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ANTIBACTERIAL POTENTIAL OF *CHENOPODIUM MURALE* L. AGAINST RESISTANT HUMAN PATHOGENIC BACTERIA

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ABSTRACT

Medicinal plants are rich source of antibacterial agents, which could be exploited in human diseases management. Present study was an effort to evaluate the antibacterial potential of *Chenopodium murale* L. against five important human pathogenic bacteria i.e. *Escherichia coli, Staphylococcus aureus, Proteus vulgaris, Salmonella typhimurium* and *Pseudomonas aueruginosa* employing filter paper disc diffusion method. Fresh leaves of *Chenopodium murale* were collected, washed, shade dried and powdered. Aqueous and methanol extracts were prepared and observed their antibacterial activity. The significant result of antibacterial activity was observed in aqueous as well as methanol leaves extract. The strongest antibacterial activity of aqueous leaves extract was observed in *Pseudomonas aeruginosa* with (21.00mm) zone of inhibition while the methanol leaves extract showed strongest antibacterial activity against *Staphylococcus aureus* with (26.00mm) maximum degree of inhibition.

INTRODUCTION

The use of plant compounds to treat infections is an age old practice in a large part of the world, especially in developing countries. Where there is dependence on traditional medicine for a variety of human diseases (Gangoue –Pieboji *et al.*, 2006). Now a day, many developing countries have been identified the antibacterial agents in the medicinal plants with the help of plant parts extract against infectious microorganisms which causing harmful severe human diseases (Palombo and Semple, 2001 and Govendarajan *et al.*, 2006). Antibacterial principles can be isolated from medicinal plants is appears to be one of the important alternative approaches to contain antibiotics resistance and the management of diseases. It is proved that plant based drugs causes less or no side effects when compare with synthetic antibiotics (Shariff *et al.*, 2001). Therefore, the demands for new and effective antibacterial agents with potential activities against human pathogenic bacteria from medicinal plants are increasing day by day.

Chenopodium murale Linn. (Chenopodiaceae) is an erect, annual herb with 30-60 cm in height with broad angular leaves. It is a medicinal plant and has wide applications in folk medicines as anthelmintic, stomachic, antispasmodic, diaphoretic, emmenagogue, for the pain of amenorrhea as an abortifacient and for the relief of asthma, catarrh and migraine (Vasishta, 1989).

In the light of these above mentioned facts, the present investigation was carried out on antibacterial potential of *Chenopodium murale* L. against five human pathogenic bacteria namely, *Escherichia coli, Staphylococcus aureus, Proteus vulgaris, Salmonella typhimurium* and *Pseudomonas aeruginosa.*

MATERIALS AND METHODS

Collection of plant materials

The fresh leaves of *Chenopodium murale* Linn. were collected from various places of Agra (U.P.), India. The leaves were washed under running tap water and shade dried for three weeks. The dried leaves were then homogenized by using a grinder to make fine powder and stored in air tight bottles.

Preparation of aqueous extract

The plant samples were air dried for 48 hours and ground into uniform powder using a grinder. 15gm. of dried powder was taken in 250 ml distilled water in separate conical flasks ,air tight with cork and then kept on a shaker for 8 hours .After it the extract were filtered by using a vacuum filtration system and stored at 4^{o}C degree in airtight containers.

Preparation of methanol extract

The collected leaves were washed twice in running tap water and once with sterile distilled water subsequently. The leaves were shade dried for three weeks and made to coarse powder. The powder of leaves was passed through whatman filter No. 40 to achieve uniform particle size and then used for extraction process. A weighed quantity of the powder was subjected to continuous hot extraction in soxhlet apparatus with 85 % methanol solvent. The extract was dried using rotatory vacuum evaporator and they give molten extract and store at 4^{o} C until further use.

Microorganism and culture condition

Present investigations were carried out on five human pathogenic bacteria Viz. *Escherichia coli, Salmonella typhimurium Staphylococcus aureus, proteus vulgaris and Pseudomonas aeruginosa.* Bacteria cultured were maintained on Muller Hinton (MH) medium .The antibacterial activity was examined for aqueous and methanol leaf extract of *Chenopodium murale* Linn.

Antimicrobial Screening

Screening of antibacterial activity was carried out by paper disc method (Gould and Bowie 1952). High media sterile disc were used for activity, saturated disc with the extract (0.04ml) and known quantity of standard reference antibiotic separately were air dried at room temperature. The molten Muller Hinton (hi media) was inoculated with the 100 ml of the inoculums and poured into sterile Petri plates (borosil) .The disc with test compound placed on the upper surface of sterilized Muller Hinton plate that had been inoculated with the test organism (using a sterile swab) and air dried to remove the surface moisture . The thickness of MH medium was kept equal in all Petri plates and the standard disc (tetracycline) was used in each plate as control. The plates were inoculated 24 hours at 37^{o}C in incubator. After 24 hours growth of bacteria was measured for its zone of inhibition. The results were obtained by measuring the zone diameter. The experiment was conducted in replicates of 3 and the mean value is presented. The results were compared with the control chloramphenicol.

RESULTS

Results obtained on antibacterial activity in aqueous as well as methanol leaf extract of *Chenopodium murale* L. against five human pathogenic bacteria i.e. *Escherichia coli, Salmonella typhimurium Staphylococcus aureus, proteus vulgaris and Pseudomonas aeruginosa* were summarized in Table.1 and 2. The present study revealed that the tested extracts exhibit potential

antibacterial activity against all the tested bacteria. When tested by filter paper disc diffusion method, the aqueous leaves extract of this plant showed highest antibacterial activity against *Pseudomonas aueruginosa* with (21.00 mm) maximum degree of zone of inhibition and least antibacterial activity was observed against *Proteus vulgaris* with (14.00 mm) minimum zone of inhibition. The moderate antibacterial activities were recorded in *Salmonella typhimurium*, *Escherichia coli* and *Staphylococcus aureus.* The methanol leaves extract of this plant also posses potential antibacterial activity against all the test bacteria. The methanol extract exhibits highest antibacterial activity against *Staphylococcus aureus* with (26.00 mm) maximum zone of inhibition. However, the lowest antibacterial activity was recorded against *Proteus vulgaris* with (21.00 mm) minimum zone of inhibitory growth. The all zone of inhibition produced by aqueous as well as methanol leaves extract were higher or similar than corresponding zone of antibiotic as chloramphenicol.

Plants are important source of active principle responsible for antibacterial activities and in the development of new drugs for the therapeutic use in human beings. Some of these findings have helped in search of new active principle for infectious diseases causes by tested bacteria. All the leaves extract of *C.murale* were able to inhibit the growth of all tested human pathogenic bacteria. This activity may be due to the presence of the active antibacterial principles of the plant and their parts. Medicinal plants have a great potentiality to produces large number of organic compounds in the form of secondary metabolites (Evans *et al.,* 1986). These secondary metabolites of plants classify on the basis of their functions like chemotherapeutic, bacteriostatic and antimicrobial (Purohit and Mathur, 1999). The aqueous leaves extract of *Chenopodium murale* L. was performed the significant antibacterial activities against all the test bacteria. Various workers have also reported that aqueous extract of the member of chenopodiaceae showed the significant antibacterial activity to great extent. Lall and Meyer, (1999) in *Chenopodium ambrosoides* and Ahmed *et al.,* (2003) in *Chenopodium murale* L.

On the other hand, the result of the present investigations on methanol leaves extract of *C. murale* also revealed the significant antibacterial activity against all test human pathogens. Methanol leaves extract of *C. murlae* exhibited the highest antibacterial activity aginst *Staphylococcus* aureus with (26.00) maximum inhibitory growth. The intensive studies have

been made on extracts and biologically active compounds isolated from plant species used for natural therapies or herbal medicine (Nascimento *et al.*, 2000; Rios and Recio, 2005).

In the present study, the methanol extracts were more potent than aqueous extracts of the plant studied. *Chenopodium murale* showed strong antibacterial activity against all the tested bacterial strains. Hence, this plant can be used to discover bioactive natural compounds that may serve as leads in the development of new pharmaceuticals that address unmet therapeutic needs. The various pharmacological industry of microbiology has been engaged in doing work on their identification of their potential compounds in the forms of antibacterial agents. The estimated about 20 % of the plants found in the world have been submitted to pharmacological or biological industry.

Table.1. Antibacterial potential of aqueous leaves extract of *Chenopodium murale* L. against five human pathogenic bacteria.

Bacteria	Zone of inhibition (mm)		
	Aqueous Extract	Antibiotic (Chloramphenicol)	Control(water)
Escherichia coli	20.00	17.00	0
Staphylococcus aureus	19.00	21.00	0
Salmonella typhimurium	16.00	17.00	0
Proteus vulgaris	14.00	13.00	0
Pseudomonas aeruginosa	21.00	18.00	0

Table.2. Antibacterial potential of methanol leaves extract of *Chenopodium murale* L. against five human pathogenic bacteria.

Bacteria	Zone of inhibition (mm)		
	Methanolic extract	Antibiotic (chloramphenicol)	Control(water)
Escherichia coli	23.00	20.00	0
Staphylococcus aureus	26.00	24.00	0
Salmonella typhimurium	22.00	19.00	0
Proteus vulgaris	21.00	20.00	0
Pseudomonas aeruginosa	19.00	18.48	0

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