



REGULAR ARTICLE

ANTIBACTERIAL ACTIVITY OF GENUS *DATURA* L. IN MARATHWADA, MAHARASHTRA

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SUMMARY

In order to investigate the antibacterial activity of extracts of different parts of four *Datura* spp. viz. *D. innoxia* Mill., *D. ferox* L., *D. metel* L. and *D. stramonium* L., a experiment was conducted by using aqueous extract of different plant parts like root, stem, leaf, seed and fruit coat of above mentioned four species of *Datura*. The efficacy of aqueous extract were tested against five human pathogenic bacteria viz. *Bacillus megaterium*, *Bacillus cereus*, *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus*, at the concentration of 50 µl and 100 µl. The results obtained were compared with control one.

Key words: Antibacterial activity, *Datura*

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1. Introduction

Plants belonging to family solanaceae are distributed world wide, which includes 85 genera and about 2,800 species in the world. There are approximately 25 different species of *Datura* throughout the world, they are often called as *Jimson weed* or '*Thornapple*'. The name *Datura* comes from the early Sanskrit *Dustura* (Mann, 1996) or *dahatura*. Common names of *Datura* are numerous some of the most common ones being reving nightshade *Thron apple*, *Stink weed*, *Devil's apple*, *Jimson weed* and *angel's trumpet* (Heiser, 1969 & Avery *et al*, 1959). The whole plant is antiseptic, narcotic, sedative and is useful for asthma (Bhattacharjee and Kumar, 1998) leaves narcotic and antispasmodic (CSIR, 1992). By taking this into consideration, attempt was made to find out antibacterial activity of four species of genus *Datura*.

2. Materials and Methods

Different species of *Datura* i.e. *D. innoxia* Mill., *D. ferox* L., *D. metel* L. and *D. stramonium* L. collected from different localities of Marathwada region and identified and voucher specimen deposited

at Botany Department of Babasaheb Ambedkar Marathwada University herbarium, Aurangabad. The plant parts were sort-out into root, stem, leaf, seed and fruit coat of above mentioned species were dried in natural condition and after that dried in the oven at 60°C up to the constant weight. After complete drying the plant parts were cut in to small pieces and ground in to fine powder, stored in the sealed container. Water was used for the extraction of the plant parts. Then solutions of known concentration were prepared in water. Pure cultures of *Bacillus megaterium*, *Bacillus cereus*, *Escherichia coli*, *Salmonella typhi* and *Staphylococcus aureus* were obtained form Department of Microbiology, Maulana Azad College, Aurangabad. The antibacterial activity was done by utilizing the hole-in plate bioassay procedure as reported by Hugo and Russell (1983); Vlietinck *et.al* (1995). Pure cultures of the organisms were inoculated onto nutrient broth incubated for 24 hr at 37°C. The suspension was used to streak for confluent growth on surface of agar plate with sterile swab. Using a sterile

cork borer of 6 mm diameter, two holes were made into set agar in petridishes containing bacterial culture. The aqueous plant part extracts were poured in well with the quantity of 50 μ l and 100 μ l in separate well while sterile water was used as control. The plates were placed in the incubator at 37°C for overnight. Antibacterial activity was recorded in the form of zone of inhibition (mm).

3. Result

The antibacterial activity of aqueous extract of root of four species of *Datura* were screened against five human pathogenic bacteria and results of the experiment were summarized in table 1. It was clear from the results that the, aqueous root extract of *D. innoxia* shown maximum antibacterial activity against human pathogenic bacterium *Salmonella typhi* i.e. 13 and 15 mm at 50 μ l and 100 μ l concentration respectively. Whereas the aqueous root extracts of other three species were less effective.

Table no. 1: Antibacterial activity of root aqueous extract of *Datura* species

Sr. no.	Name of bacteria	Root extract									
		<i>D. innoxia</i>		<i>D. ferox</i>		<i>D. metel</i>		<i>D. Stramonium</i>		Control	
		50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l
Zone of inhibition (mm)											
A	<i>Bacillus megaterium</i>	00	00	00	00	00	00	00	00	00	00
B	<i>Bacillus cereus</i>	09	12	00	12	10	13	00	00	00	00
C	<i>Escherichia coli</i>	10	12	00	00	00	00	00	00	00	00
D	<i>Salmonella typhi</i>	13	15	00	12	00	00	10	13	00	00
E	<i>Staphylococcus aureus</i>	09	11	00	12	09	13	00	12	00	00

Table no. 2: Antibacterial activity of stem aqueous extract of *Datura* species

Sr. no.	Name of bacteria	Stem extract									
		<i>D. innoxia</i>		<i>D. ferox</i>		<i>D. metel</i>		<i>D. Stramonium</i>		Control	
		50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l
Zone of inhibition (mm)											
A	<i>Bacillus megaterium</i>	00	00	00	00	00	00	13	14	00	00
B	<i>Bacillus cereus</i>	00	12	13	16	00	00	00	09	00	00
C	<i>Escherichia coli</i>	00	00	10	15	00	00	09	10	00	00
D	<i>Salmonella typhi</i>	00	00	10	16	10	15	00	00	00	00
E	<i>Staphylococcus aureus</i>	13	16	14	24	10	12	00	10	00	00

Similarly, the aqueous stem extracts of four species of *Datura* were screened for antibacterial activity against five human pathogenic bacteria at the concentration of 50 μ l and 100 μ l and the results of the experiment are summarized in table 2. It is evident from results that the aqueous stem extract of *Datura ferox* was most effective against bacterium *Staphylococcus aureus* and shown inhibition of 14 and 24 mm at the concentration of 50 μ l and 100 μ l respectively. Whereas aqueous stem extracts of other three *Datura* species were less effective.

The aqueous extract of leaf of four species of *Datura* were screened against human pathogenic bacteria and results of experiment are summarised in table no. 3. It is explicitly evident from the result that the aqueous leaf extract of *Datura ferox* shown maximum antibacterial activity against *Staphylococcus aureus*. The aqueous stem extract of *D. ferox* shown inhibition i.e. 12 and 21 mm at the concentration of 50 μ l and 100 μ l respectively. Whereas other three plants aqueous leaf extracts shown near about results.

Table no. 3: Antibacterial activity of leaf aqueous extract of *Datura* species

Sr. no.	Name of bacteria	Leaf extract									
		<i>D. inoxia</i>		<i>D. ferox</i>		<i>D. metel</i>		<i>D. Stramonium</i>		Control	
		50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l
		1	1	1	1	1	1	1	1	1	1
Zone of inhibition (mm)											
A	<i>Bacillus megaterium</i>	12	13	11	14	11	13	10	14	00	00
B	<i>Bacillus cereus</i>	11	16	11	16	00	13	11	13	00	00
C	<i>Escherichia coli</i>	00	13	13	14	11	13	12	14	00	00
D	<i>Salmonella typhi</i>	12	15	10	16	11	14	09	13	00	00
E	<i>Staphylococcus aureus</i>	11	14	12	21	10	14	13	17	00	00

Table no. 4: Antibacterial activity of seeds aqueous extract of *Datura* species

Sr. no.	Name of bacteria	Seeds extract									
		<i>D. inoxia</i>		<i>D. ferox</i>		<i>D. metel</i>		<i>D. Stramonium</i>		Control	
		50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l	50 μ l	100 μ l
Zone of inhibition (mm)											
A	<i>Bacillus megaterium</i>	00	00	00	00	11	12	00	00	00	00
B	<i>Bacillus cereus</i>	00	00	08	12	00	00	00	00	00	00
C	<i>Escherichia coli</i>	00	00	08	12	09	12	00	00	00	00
D	<i>Salmonella typhi</i>	00	11	10	14	00	00	00	14	00	00
E	<i>Staphylococcus aureus</i>	11	12	13	16	14	17	09	14	00	00

Table no. 5: Antibacterial activity of fruit coat aqueous extract of *Datura* species

Sr. no.	Name of Bacteria	Fruit cot extract									
		<i>D. inoxia</i>		<i>D. ferox</i>		<i>D. metel</i>		<i>D. Stramoniu</i>		Control	
		50 µl	100 µl	50 µl	100 µl	50 µl	100 µl	50 µl	100µ l	50 µl	100 µl
Zone of inhibition (mm)											
A	<i>Bacillus megaterium</i>	00	00	00	00	10	13	09	10	00	00
B	<i>Bacillus cereus</i>	10	15	12	17	00	00	00	00	00	00
C	<i>Escherichia coli</i>	10	12	11	14	10	12	00	10	00	00
D	<i>Salmonella typhi</i>	11	15	17	26	00	00	09	12	00	00
E	<i>Staphylococcus aureus</i>	09	19	15	19	09	11	11	16	00	00

The aqueous extracts of seeds of four species of *Datura* were screened against five human pathogenic bacteria and results of the experiment were summarised in table 4. It was clear from the table 4 that, the aqueous seed extract of *D. metel* was effective against *Staphylococcus aureus* and shown inhibition 14 and 17 mm at the concentration of 50 µl and 100µl respectively. The aqueous extracts of fruit coat of four species of *Datura* were screened against five human pathogenic bacteria and results of the experiment were summarised in table 5. It is clear from table 5 that, the aqueous extract of fruit coat of *D. ferox* was most effective against the human pathogenic bacterium *Salmonella typhi*.

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