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Research Article

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Study on antibacterial activity of *Parthenium hysterophorus* L.

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ABSTRACT

The aim of the study was to find the effect of the antibacterial. Ethanol, chloroform, methanol, acetone, ethyl acetate, hexane, petroleum ether and aqueous extracts of Parthenium hysterophorus from vellore were tested in vitro for their antibacterial activities against, Pseudomonas aeruginosa, Micrococcus luteus and Bacillus cereus with the disc diffusion method. Methanol was the best solution for extracting the effective antibacterial materials from the Parthenium hysterophorus used in this experimental and compared with standard drug, Ciprofloxacin. In the present study show the importance of in producing new bioactivity compounds having antibacterial activity.

Key words: Antibacterial activity, *Parthenium hysterophorus* and leaf extract

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INTRODUCTION

Recently scientific interest in medicinal plants has burgeoned due to the increased efficiency of plant derived drugs and raising concern about the side effects of modern medicine. The efficacy of current antimicrobial agents has been reduced due to the continuing emergence of drug resistant organisms and the adaptations by microbial pathogens to commonly used antimicrobials. Therefore the search for new drugs from plants continues to be a major source of commercial drugs. Plant based antimicrobials represent a vast untapped source of medicines even after their enormous therapeutic potential and effectiveness in the treatment of infectious disease hence, further exploration of plant antimicrobials need to occur [1]. Mainstream medicine is increasingly receptive of the use of antimicrobial and other drugs derived from plants, as traditional antibiotics become ineffective and because of the rapid rate of plant species extinction Medicinal plants are valuable natural resources and regarded as potentially safe drugs and have been tested for biological, antimicrobial and hypoglycemic activity also play an important role in the modern medicine [2].The screening of plant extracts and their products for antimicrobial activity has shown that higher plants represent a potential source of novel antibiotic prototypes [3]. It is well known that even the most synthetic drugs have their origin from plant products [4]. There is a feeling among natural-products chemists and microbiologists alike that the multitude of potentially useful phytochemical structures which could be synthesized chemically is at risk of being lost irretrievably [5]. In the present study was undertaken to evaluate antibacterial activity of the *Parthenium hysterophorus* However against selected strains of both bacteria. *Parthenium hysterophorus* belongs to the family Asteraceae.

EXPERIMENTAL SECTION

Parthenium hysterophorus leaf was collected from Vellore, Tamil Nadu, India in the form of dry sample

Crude extract preparation

For preliminary investigation, 20.0 g dry powdered material was extracted with 200 ml of desired solvent [Ethanol, chloroform, methanol, acetone, ethyl acetate, hexane, petroleum ether and aqueous extracts] in cold maceration method using aspirated bottle and the extract thus obtained was dried *in vacu.*

Test Microorganisms

Clinical isolates of *Pseudomonas aeruginosa, Micrococcus luteus* and *Bacillus cereus* were gifted by Dr Agarwal's eye Hospital, Chennai, used as the test organisms. Disc diffusion method Bauer [6] was adopted for the determination of antibacterial activity of the extract residues. From the stock cultures of various test organisms, inoculum was prepared by subculturing each of the organisms on Muller-Hinton agar at 37^{o}C. Seeding of Muller-Hinton agar plates was done using the 24 hr culture with a cotton swab under aseptic conditions. The discs loaded with extract residues were aseptically placed on top of the seeded medium and gently pressed to ensure contact. The plates were then incubated at 37^{o}C. After overnight incubation, the plates were observed for zones of inhibition. Ciprofloxacin was used as standard drug.

RESULTS AND DISCUSSION

The antibacterial activity of the crude solvent extracts of the *Parthenium hysterophorus* eight solvent systems namely Ethanol, chloroform, methanol, acetone, ethyl acetate, hexane, petroleum ether and aqueous extracts. The bacteria *Bacillus cereus* was used as test organism (Table.1). In this preliminary investigation, the leaf extract prepared with a mixture of methanol proved to be more effective than the other solvent system used in inhibiting the growth of *Bacillus cereus* on Muller-Hinton agar plates. Ethanol exhibit only 87% maximum activities against the test organism (Table.1). While ethyl acetate, acetone, petroleum ether, hexane and chloroform of the leaf were able to exhibit only 24% to 79% maximum activity against the test organism (Table.1). The aquas extract appeared to be poor growth of *Bacillus cereus*. Based on these observations, further experiments on the antibacterial activities of the *Parthenium hysterophorus* were carried out methanol extracts.

The methanol extract of the *Parthenium hysterophorus* were prepared as described earlier and testes at a concentration of 700 µg/disc by disc diffusion method against three pathogenic bacteria namely, *Pseudomonas aeruginosa, Micrococcus luteus and Bacillus cereus*. The results are presented in Table.2. The extract residues of leaf recorded maximum activity against *Bacillus cereus* with an inhibition zone of 13 mm for *Parthenium hysterophorus* which are quite high (Table.2). The extract residue of *Parthenium hysterophorus* recorded activity against *Micrococcus luteus* and *Pseudomonas aeruginosa* 76.9 to 53.8% (Table .2). The antibacterial activity of the methanols extract residues of the *Parthenium hysterophorus* against the three pathogenic bacteria was compared with the standard antibiotics (Tables.2).

Sumathi and Parvathi [7] obseverd antibacterical activity of *B. orellana* leaf extract of various solovent. She repoted that marked zone of inhibition showed only at concentration of 3200µg and 6400µg of methanolic leaf extract. The inhibitory zone around the well indicated the absence of bacterial growth and it as reported as positive and absence of zone as negative [9].

Table 1: Antibacterial activity of the crude solvent extracts of the *Parthenium hysterophorus*

S.No	Solvent used for extraction	Antibacterial activity (% maximum activity)
		Parthenium hysterophorus
1.	Methanol	100%
2.	Ethanol	87%
3.	Ethyl acetate	79%
4.	Acetone	75%
5.	Chloroform	63%
6	Petroleum Ether	55%
7	Hexane	24%
8	Aquas Extract	15%

The present study differs from the previous study since the antibacterial activity was evaluated using methanol extract residues of the *Parthenium hysterophorus.* On evaluating the antibacterial property of, *Parthenium*

hysterophorus the alga proved to be a potent antibacterial agent. The finding of this study also paves the way for further research to identify the specific bioactive compounds that is responsible for its claimed antibacterial activity. Maximum activities (zone of inhibition) for *Bacillus cereus* were 13 mm (for *Parthenium hysterophorus* extract)

Table 2: Antibacterial activity of the crude petroleum extracts residue of the *Parthenium hysterophorus*

S.No	Test bacteria	Zone of inhibition (mm) ± S.E.	
		Parthenium hysterophorus	Ciprofloxacin
1.	***Bacillus cereus***	13 ± 0.132 (100)	9.3 ± 0.171
2.	***Micrococcus luteus***	10 ± 0.045 (76.9)	5.9 ± 0.130
3.	***Pseudomonas aeruginosa***	7 ± 0.165 (53.8)	6.7± 0.056

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