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PHYTOCHEMICALS AND ANTIBACTERIAL SCREENING OF *Parthenium hysterophorus*

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ABSTRACT

The present study is based on phytochemical and antibacterial screening of *Parthenium hysterophorus.* For the plant extraction three solvents viz. methanol, ethanol and petroleum ether were used. Phytochemical antibacterial screening three sets of gram positive and gram negative bacteria were used. *Parthenium hysterophorus* exhibited antibacterial activity against all the test organisms in all extracts, where maximum zone of inhibition was found against *Bacillus subtilis* in methanolic extract. These result shows that *Parthenium hysterophorus* can be used as an antimicrobial agent.

KEYWORDS: *Parthenium hysterophorus,* Antibacterial, Weed Plants

The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments (Farnsworth, 1994, Srivastava *et al*., 1996). For treatment of infectious diseases on Earth pharmacologists, microbiologists, and natural-products chemists are relying on plant derived dietary supplements as well as Phytochemicals (Pandey *et al*; 2015). Scientific investigations revealed that a large number of plant products inhibit growth of pathogens (Deshpande and Deshpande 2017). An antimicrobial is a compound that can kill microorganisms or inhibits the growth of microorganisms. Antibacterial which is also called as antibiotics, are used against bacteria and antifungal are used against fungi. They can also be classified according to the function they perform. (Pandey *et al*; 2014). All though several new antibiotics have been produced by pharmacological industries in the last three decades but resistance to these drugs by microorganisms has increased (Deshpande *et al;* 2017). In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly synthesized during secondary metabolism of the plant. Therefore, such plants should be investigated to better understand their properties, safety and efficacy (Prusti *et al*., 2008). *Parthenium hysterophorus* Linn. (Family-Asteraceae), commonly known as Congress grass, Congress weed. The "Scourge of India" is an exotic weed that was accidentally introduced in India in 1956 through imported food grains and is now considered as one of the most feared noxious weed (Rao 1956). It adapts various agro-climatic conditions and almost distributed itself to variety of growing environmental conditions (Annapurna and Singh 2003). The plant is used in the treatment of ulcerated sores, wounds, and fever, anemia and heart troubles. A decoction of the root finds use in treatment of dysentery (Kalsi *et al*., 1995) and the lower concentrations of extracts might find use as antifungal agent (Bajwa *et al*., 2003).

Thus the present study is designed to analyze the phytochemical profile of *Parthenium hysterophorus* and to evaluate its antimicrobial activity against various pathogenic Microorganisms to reveal its medicinal significance.

MATERIALS AND METHODS

Collection of Plant Material

The fresh plants of *Parthenium hysterophorus* were collected from Botanical Garden of Bhilai Mahila Mahavidyalaya, Bhilai Chhattisgarh. The fresh leaves were separated from the plant and washed thoroughly for 2-3 times with running tap water and then with sterile water followed by shade drying. The separated leaves were powdered in a mixer and fine powder was collected for further analysis.

Preparation of Extract

The powdered leaves were subjected to hot extraction by soxhlet using Ethanol and Methanol and cold extraction using Petroleum ether as solvent.

Phytochemical Analysis

The crude samples were subjected to phytochemical screening for the presence of Alkaloids, Carbohydrates, saponins, glycosides, proteins AminoAcids, Phytosterols, triterpenoids, flavonoids, Phenolic compounds, tannins, using the method of Harborne.

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Microorganisms Used For Antimicrobial Study

Gram negative bacteria*: Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. Gram-positive bacteria: *Bacillus subtilis, Staphylococcus aureus* and *Micrococcus luteus.*

Antibacterial Activity

The Antibacterial activity was determined by well diffusion method (Bauer et al., 1966). The medium was sterilized by autoclaving and was allowed to cool at room temperature. The medium was poured into the sterile Petri plate. The inoculated plates were kept aside for few minutes, using well cutter. Using sterilized micropipettes 20 µl of different solvents with selected *Parthenium hysterophorus* extract was added in to well. The plate was incubated at 37°C for overnight. The microbial growth was determined by measuring the diameters of zone of inhibition. Controls were maintained where pure solvents were used instead of *Parthenium hysterophorus* extracts.

RESULTS AND DISCUSSION

Table 1: Preliminary Phytochemical analysis of *Parthenium hysterophorus*

S. N	Phytochemicals	Test performed	Methanol Extract	Ethanol Extract	Petroleum Ether
1.	Alkaloids	Dragendorff's test	+	+	+
2.	Carbohydrates	Molish test	+	+	+
3.	Saponins	Chloroform and H_2SO4 test	-	+	-
4.	Glycosides	Molish test	+	+	-
5.	Proteins & amino acids	Million's Test	+	+	-
6.	Phytosterol	Libermann-Burchard's Test	+	+	-
7.	Phenolic compounds	Ferric chloride test compounds Lead acetate test	+	+	+
8.	Flavonoids	Shinoda test	+	+	+
9.	Terpenoids	Noller's test	+	+	-
10	Tannins	Neutral FeCl3	+	-	-

Table 2: Antibacterial activity of *Parthenium hysterophorus* extracts against bacterial pathogens

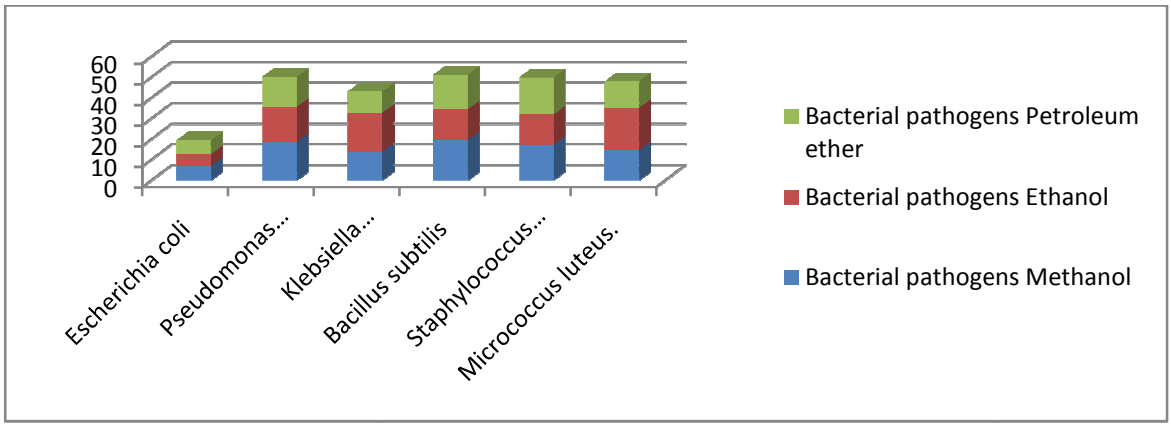
Bacterial pathogens	Zone of Inhibition (in mm) 50mg/ml			
	Control	Methanol	Ethanol	Petroleum ether
Escherichia coli	No zone	**6.90**	**5.76**	**6.75**
Pseudomonas aeruginosa	No zone	**18.65**	**17.00**	**14.55**
Klebsiella pneumoniae	No zone	**13.91**	**18.85**	**10.35**
Bacillus subtilis	No zone	**19.45**	**15.00**	**16.75**
Staphylococcus aureus	No zone	**17.35**	**14.62**	**17.88**
Micrococcus luteus.	No zone	**14.62**	**20.50**	**12.85**

The *Parthenium hysterophorus* extracts showed varied antibacterial activity with zone of inhibition from 4-20 mm against all tested bacteria.

Maximum activity in Methanol extract was exhibited against *Bacillus subtilis (*19.45*) Pseudomonas aeruginosa* (18.65mm), *Staphylococcus aureus* (17.35mm), *Micrococcus luteus (*14.62 *mm,) Klebsiella pneumonia* (13.91mm) and minimum activity against *E. coli* (6.90 mm*).* In extracts obtained using ethanol maximum activity was shown against *Micrococcus luteus*(20.50mm), *Klebsiella pneumoniae* (18.85mm), *Pseudomonas aeruginosa* (17mm), *Bacillus subtilis* (15mm), *Staphylococcus aureus* (14.62mm) and minimum activity against *E. coli* (5.76mm). Saini *et al.* (2016) evaluated the antimicrobial activity of methanolic extract of *Parthenium hysterophorus* by well diffusion method and according to them antibacterial

potential showed varying degree of antibacterial activities against the *P. aeruginosa* and *S. aureus* but no activity against E.coli. The Petroleum ether extracts showed a maximum activity against *Staphylococcus aureus* (17.88mm), *Bacillus subtilis* (16.75mm), *Pseudomonas aeruginosa* (14.55mm), *Micrococcus luteus*.(12.85mm), *Klebsiella pneumonia* (10.35 mm), and minimum activity in *E. coli* (6.75mm).

Plants are utilized as food by human and animals but also for other compounds including alkaloids, terpenoids, flavonoids, glycosides etc. Knowledge of the chemical constituents of plants is important for the synthesis of complex chemical substances. Such phytochemical screening of various plants is reported by (Siddiqui *et al*., 2009; Chitravadivu *et al*., 2009; Ashok Kumar *et al*., 2010; Savithramma *et al*., 2011). Nutritive and antinutritive studies also performed by (Juna Beegum *et al.,* 2014)(Table 1&2 and Graph 1).



Graph 1: Antibacterial activity of *Parthenium hysterophorus* extracts

CONCLUSION

Parthenium hysterophorus possesses pharmacological compounds. Phytochemical constituents are the source for useful drugs. Based on the results of the present investigation, it can be concluded that this plant is ideal for medical applications due to presence various phytochemicals. Demand of the new therapeutic agents in low cost is very needful for the human beings as chemically synthesized drugs are very costly. Also, pathogens are becoming highly resistant to antibiotics therefore this study is beneficial for humans emphasizing on medical applications of *Parthenium hysterophorus.*

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