



Antimicrobial activity of Parthenium Hysterophorous

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Abstract:

Today the world is in scare of parthenium hysterophorous havoc, as it capable of creating allergic, respiratory problems, contact dermatitis, diarrhea, skin allergy, skin rashes, and excessive water loss mertagenicity both in humans and in livestock. Even though parthenium plant is known for its toxicity, it is traditionally used for the treatment of fevers, headache, wounds, diabetes, anemia, heart troubles and malaria in different parts of the world. The plant is capable of producing many metabolites of medicinal values. The present research work is on the antimicrobial activity of parthenium hysterophorous against three human pathogenic bacteria viz. Escherchia coli, Pseudomonas aeruginosa, Bacillus Subtilis. All the material (plant extract, glassware etc). were kept available and sterilized for carrying out the research work in an aseptic conditions. The inferences from this experiment showed that parthenium hysterophorous is an excellent medicinal plant with antibiotic properties against many human pathagens.

Keywords: Antimicrobial activity, respiratory problems, hysterophorous

1. Introduction

Parthenium hysterophorous is a strange, destructive weed which is cited as the seventh most devastating and hazardous weed. It is highly adaptable weed and can grow anywhere, invade all types of pasture lands and cause substantive losses in yield of agriculture (Tevefe Tevese Bezunch et al 2015; Aneja et al, 1991; Auld et al, 1983 etc) It is fast maturing annual herb with a deep tap root and may reach a height of 2m. The seed of P.hysterophorous mainly disperses through flooding, water currents, and movement of vehicles, livestock and to a lesser extent by wind. (Seema P et al 2011; Masum. S et al; Mirza. H et al: 2013) It is native to tropical America, where it is known as “Santa Maria Feverfew” white top weed and Rag weed. In India it is vernacularly known as “Gagarghas and chatakchandni”. P. hystreophorous is supposed to have originated as a result of natural hybridization between P. conifertum and P. biplnatifidum (Nath, 1988)

P. hysterophorous is a weed of global significance responsible for drastic human and animal health disorders such as dermatitis, bronchitis and Asthema, and Agriculture losses besides a great problem for biodiversity. (Manpreet Kaur, Neevay kaur et al 2014) In India the weed was first observed in Poona (Maharashtra). by professor Paranjape, 1951, as stray plants on rubbish heaps and was reported by Rao as a new species in India.

P. hysterophorous became a great threat to the world, including India. Attempts have been made to control the menace of this weed utilizing many strategies like mechanical, competitive replacement, chemical and biological control methods. P .hysterophorous, a noxious, alien, weed is popularly known for its toxicity but in other hand it is most prominent in diverse parts of the world, as well as India, for its traditional medicinal values. Many researchers from different parts of the world carried out many experiments on its antimicrobial activity for many animals and plant pathogens viz. Escharchia coli, B. subtilis, Enterocous spp., S. Aureus, Salmonette typhimarium, S. epederminds, V.

choleval, Pseudomonas Auragenesa, Micrococcus lieteus, bacillus cereus, klebsiella pneumonia, Enterobacter aerogenes, Xanthomonas vesicattaria etc.

P. hysterophorus, though toxic, is used to prepare traditional medicines. The plant traditionally used for the cure of fevers, migraine, headache, toothaches, insect bites, infertility, problem with menstruation and labour delivering child birth. It is also used to treat wounds, diabetes, ulcerated sores, urinary infection, neurological disorder, malaria etc. this traditional application of *P. hysterophorus* for many diseases shows that the plant synthesizes secondary metabolite chemicals with the capacity of antimicrobial activity. These metabolites are cost effective as well as ecofriendly. The active ingredient of parthenium is parthenium (Rodriguez, 1975)

P. hysterophorus exhibits major essential constituents such as parthenium, phenolic acids like caffeic acid, anesic acid, chlorogenic acid and para hydroxyl benzoic acid. It also contains many important bioactive compounds, mainly sesquiterpane lactones, flavonoid, glycosides and pinenes. Sesquiterpane lactones exhibit a wide spectrum of biological activities, which include toxic, antitumor, allergen, antimicrobial, and antifeedant, phytotoxic and insecticidal properties (Rodriguez et al; 1976)

The sesquiterpene lactone parthenium is the main secondary metabolite of *P. hysterophorus*. Parthenium can be listed among various medicinal plants with potent antimicrobial activity. Besides antimicrobial activity of *P. hysterophorus*, many investigations reported the antiviral, antifungal, antimolluscal, anti-inflammatory, anticancer etc properties of parthenium.

2. Material and method

In order to perform the experimental activity on antimicrobial activity of *P. hysterophorus*, fresh leaves of the plant were assembled from different parts of Uttarakhand and Saharmpur (UP). in 2019. Plant has been identified taxonomically very keenly to carry out the experiment. Its leaves were washed thoroughly 2-3 times with running tap water and then with sterile water followed by shade drying. (Manpreet Kaur et al 2016)

3. Extraction of plant material

Samples of parthenium were air dried at room temperature (35°C). for 4-5 days and then homogenized to a fine powder with the help of sterilized mixer grinder and stored in air tight bottles. Three different solvents namely ethyl acetate, methanol and acetone were used for extraction. Required amount of homogenized leaves were soaked on conical flasks containing ethyl acetate, methanol and acetone. Each preparation was filtered through a sterilized Whatman No. 1 filter paper and finally concentrated to dryness under vacuum at 40°C. The dried extract thus obtained was sterilized by overnight UV-irradiations and checked for sterility on nutrient agar plates and stored at 4°C in labeled sterile bottles. (Manpreet Kaur, 2016 kumar, et al 2006)

4. Test microorganism

Human pathogenic bacteria such as *E. coli*, *P. aureginase*, *B. subtilis* to be observed for pathogenicity, were already available in the department of Uttarakhand collage of biomedical science. The microorganism were subcultured on nutrient agar and incubated aerobically at 37°C.

5. Screening for antimicrobial activity

The Ethyl acetate, methanol and acetone extracts were employed for evaluation of the antimicrobial activity by the agar well diffusion method. In this method, pure isolates of each microbe was subcultured on the agar media plates at 37°C for 24 hours. One plate of each microorganism was taken and a minimum of four colonies were touched with a sterile loop and transferred into normal saline under aseptic conditions. One hundred microliter of inoculum of each test organism was spread onto the agar plates so as to achieve a confluent growth. The agar plates were allowed to dry and wells of

8mm were made with a sterile borer in the inoculated agar plates and the lower portion of each well was sealed with a little species molten agar medium. The dried extracts were reconstituted in 20% dimethyl sulphoxide for the bioassay. A 100l volume of each extracts was propelled directly into the wells of inoculated agar plates for each test organism. The plates were allowed to stand for 1 hour for diffusion of the extracts into the agar and incubated at 37c for 24 hours. (M. kaur, N.K, Aggarwal et al 2016, Rios et al, 1988, Okeke et al 2001).

6. Results

From the above experiment, it has been observed that Ethyl acetate, methanol acetone and aqueous extracts of the medicinal plant (*P. hysterophorous*). along with positive control ciprofloxacin and Amphotericin are present in table 1. Some of the solvents showed the highest activity against some pathogenic organisms than standard antibiotic used for the three plant extracts of *p. hysterophorous* tested for antimicrobial activity. Ethyl acetate showed antimicrobial activity against all the given pathogens. The above result concludes effective against all the three pathogens. Ethyl acetate proved the most effective, with highest zone of inhibitive, against *Bacillus subtilis* (28.5 mm) Followed by *pseudomonas acruiginose* 25.5mm followed by *E. coli* (12mm).

Table 1: Antimicrobial activity of parthenium extracts on pathogenic microorganism

Parthenium Extract	<i>Bacillus subtilis</i>	<i>P. aeruginose</i>	<i>E. coli</i>
Ethyl acetate	28.5+0.50	25.5+0.50	12.0+0.50
Methanol	9.0+0.50	8.0+0.50	-
Acetone	25.0+0.50	19.5+0.50	-
Ciprofloxacin	20.5+0.50	21.0+0.50	-
Amphotericin	-	-	-

Thus from the above experiment, it is possible to conclude the *P. hysterophorous* exhibits an excellent antibiotic property with a broad spectrum of antibacterial activity against human pathegens. So, therefore, this medicinal plant contains necessary metabolites which can help to curb many dreadful diseases in the future.

7. Conclusion

Many researchers have studied *P. hysterophorous* plant very deeply and keenly and revealed its negativity (toxicity) and positivity (medicinal value) But from the present investigation it reveals its medicinal value. From this study it is summarized that the extracts from *p. hysterophorous* showed the antibacterial activity, hence describes it as an essential source for the treatment of many bacterial diseases. So there is need to investigate the plant thoroughly and its metabolites to realize its toxic activity, in order to save the humans and livestock from the disease caused by it, and its medicinal values, in order to obtain many antibiotics to get rid of many diseases.

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