STUDY ON ANTIBACTERIAL ACTIVITY OF AERIAL PART OF ARGEMONE MEXICANA LINN

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Abstract

On the contrary in India, herbal drugs are an integral part of the Indian system of medicine (Ayurveda) which is an ancient and main stream system. The antimicrobial activity of aerial part of Argemone mexicana was investigated and it is found that ethyl acetate extract (EAE) of Argemone mexicana is most active. The two Gram-positive, two Gram-negative bacterial stains and yeast were used. Ethanolic and aqueous extracts of Argemone mexicana samples showed antibacterial activity against S. aureus, B. subtilius, S.aeruginosa and E.coli. From these results it may be stated that Gram-positives bacteria are more susceptible to EAEAM antibacterial activity than Gram-negatives bacteria. Antibacterial activity of EAEAM may be due to the flavonoids, aromatic acids, and its esters. Phytochemical analysis showed the presence of glycosides, tannins, alkaloids, saponins and flavonoids. Therefore results of this study indicate the ethanolic extract of aerial part of Argemone mexicanapossesses antibacterial activity.

Key word: Antimicrobial activity, Argemone mexicana, Aerial part, Ethanolic extract.

INTRODUCTION

As global temperatures are rising steadily, the duration of the summer season is also increasing in many countries currently. Therefore, the optimal conditions for living of pathogenic bacteria is also increasing. Various side effects, such as food poisoning, infection, spoiled food, and more, are expected with the increase of harmful microbial activities. It is appreciable that now Union Health Ministry is working on a proposal to inculcate the Indian System of Medicine into modern medical education. Thus, antimicrobial substances are being developed very rapidly.1

Plants normally produce various secondary metabolites. These metabolites are polyphenols, flavonoids, terpenoids, steroids, quinones, alkaloids, polysaccharides and so on. Studies have shown that from 9% to 16% of patients with gastrointestinal disorders use alternative remedies, with the highest rates in patients with irritable bowel syndrome, often considered to have a component of functional etiology.2

The Argemone mexicana plant is commonly grown plant and used as medicinal preparation. Argemone mexicana belongs to Kingdom- Plantae, Division- Magnoliophyta, Order- Ranunculales, Family- Papaveraceae, Genus- Argemone, Species- Argemone mexicana. It is erect prickly herb abounding throughout, in areas up to 1,500m elevation on road side and waste places.3

Argemone mexicana has number of health benefits likehepatoprotective activity4, antioxidant activity5, in vitro antichromonal activity6, peripheral analgesic activity7, antibacterial and antifungal activity8, anthelmintic activity9, in vitro anti-cancer activity10, anti-diabetic activity11, and wound healing activity12. The whole plant is good tonic, depurative. The flowers are bitter, digestive, astringent, and stomachic. The root are useful in guinea worm infestation, skin diseases, leprosy, puritus13. In the traditional ayurvedic books it is reported that it possesses antimicrobial activity and used in the treatment of microbial infection. Hence the present study was undertaken with the aim of exploring the antimicrobial activity of Argemone mexicanalinm.

MATERIAL AND METHODS

Plant material

The plant was identified on the basis of its vernacular name Mexican poppy and its morphological characteristics. The aerial part of identified Argemone mexicana linn was collected from near CDS College, Bhind, MP.

The plant was identified and authenticated by Dr. Zia ul Hasan, Prof. Botany Saifia Science College, (Barkatulla University) Bhopal (M.P.). Voucher specimen number is 317/Bot/Saifia/2012.

Preparation of Extracts

Grangehas reported that antibacterial activity of Argemone mexicana linnhow’s the maximum zone of inhibition at 200 mg/ml14. So100mg, 150mg and200mg of each extract was weighed and dissolved in 1ml of dimethyl sulfoxide (DMSO) to obtain the concentration of 100mg/ml, 150mg/ml and 200mg/ml. 0.1 ml of this solution was used for measurement of zone of inhibition.15

Preparation of Standard

50mg of the Ampicillin was dissolved in the 100 ml of sterile water.16

Microorganisms used

Cultures of Staphylococcus aureus (MTCC 389), Bacillus subtilius (MTCC 1924), Pseudomonas aeruginosa (MTCC 242) and Escherichia coli (MTCC 40) were obtained from Microbial Type Culture Collection and Gene Bank, Chandigarh, India. The microorganisms were identified by various staining techniques and bio-chemical reactions. The microorganisms were maintained by sub-culturing and used at regular intervals in nutrient agar medium.

Preparation of standard inoculum

McFarland Constants

A chemically induced precipitation reaction can be used to approximate the
Procedure

- Ten test tubes of equal size were set up.
- 1% chemically pure sulphuric acid solution was prepared.
- 1.175 % aqueous solution of barium chloride (BaCl₂) was prepared.

RESULTS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Ingredients</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Beef extract</td>
<td>5.0</td>
</tr>
<tr>
<td>2.</td>
<td>Peptone</td>
<td>7.0</td>
</tr>
<tr>
<td>3.</td>
<td>Agar</td>
<td>23.0</td>
</tr>
<tr>
<td>4.</td>
<td>Distilled water</td>
<td>q.s. 1000 ml</td>
</tr>
</tbody>
</table>

The above mentioned quantities of different ingredients were accurately weighed and dissolved in appropriate amount of distilled water. The prepared media was sterilized by autoclaving at 121°C for 15 minutes.

Procedure

The petridishes were thoroughly washed and sterilized in hot air oven at 160°C for one hr. Inoculum was added to 30 ml of sterile nutrient agar medium and was poured into sterile petridishes for solidifying. Bores were made on the medium using sterile borer. 0.1ml of test solution was added to the respective bores, 0.1ml of the Ampicillin at a concentration of 100 µg/ 0.1ml was taken as standard reference. A control having only DMSO in the cup was maintained in each plate.

The petridishes were kept in the refrigerator at 4°C for 45 minutes for diffusion to take place. After diffusion, the petridishes were incubated at 37°C for 24 hr and zones of inhibition were observed and measured using a scale.

Antibacterial activity of all the compounds was carried out against all four microorganisms. The same media was used both for subculturing and for estimating antibacterial activity. All the reading was taken in triplicate and is reported in Standard Error Mean (± SEM). The results are tabulated in the Table No.

RESULTS

The turbidity of a bacterial suspension which is produced by the interaction of barium chloride with sulfuric acid.1(2)

**DISCUSSION**

Argemone mexicana showed significant results (P<0.01) by applying one way ANOVA (Dunnet test). Ethyl acetate extract of Argemone mexicana was more effective than ethanolic extract of Argemone mexicana against E. coli (Gram –ve). Least active extract was ethanolic extract of Argemone mexicana against E. coli (Gram –ve). In case of antibacterial activity against (Gram –ve) Pseudomonas aeruginosa, ethyl acetate extract of Argemone mexicana was more active followed by ethyl acetate extract and least active was ethanolic extract. Ethyl acetate extract of Argemone mexicana showed significant results against Candida albicans which was further followed by ethanolic extract.

**CONCLUSION**

The two Gram-positive, two Gram-negative bacterial strains and yeast were used. According to the results in the Table, only ethyl acetate, ethanolic and aqueous extracts of Argemone mexicana samples showed antibacterial activity against S. aureus, B. subtilis, S. aeruginosa, E. coli, A. fumigates and C. albicans. From these
results it may be concluded that Gram-positives bacteria are more susceptible to EAEAM antibacterial activity than Gram-negatives bacteria. Antibacterial activity of EAEAM may be due to the flavonoids, aromatic acids, and its esters. The mechanism of this activity is attributed to a synergism between phenolic and other compounds in the resin. The strong antibacterial activity of Argemone mexicana may be due to high total phenolic and flavonoid contents. There are numerous questions yet to be answered concerning chemical compositions and antibacterial properties of Indian Argemone mexicana and further research is required for clarification.

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REFERENCES