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Phytochemical Screening and Antimicrobial Activity of *Shuteria involucrate*

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ABSTRACT

Shuteria involucrata belongs to fabiaceae family is one of the highly potential Indian medicinal plant with wide range of pharmaceutical applications which includes dental diseases. In the present work the plant extract of Shuteria involucrata is investigated for its phytochemical and antimicrobial characteristics. The dry plant material was successively extracted using various solvents such as chloroform, ethanol, hexane, methanol, and petroleum ether in soxhlet apparatus. All extracts were concentrated by rotary vacuum evaporator and were screened for major phytochemical compounds using established procedures. Around ten phytoconstituents were identified to be present. The antimicrobial activity were carried out by disc diffusion technique against the six selected pathogens. Among the six, tested for Antimicrobial Activity Staphylococcus aureus, Pseudomonas aeruginosa and Candida albicans were more susceptible to the extract, whereas the others are less susceptible. Ethanol, methanol and water extracts of plant materials exhibited good antimicrobial activity against gram positive, gram negative bacteria and fungus.

Keywords: *Shuteria involucrata*, Soxhlet apparatus, Antimicrobial activity, Disc diffusion technique.

INTRODUCTION

In the recent past, there has been growing interest in exploiting the biological activities of different ayurvedic medicinal herbs, owing to their natural origin, cost effectiveness and lesser side effect. Medicinal plants are expensive gift from nature to human [1,2]. For thousands of years, natural products have played a vital role in health care and prevention of life killing diseases. Now a days about 80% of the developed countries use traditional medicine, which has compounds derived from medicinal plants [3]. Modern pharmacological drugs are derived directly or indirectly derived from plants and the plants are the cheapest and safer alternative sources of drugs [4,5]. *Shuteria involucrata,* is considered one of the main sources of biological active compounds, it is familiarly known as kodiveli belongs to *Fabiaceae* family, Herbs, 1-3 m. Stems twining, slender, densely pubescent or glabrous [6]. *Shuteria involucrata* extracts were investigated to estimate the secondary metabolites using various analytical techniques. The leaves and roots of *Shuteria involucrata* are used for traditional health care practice for the treatment of dental diseases, wounds of the skin and anti-cancer activity [7].

This paper reveals a detailed study on phytoconstituents present in the plant of *Shuteria involucrata.* The result of this study shows a moderate correlation between traditional therapeutic use and antimicrobial activity in different pathogens.

MATERIALS AND METHODS

Reagents

All the solvents used for extracting primary and secondary metabolites from plant tissues were from Merck manufactured analytical grade.

Collection and Preparation of Plant Material

Fresh plants of *Shuteria involucrata* were collected from the natural habits of Kolli hills, Namakkal, Tamilnadu, India. The identity

was confirmed/authenticated by Dr. S. Susairaj, Department of Botany, St Joseph's college, Tiruchirappalli, Tamilnadu, India. The samples were washed thoroughly in running tap water to remove soil particles and other adhered debris and finally washed with sterile distilled water. The whole plants were shade dried and ground into fine powder. The powdered materials were stored in air tight polythene bags until use.

Preparation of extracts

Shade dried plant materials were coarsely powdered and subjected to successive solvent extraction by continuous hot extraction (soxhlet). The solvent extracts were prepared based on their polarity. The extraction was done with different solvents like chloroform, ethanol, hexane, methanol and petroleum ether. 25 g of powdered plant material and 150 mL of solvents were taken in soxhlet apparatus. The plant material and different solvents were heated to their boiling points for 14 h. The dark green colour extracts was obtained. Above procedure were repeated for other solvents. All the extracts were concentrated by distilling the solvents in a rotary vacuum evaporator. Water extraction was done by using dissolving method. 25 g of plant material was added into 100 ml of distilled water and kept aside for three days (soaked for 72 h). The filtrates were preserved in airtight containers and kept at 4-5ºC until further use.

Test organisms

The microorganisms used for the test were *Staphylococcus aureus (S. aureus), Bacillus subtilis (B. subtilis), Klebsiella aerogenes (K. aerogenes), Pseudomonas aeruginosa (P. aeruginosa) and Fungus Aspergillus niger (A. niger), Candida albicans (C. albicans)* were obtained from National Chemical Laboratory (NCL) Pune, India [8].

Culture media and inoculums preparation

The NCIM numbered strains bought from Chemical Laboratory (NCL) pune was sub cultured in nutrient agar and maintained in the laboratory. The plates were incubated 37 ± 2^0 C for 24 h. During this period the drug diffuse the agar and inhibit the growth. The ATTC numbered strains bought from Madras Medical College was periodically sub cultured in Sabouraud dextrose agar maintained in the laboratory. The test sample about 100 µl was loaded to the sterile disc by using aseptic precautions. The plates were incubated at room temperature for 2 to 4 days. During this period the drug diffuse through the agar and inhibit the growth if the drug is potent.

Phytochemical screening

The preliminary phytochemical screening was performed by Harborne method [9]. The different extracts were tested for alkaloids, carbohydrates, flavonoids, glycosides, phenolic compounds, proteins, saponin, steroids, tannin, and terpenoids.

Antimicrobial activity study

The Antimicrobial activity of the *Shuteria involucrata* plant extracts viz. Chloroform, ethanol, hexane, methanol, petroleum ether and water were determined, using Disc Diffusion Technique [10].

RESULTS AND DISCUSSION

Phytochemical screening of *shuteria involucrata*

In the present study, Qualitative phytochemical analysis was carried out in all extracts (chloroform, ethanol, hexane, methanol, petroleum ether, and water) *Shuteria involucrata* results were presented in Table 1 Among the six solvent extracts, ethanol, methanol, and water was found to contain high levels of alkaloids, flavonoids, glycosides, saponin and moderate levels of protein, tannin, terpenoids respectively.

Antimicrobial activity

The anti-microbial activity for the given sample was carried out by Disc Diffusion Technique. Six selected pathogens, among the six *Staphylococcus auereus, Pseudomonas aeruginosa* and *Candida albicans* were more susceptible to the extract, whereas

Table 1: Phytochemical Screening of Different Solvents Extract of *Shuteria involucrata*

S.No	Phytoconstituents	Chloroform	Ethanol	Hexane	Methanol	Pet.ether	Water
1	Alkaloids	+	+	+	+	-	+
2	Carbohydrates	-	+	-	-	-	+
3	Flavonoids	+	+	-	+	+	+
4	Glycosides	+	+	+	+	+	+
5	Phenolic compounds	-	+	-	+	-	-
6	Proteins	+	+	+	+	-	+
7	Saponin	+	+	+	+	+	+
8	Steroids	+	+	-	+	-	-
9	Tannin	-	+	+	+	-	+
10	Terpenoids	-	+	-	+	+	+

* + = Present - = Absent

the others are less susceptible (Table 2). Ethanol, methanol and water extracts of the plant materials exhibited good antimicrobial activity against gram positive, gram negative and fungus. Anti-bacterial activity procedure for the NCIM (National Collection of Industrial Microorganisms) numbered strains bought from National Chemical Laboratory (NCL) pune was periodically sub cultured in Nutrient agar maintained in the laboratory. Anti-fungal activity procedure for the ATTC numbered strains bought from Madras Medical College was periodically sub cultured in Sabouraud dextrose agar maintained in the laboratory. Zone of inhibition between 6 mm to 12 mm is intermediate, as well as below 6 mm is resistant and zone of inhibition more than 12 mm is the sensitive for both bacteria and fungus (Figures 1 and 2). The effect produced by the sample was compared with the effect produced by the positive control (Reference standard Ciprofloxacin 5 µg/disc for bacteria; Nystatin 100 µg/disc for fungi).

Table 2: Antimicrobial activity of different solvent extracts of *Shuteria involucrata* against test Organisms

		Zone of inhibition in mm						
S.No	**Name of the Microorganisms**	**Hexane**	**Chloroform**	**Pet.Ether**	**Ethanol**	**Methanol**	**Water**	**Std**
1	*Staphylococcus aureus*	17	26	18	30	26	16	35
2	*Basillus subtilis*	14	20	18	26	24	13	40
3	*Klebsiella aerogenes*	18	15	16	22	20	12	30
4	*Pseudomonas aeruginosa*	16	16	12	24	20	14	40
5	*Aspergillus niger*	18	18	20	21	19	16	35
6	*Candida albicans*	20	16	22	25	23	23	32

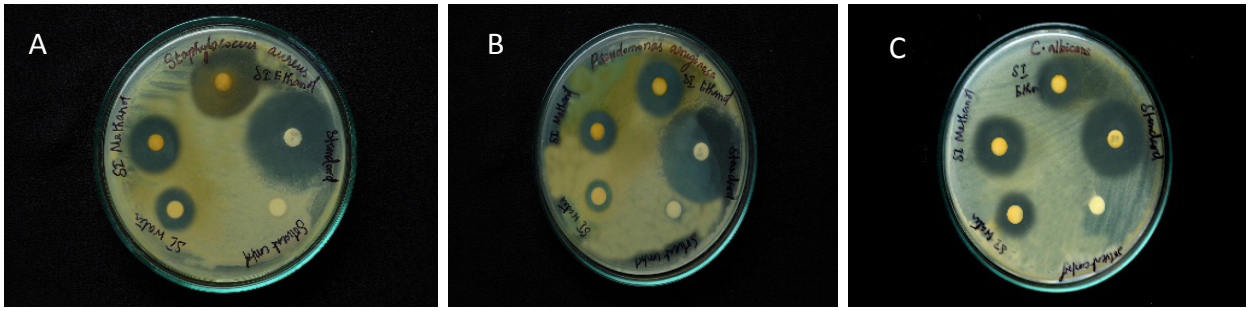

Figure 1: Different concentrations of ethanolic extract of *Staphylococcus aureus* produce zones of inhibition against (A) *S. auereus*, (B) *P. aeruginosa* (C) *Candida albicans*

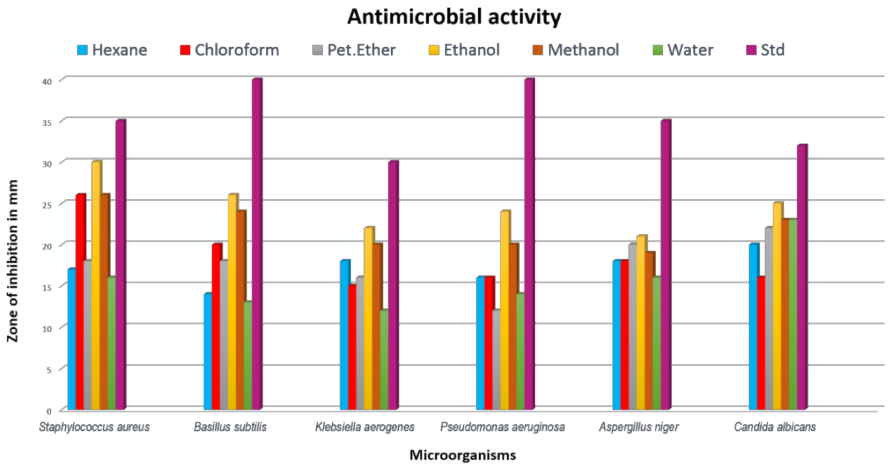

Figure 2: Antimicrobial Activity of Different Solvent Extracts of *Shuteria involucrata* Against Various Microorganisms

CONCLUSION

The plant extracts were screened for major phytochemical compounds using established procedures. Around ten phytoconstituents like alkaloids, carbohydrates, flavonoids, glycosides, phenolic compounds, proteins, saponin, steroids, tannin, and terpenoids were identified to be present. The result of this study suggest a fairly good correlation between traditional therapeutic use and antimicrobial activity. They show that the different extract of *S. involuctarata* has antibacterial and antifungal effect on *Staphylococcus aureus (S. aureus), Bacillus subtilis (B. subtilis), Klebsiella aerogenes (K. aerogenes), Pseudomonas aeruginosa (P. aeruginosa) and Fungus Aspergillus niger (A. niger), Candida albicans (C. albicans)*. The tested anti-microbial potency of the extracts of ethanol, methanol and water showed equipotential activity against *S. aureus, P. aeruginosa, C. albicans.* The various extracts displayed moderate activity to the tested culture.

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