pressure and maintaining clean and health gut. The principle of brain and gut relationship really want to know natural weight maintain the mental status [6, 7, 8]. 90 percent of serotine made in gut. It is the happy hormone that is responsible for maintaining mood. Bacteria in the gut has the capability to help the body produces serotine. Lack of neurotransmitters is associate certain health problems such as anxiety, depression [9]. *M. pudica* has the caper to maintain gut health by removing body waste and maintain good bacteria growth. Plants are the major source of phytomedicine for human health care and it is prudent to analyse the various phytoconstituents present in them. Phytochemical analysis of *Mimosa pudica L.* showed presence of alkaloids, flavonoids, phenols [4, 10]. Hence, the current work emphasized on the extraction of secondary metabolites from Mimosa pudica and investigated its antimicrobial activity.

MATERIALS AND METHODOLOGY
PLANT MATERIAL COLLECTION

The plant materials were collected from GIET University campus and transported to Plant Science laboratory and properly washed with tap water. After the washing the plant materials were dried under normal temperature for two days and again expose to oven drying at 70ºC for 3 hours. The dried leaves were grinded into powder form and subjected to

aqueous extraction.

AQUEOUS EXTRACTION

Two grams of leaf powder was taken and dissolved in 100ml of distilled water and incubated for 48 hours. Then the sample was further filtered by Whatman no.1 filter paper to discard the cell debris. The filtered supernatant was collected in a test tube [11].

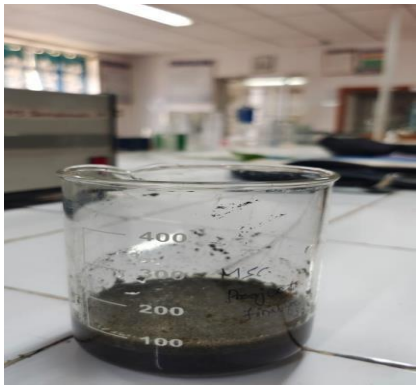

Fig:1 Aqueous extract from *Mimosa pudica* L

SOLVENT EXTRACTION

Two grams of powdered leaves were taken for solvent extractions using Soxhlet apparatus. Here ethanol used as solvent. 150ml of solvent was prepared by adding 75% ethanol with 25% distilled water (112.5 ethanol and 37.5 ml distilled water) [12, 13].

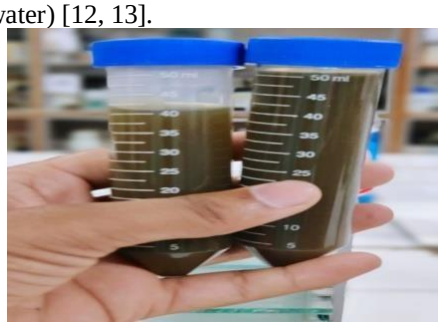

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Fig:2 Solvent extract from *Mimosa pudica* L

PROCESS OF SOXHELT EXTRACTION

The solvent taken in Soxhelt apparatus for assembling and solvent is heated under reflex. Solutes are taken and transferred from the extraction chamber into the reservoir. Reflex it for 5 cycles. After completion of each cycle the fresh solvent is extracted and collected in the Soxhelt apparatus. At last the extracted sample is collected in a centrifuge tube [12].

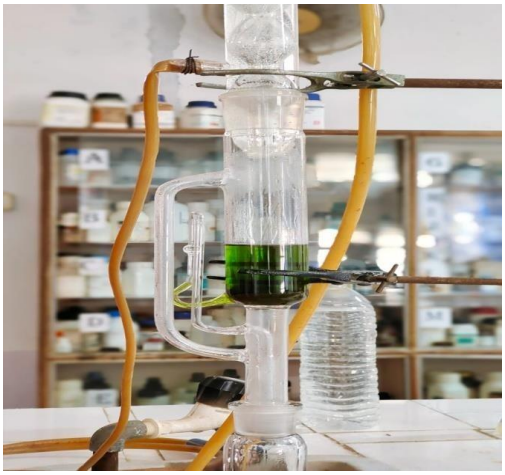

Fig:3 Soxhelt extraction from *Mimosa pudica* L

ANTIMICROBIAL ACTIVITY

The antimicrobial activity of *M pudica* plant's extract against *E. coli* is determined by agar well diffusion method. The aqueous extract taken to study the antimicrobial properties of *M. pudica*. In the very first step, we have taken 1.4 gram of nutrient agar and added 50ml of distilled water inside a beaker. Then petridish, conical flask with distilled water and agar is taken to autoclave for sterilization. After this process, all the sterilized materials were transferred into the laminar air flow to prevent from getting contaminated [14].

Then nutrient agar is taken in a petridish and it allowed to drt for 15 minutes. Then a sterilized cork borer was used to make well. The *E. coli* bacteria collected from MTCC were spread on solid agar plate using a spreader. Variable concentrations (25, 50, 75 and 100µl) of plant extract test sample were added into the every well. The plates were labelled and kept for incubation at 37ºC overnight. Then zone of inhibition zone was calculated and diameters of zones were noted [15].

RESULTS AND DISCUSSION

The antimicrobial activity of *M. Pudica* tested against gram negative bacteria *E.coli*. It was found that aqueous extract of *M. pudica* confirmed antimicrobial potential and shown the most effective inhibition zone against *E. coli*.

We found that the inhibition zone was increased when the concentration of aqueous extract is decreased. The difference in the observe zone of inhibition activity is due to the varying degree of solubility of the active constituent as in extract.

Fig:4 Treatment of aqueous from *Mimosa pudica* L against *E. Coli* by agar diffusion method

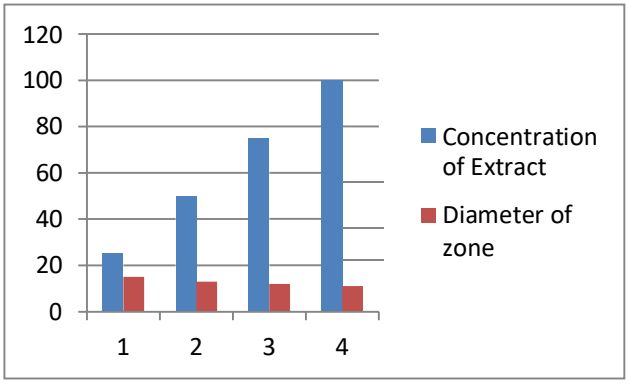

Fig: 5 Comparative analysis of zone of inhibition in different concentration

Sl no.	Concentration of Extract	Diameter of zone	Results
1	25	15mm	+
2	50	13mm	+
3	75	12mm	+
4	100	11mm	+

Table:1 Zone of Inhibition of *Mimosa pudica* L against E. coli

CONCLUSION

The current research work concluded that the antimicrobial activity of the *M. pudica* plant extract would be more effective against *E. coli* bacteria and the disease associated by *E. coli*. Also it is found that the aqueous extract have antagonistic effects on broad spectrum gram -ve bacteria. Further research work can be conducted on broad range of bacteria to see more antagonistic effects. Also investigation on identification and purification of bioactive compounds associated with *M. pudica* and their toxicological effects can be investigated for the development of future potential drugs for human welfare.

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