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EVALUATION OF ANTIBACTERIAL ACTIVITIES OF *CHENOPODIUM ALBUM* L.

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ABSTRACT : The present study was aimed to evaluate the antibacterial activities of *Chenopodium album* L. against five human pathogenic bacteria. *Cheopodium album* L. is belonging to family Chenopodiaceae and commonly known as Bathua. The collected leaves were washed, dried and powdered. Aqueous and methanol extracts were prepared and observed their antibacterial activity against human pathogenic bacteria Viz. *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Proteus vulgaris* and *Pseudomonas aueruginosa* The significant results were obtained by aqueous as well as methanol leaf extract on tested pathogens using paper disc diffusion method. The aqueous extract revealed strongest antibacterial activity on *Staphylococcus aureus* and methanol leaf extract showed strongest antibacterial activity on *Pseudomonas aeruginosa.*

Key words: Pathogenic microorganisms, antibacterial activity, *Chenopodium album*

INTRODCTION

Traditional medicine has been practiced for many centuries by a substantial proportion of the population of many countries. The medicinal plants as a source of pharmacological active compounds has increased world wide. In India plants are the main medicinal source to treat infectious diseases. Medicinal plant extracts represent a continuous effort to find new active compounds with the potential to act against multi resistant bacteria. (Mothana and Lindequist, 2005).

The world health organization (WHO) is encouraging, promoting and facilitating the effective countries for herbal health programs. The potential of higher plants as a source of new drugs is still largely unexplored (Dubey *et al.,* 2004). Hence, last decade as witnessed a source of new biomolecules for human disease management (Grierson and Afolayan, 1999). This is also true in India , among estimated medicinal plant diversity only a small percentage of plants of this region have been investigated for antibacterial activity against human pathogenic microorganisms (Patwardhan *et al* .,2004 and Kumar, 2004).

Chenopodium album L. (chenopodiaceae) is native of Western Asia. It is a summer annual weed and attains a height upto 1 meter. The entire plant is covered with varying amounts of a waxy substance giving the plant a light green appearance it is commonly used for food and medicinal values and it grows in waste places and as weed in wheat or other crops in almost all part is used in Sag and Bathua Roti and Bathua Parantha (Bakshi *et al.,* 1999) also reported that the plant and their parts are useful in curing anorexia, cough, dysentery, and diarrhea, piles and kills small worms.

In the light of these above enumerated facts the present study was carried out on evaluation of antibacterial activities of *Chenopodium album* L. against five human pathogenic bacteria viz. *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Proteus vulgaris* and *Pseudomonas aueruginosa*

MATERIALS AND METHODS

Collection of plant materials

The fresh leaves of *Chenopodium album* L. 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 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 solvent 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 of organic solvent according to their polarity (methanol) 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 . Now solvent was evaporated to make the final volume one –forth of the original volume and stored at 4^{o}C degree in airtight containers until for 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 aueruginosa.* Bacteria cultured were maintained on Muller Hinton (MH) medium .The antibacterial activity were examined for aqueous and solvent leaf extract of
Chenopdium album L.

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 37degree 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.

RESULT AND DISCUSSION

The results on antibacterial activities of aqueous as well as methanol leaf extract of *Chnopodium album* L. against five human pathogenic bacteria viz. *Escherichia coli, Salmonella typhimurium, Staphylococcus aureus, Proteus vulgaris* and *Pseudomonas aueruginosa* are summarized in Table.1 and 2.

Table 1. Antibacterial activity of aqueous leaf extract of *Chenopodium album* L. against five human pathogens as tested by disc diffusion assay.

Species of bacteria	Zone of Inhibition (mm)		
	Extract	Antibiotic	Control
Escherichia coli	19.50	20.00	0
S. aureus	14.75	25.00	0
S. typhimurium	14.00	20.00	0
P. vulgaris	28.30	Nil	0
P. aeruginosa	16.60	Nil	0

Antibiotic – Chloramphenicol (1mg/ml)
Control- Distilled Water

Table 2. Antibacterial activity of methanol leaf extract of *Chenopodium album* L. against five human pathogens as tested by disc diffusion assay.

Species of bacteria	Zone of Inhibition (mm)		
	Extract	Antibiotic	Control
Escherichia coli	21.00	20.00	0
S. aureus	25.00	24.00	0
S. typhimurium	17.75	16.00	0
P. vulgaris	19.00	17.50	0
P. aeruginosa	18.00	16.50	0

Antibiotic – Chloramphenicol (1mg/ml)
Control- Distilled Water

The present study reveals that the leaf extracts of *Chenopodium album* (aqueous and methanol) exhibited significant antibacterial activity against all the tested bacteria. The aqueous extract performed strongest antibacterial activity in *Staphylococcus aureus* with (25.00 mm) zone of inhibition and least antibacterial activity was observed in *Salmonella typhimurium* with (17.75 mm) zone of inhibition. On the other hand, methanol leaf extract of *C. album* also displayed potential antibacterial activity against all the tested bacteria. The strongest activity was recorded in *Pseudomonas aeruginosa* with (28.30 mm) zone of inhibition while, lowest antibacterial activity was observed in *Salmonella typhimurium* with (14.00 mm) zone of inhibition. The moderate antibacterial activities were recorded by *E.coli,* and *Proteus vulgaris* with moderated inhibition zone of growth of bacteria. From a time immemorial, it has been known that plants and their parts have an effective compound which comes out in the water or alcohol, than used for curing the human disease because they have capacity to destroy the microorganisms against infectious diseases. Most of the *chenopodium* species exhibit numerous medicinal properties, it has also been mentioned in Indian mythology for example Reg Veda, Ayurveda, Arthva Veda, charaka Samhita, Sushruta Samhita (Bakshi *et al.,* 1999). Some compounds may be present in *Chenopodium* which showed the activity against antibacterial activity. Antibacterial is a substance that kills or inhibit growth of microorganisms, such as bacteria. In recent years several reports available on the antibacterial activity of plant extracts of some members of chenopodiaceae on human pathogenic bacteria.

Maksimovic *et al.,* (2005) isolated the essential oil from aerial parts of *Chenopodium botrys* exhibited significant bactericidal and fungicidal activity against selected strains of bacteria i.e. *Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumonia, Salmonella enterdis* and fungi i.e. *Aspergilus niger* and *Candida albicans.* Chandrasekharan *et al.,* (2008) have been studied antimicrobial activity of fatty acid methyl ester extracts of four halophytic plant viz. *Arthrocremum indicum, Salicornia brachiata, Suaeda maritime* and *Suaeda monoica* belonging to the family chenopodiaceae and their composition was analyzed by GC-MS. The extract of *Salicornia brachiata* showed highest antibacterial activity and antifungal activities among the extracts tested. The present observation reveals that the aqueous leaves extract of Chenopodium album L. showed the maximum antibacterial properties against all the tested bacteria. The similar observations were also studied by the Lal and Meyer, (1999. They used acetone and water extracts of aerial parts of *Cenopodium ambroisoides* have shown activity against the drug resistant strain of *Mycobacterium tuberculosis*. From the foregoing results and discussion that the present authors conclude that the Chenopodium album showed the antibacterial activity up to great extend against all the tested human pathogenic bacteria. These antibacterial activity attributed to phytochemicals, may be responsible for the activity. Further, need to screen the identification and isolation of active compounds of this plant. Thus, the plant can be used as a antibacterial agent and may serve as leads for the pharmaceuticals industries in developing country like India.

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