

Antibacterial Activity of *Argemone mexicana* Root and Leaves Solvent Extracts against some Pathogenic Bacteria

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Abstract

The present study was carried out to investigate the antibacterial activity of *Argemone mexicana* roots and leaves extract. The *Argemone mexicana* weed collected from the agricultural area of Baramati tehsil. The antibacterial activity was studied by disc diffusion method in the laboratory. This extract was effective against most of the bacteria. Ethanolic and methanolic extracts were more potentials than aqueous extracts of *Argemone mexicana*. Ethanolic extract of leaves shows a zone of inhibition against *E. coli* and *B. subtilis* while root extract also shows the zone of inhibition against *S. aureus* & *B. subtilis*. Methanolic extract of leaves and root shows the maximum zone of inhibition against *E. coli* and *S. aureus*. The results of the present study suggest that *Argemone mexicana* have more importance and active against gram-positive as well as gram-negative bacteria.

KEYWORDS: *Argemone mexicana*, Antibacterial, Disc diffusion, *E. coli*, *B. subtilis*, *S. Aureus*

Introduction:

The plant is tropic in distribution and it is a weed in waste places. It is everywhere by road-sides and fields in India. The plant contains alkaloids, flavonoids, tannins, sterols, and terpenes. In fact, berberine and sanguinarine, two of the main alkaloids isolated from *Argemone* tissues, display significant cytotoxic and antimicrobial properties (Quinn-Beatie, M.L. 2002). The wide range of potential medicinal uses of this plant is one of the reasons for the growing attention to researchers. The potential of a higher plant as a source for a new drug still largely unexplored. The Medicinal plant represents a rich source of antimicrobial agents. A wide range of medicinal plant parts is used for extract as a raw drug and they possess a variety of medicinal properties.

The different plant parts show antibacterial activity includes root, stem, flower, fruits, leaves and seeds and modified plant organs. Medicinal plants are very useful to mankind. They are nature's offering human beings to regulate illness free healthful life. They perform a necessary role in preserving our health (Bhagwati, 2003). Microorganisms have created resistance to various antibiotics and this had developed immense clinical difficulty in the curing of contagious illness (Davis, 1994). Medicinal plants are considerably serviceable and economically needed. Any phytochemical investigation of given plant will reveals only a very narrow spectrum of its constituents (Mahesh and Satish, 2008). The plant extracts have been revealed and recommended for use as antimicrobial properties (Del Campo et al., 2000). Medicinal and aromatic plants and substances are luxuriant antibacterial compounds

could be an alternate manner to fight against bacterial ailments (Meera et al., 1999). The plant is destroyed worms, different skin disorders, bilious fever, and inflammation. It is used in treatment of antibacterial, antimicrobial, cytotoxicity, wound healing, antioxidant and antifungal properties (Mohana et al., 2008; Dash and Murthy, 2011).

Phytochemically the leaves contain flavonoids, sterols, tannins, alkaloids, and glycosides, (Bhalke et al., 2009). Many reports have been carried out to investigate the antibacterial activity of *Argemone mexicana* extracts. The earlier observations on *A. mexicana* leaf and seed extracts showed considerable antimicrobial activity (Santosh Kumar Singh et al., 2009; Shyam Prasad and Dhanapal, 2010). The root is alternative and has been used in the treatment of skin diseases. Another study found that use of *Argemone mexicana* may be a suitable first-aid treatment in rural areas when access to other better antimalarials is delayed (Bertrand Graza et. al., (2010). The plant is known to possess antimalarial (Indranil Bhattacharjee. et. al., 2006), antioxidant, antibacterial (Sreejayan & Rao 1996.) activities. It occurs as wasteland weed in almost every part of India. In Homeopathy, the tincture of the entire plant is reported to be used orally for bronchitis and whooping cough (Kala, 2005; Eldridge, 1995). The fresh juice of the leaves and the latex both are reported to be used externally as a disinfectant for open wounds and cuts (Panghal et al., 2010). Various isoquinoline alkaloids viz. berberine, cryptopine, coptisine, muramine, scoulerine, stylophine, cheilkanthifoline, sanguinarine, chelerythrine, sanguinarine, thalifoline and protopine have been reported from the plant (Gupta et al., 1990).

Hence in the present study, the Ethanolic & methanolic extract of roots and leaves were examined for its antimicrobial activity. The present study was undertaken to evaluate the antibacterial activity of *Argemone mexicana* leaf and root extracts against some selected bacterial species with the possible use as an antimicrobial agent in pharmacological industries.

Materials and methods:

Collection and identification of plant materials:

The fresh roots and leaf were collected in October 2018 from Agricultural area from Baramati tehsil, Dist. Pune and dried at 30o C for 5 days. The plant specimens were identified and deposited in the Department of Zoology, Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati, Dist. Pune for the future study.

Test microorganisms:

In this study, we have used three bacteria such as *Bacillus subtilis*, *Staphylococcus aureus* and *Escherichia coli* were used for bioassay. The pure strains were procured from Department of Microbiology, T. C. College, Baramati. The organisms were maintained on nutrient agar media at 4°C and subculture for 24 hr. before use.

Preparation of plant extracts:

Fresh plant parts (leaves and root) collected were cleaned individually under running tap water and then with sterile distilled water. The leaves were air dried in the laboratory at room temperature 30°C for 5 days. While the root parts were dried at 50°C for 24 -32 hr. in an oven. The dried leaves and root samples were ground well into a fine powder form by a grinding machine. The powder was stored in airtight small bottles at room temperature before extraction. A fixed weight 5 g of powdered plant materials were soaked separately in 30 ml each of ethanol and methanol for 48 h. Each mixture was stirred at 24 h interval using a sterile glass rod. At the end of the extraction, each extract was passed through Whatman No.1 filter paper (Whatman

England), and the filtrate obtained was concentrated. Then the extracts were used for the antibacterial activity.

Antibacterial assay:

Antibacterial activity was screened by agar well diffusion method (Azoro, 2002). The agar well diffusion manner was employed for the determination of antibacterial activity of the extracts. The Petri plates containing 20 ml of Muller Hinton Agar medium were seeded with 24 h culture of the microorganism. The wells (6 mm in diameter) were cut from the agar and the extract solution (5 mg/ml) was then added into it. The diameter of the inhibition zone was measured on millimeters (mm). 10 ug/ ml of streptomycin served as control.

Result and Discussion:

The results of the antibacterial activity of ethanol and methanol extracts of the root and leaves of *Argemone mexicana* are given in Table 1. All the extracts showed a wide spectrum of screening, When the two extracts compared with other and with that of standard antibiotic streptomycin. The ethanol root extract showed the highest potentiality compared to that of methanol extracts. The extract obtained using ethanol showed highest activity against *S. aureus* (19.20mm) in leaves and *E.coli* (18.68 mm) in root extract. Least inhibition zone was observed against *B. subtilis* (14.30 mm) & *E.coli* (15.10mm).

Table 1. Antibacterial potentiality of the root, stem and leaf extracts of *Argemone mexicana* L. by agar well diffusion method.

Plant Parts	Plant Extract	Diameter of Zone of inhibition (in mm)		
		<i>Escherichia coli</i>	<i>Bacillus subtilis</i>	<i>Staphylococcus aureus</i>
Leaves	Ethanol	15.10	14.30	19.20
	Methanol	16.10	15.60	15.70
Root	Ethanol	18.68	18.05	17.04
	Methanol	16.80	15.70	15.90

Conclusion:

The research work was carried out to investigate the antibacterial activity of *Argemone mexicana* roots and leaves extract. This plant represents a rich source of antimicrobial agents. A wide range of medicinal plant parts is used for extract as a raw drug and they possess a variety of medicinal properties. All the extracts showed a wide spectrum of screening when the two extracts compared with other and with that of standard antibiotic streptomycin. The ethanol root extract showed the highest potentiality compared to that of methanol extracts. Therefore our findings have very much importance because the unwanted plant can be used for the antibacterial activity. These results are primary but very important. In future, these weed extract can be used in different forms against toxic bacterial strains.

Acknowledgements:

The authors are very grateful and thankful to The Principal, T.C. College of Arts, Science & Commerce, Baramati for providing laboratory facilities for this project work. Authors are also thankful to Dr. R. G. Kudale, Head, Department of Zoology, T.C. College, Baramati for providing necessary facilities to carry out the research project.

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