



## EVALUATION OF ANTIMICROBIAL POTENCY OF *ARGEMONE MEXICANA* AGAINST GASTRO INTESTINAL PATHOGENS

Satish Kumar Verma\*, Santosh Kumar Singh\*\*, Md Aslam Siddiqui\*\*\* and Brij Mohan Sharma\*\*\*\*

\*Department of Biotechnology Sai Institute of Management and Technology, Dehradun.

\*\*Department of Microbiology, Gayatri College of Biomedical Sciences, G.M.S. Road, Dehradun

\*\*\*Department of Chemistry, BFIT, Dehradun

\*\*\*\*Society of Pollution and Environmental Conservation Scientists (SPECS), Dehradun

*Argemone mexicana* extracts in different solvents showed high potency of antimicrobial activities against gastrointestinal pathogens. The growth of the bacteria *Escherichia coli* was found to be inhibited by all plant extracts. *Staphylococcus aureus* was found to be resistant to Hexane extract. While Ethanol extract inhibited the growth of *Staphylococcus aureus*. In the case of *Pseudomonas aeruginosa*, water extract showed resistance towards these bacteria. *Salmonella typhimurium* cultures were inhibited by all extract. Maximum inhibition was found in case of water extract. Cultures of *Staphylococcus epidermidis* showed that the water extracts were more effective than other extracts. Anova analysis of the results showed that the results were significant and reproducible every time.

*Argemone mexicana* Linn. belongs to the family Papaveraceae. It is an annual prickly herb containing yellow latex. Its leaves are simple, alternate, cauline, sessile, exstipulate prickly deep cut, with spiny teeth, unicostate reticulate venation<sup>1</sup>. The plant is widely used in Sudanese traditional medicine for the treatment of Trypanosomiasis<sup>2</sup>. Many chemical constituents of medicinal potential are reported in *Argemone Mexicana* such as Allocryptopine, berberine, chelerythrine, coptisine etc<sup>3,4,5,6</sup>. In the present study the authors set forth the objective of evaluating the antimicrobial activities of *Argemone mexicana* on various skin and gastrointestinal pathogens.

### MATERIALS AND METHODS

Plants were collected from the fields of various regions of Eastern Uttar Pradesh and dried it for two days in the hot air oven at 40°C. Dried plant material was powdered and dissolved in different solvents such as Hexane, Chloroform, Ethanol and Distilled Water. Following microbial cultures were obtained from National Culture Laboratory and used for the experiments:

*Staphylococcus aureus* (NCIM-2079), *Staphylococcus epidermidis* (NCIM-2493), *Salmonella typhimurium* (NCIM-2501), *Escherichia coli* (NCIM-2065) and *Pseudomonas aeruginosa* (NCIM-2036). Antimicrobial activity was assayed by using broth dilution method<sup>7,8,9</sup>. Broth dilution test was used to determine the minimum inhibitory concentration (MIC) or minimum bactericidal concentration (MBC) of plant extracts as well as of standard drugs.

### RESULTS AND DISCUSSION

The results obtained were very interesting shown in Fig. 1. Results were repeated thrice and significance of the data was analyzed using appropriate statistical packages. The growth of *Escherichia coli* bacteria was found to be inhibited by all extracts in comparison to control (O.D. 1.58), but ethanol extract (O.D. 1.36) showed more inhibition than other extracts. Water extract (O.D. 1.44) and hexane extract (O.D. 1.45) showed nearly same inhibitory effect (Fig.1). Chloroform extract (O.D. 1.50) showed least inhibitory effect. According to Anova table (Table 1) results were found to be significant showing F. Calculated value 32.59, due to the treatment, whereas F. Table value at 5% significance was 3.84.

In the case of *Staphylococcus aureus*, (Fig.1) the cultures were found resistant to hexane extract (O.D. 1.87) with respect to control (O.D. 1.87). Chloroform extract (O.D. 1.81) showed a little inhibition of cultures. While ethanol extract (O.D. 1.75) was found inhibiting the growth of *Staphylococcus aureus*. Water extract (O.D. 1.89) had no effect on it. According to Anova table (Anova Table 2) due to treatment F. Calculated value was 815.01, whereas F. Table value at 5% significance was 3.84 proving the data to be significant. In the case of *Pseudomonas aeruginosa*, water extract (O.D. 1.82) showed resistance towards these bacteria in comparison with control (O.D. 1.8s1). Ethanol extract (O.D. 1.38) showed more inhibition than other extracts. Chloroform.

extract (O.D. 1.56) showed more inhibition than Hexane extract (O.D. 1.62). According to Anova table (Table 3) due to treatment F. calculated value was 62.43, whereas F. Table value at 5% significance was 3.84. So, it the data was significant.

In the case of *Salmonella typhimurium* (Fig.1), all extract showed good inhibitory effect with respect to control (O.D. 1.73) Maximum inhibition was found in case of water extract (O.D. 1.52). Ethanol extract (O.D. 1.59) also showed good inhibitory effect but showed less inhibition than water extract. Chloroform extract (O.D. 1.70) and Hexane extract (O.D. 1.69) showed very less inhibition. According to Anova table (Anova Table 4) due to treatment F. calculated value was 424.83, whereas F. Table value at 5% significance was 3.84. So, it proved the result to be significant.

In the case of *Staphylococcus epidermidis* (Fig. 1) in comparison to control (O.D. 1.67), water extract (O.D. 1.2) was showing more inhibition than other extract. Ethanol extract (O.D. 1.34) was also showing good inhibition. Chloroform extract (O.D. 1.58) was least effective and Hexane extract was showing resistance. According to Anova table (Table 5) due to treatment F. Calculated value was 3212.08, whereas F. Table value at 5% significance was 3.84 showing the data to be significant. The effect of different extracts on various gastrointestinal pathogens showed variable results that were in accordance with the earlier studies<sup>10-13</sup>. Antibacterial properties of ethanolic and aqueous extracts might be due to the presence of alkaloids as alkaloids are natural antioxidants. It is proposed that *Argemone mexicana* in conjunction with *Pseudomonas aeruginosa*, a plant growth-promoting rhizobacterium, significantly suppressed root-infecting fungi with concomitant increase in plant growth<sup>14</sup>. All other extracts were observed to show good antimicrobial properties. All observation and statistical data showed a clear-cut view about the activity of different extracts. This might be useful in formulating the antimicrobial uses of *Argemone mexicana*.

Plants are the best friends of human being dedicating to humanity without selfishness. They are the good source of medicines. The natural plant products could be a potential alternative for controlling the pathogen associated with diseases. *Argemone mexicana* alkaloids and other metabolites can be used in various medicines and present study might provide suitable clue for studying and formulating the antimicrobial potential of this plant against various gastrointestinal pathogens.

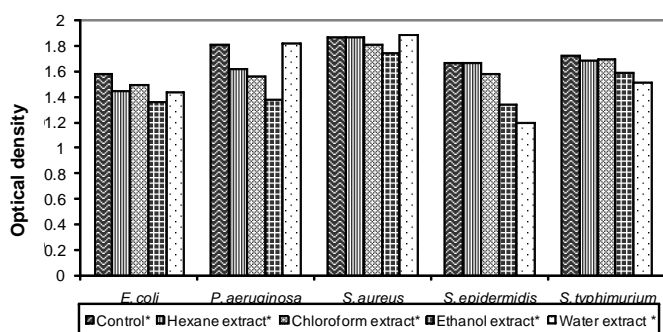


Figure 1: Antibacterial Properties of all extracts of *Argemone mexicana* by Broth Dilution Test

Table 2: Effect of plant extracts on *S. aureus* by Broth dilution test.

Source of Variation	d. f	S.S.	M.S.S.	F.Cal	F.Tab 5%	Result
Due to Treatment	4	0.41	0.10	815.01	3.84	S
Due to replication	2	0.001	0.0007	5.73	4.46	NS
Due to Error	8	0.001	0.0001			
Total	14	0.41				

Table 1: Effect of plant extracts on *E. coli* by Broth dilution test.

Source of Variation	d.f	S.S.	M.S.S.	F.Cal	F.Tab 5%	Result
Due to Treatment	4	0.06	0.01	32.59	3.84	S
Due to replication	2	0.0005	0.0002	0.62	4.46	NS
Due to Error	8	0.003	0.0004			
Total	14	0.064	0.004			

Table 3: Effect of all extracts on *P. aeruginosa* by Broth dilution test.

Source of Variation	d.f	S.S.	M.S.S.	F.Cal	F.Tab 5%	Result
Due to Treatment	4	0.03	0.009	62.43	3.84	S
Due to replication	2	0.001	0.0006	4.40	4.46	NS
Due to Error	8	0.001	0.0001			
Total	14	0.039	0.002			

**Table 4: Effect of plant extracts on *S.typhimurium* by Broth dilution test.**

Source of Variation	d.f.	S.S.	M.S.S.	F.Cal.	F.Tab 5%	Result
Due to Treatment	4	0.10	0.025	424.83	3.84	S
Due to replication	2	0.0002	0.0001	2.11	4.46	NS
Due to Error	8	0.0004	0.00006			
Total	14	0.102				

**Table 5: Effect of plant extracts on *S.epidermidis* by Broth dilution test.**

Source of Variation	d.f.	S.S.	M.S.S.	F.Cal.	F.Tab 5%	Result
Due to Treatment	4	0.51	0.128	3212.08	3.84	S
Due to replication	2	0.0001	0.00006	1.38	4.46	NS
Due to Error	8	0.0003	0.00003			
Total	14	0.51				

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Oral pathogens are microorganisms on the oral surface that play an important part in the development of caries and periodontal diseases [3, 4]. It is now clear that microorganisms play an essential role in the pathogenesis of dental caries and consequently provides a prime target for the prevention of this disease by antibiotics and vaccine [5, 6]. We have prepared several solutions from OHMG hydrochloride for evaluation of antimicrobial activity. Antimicrobial activity assay. Examination of the bactericidal activity of the 0.1%, 0.2% and 0.5% water solution of the OHMG hydrochloride [2, 4, 7].