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ANTIBACTERIAL AND PHYTOCHEMICAL SCREENING OF *NOTHAPODYTES NIMMONIANA* (GRAHAM) MABB. AGAINST PLANT AND ANIMAL PATHOGENIC BACTERIA

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Abstract:

In the present study the antibacterial activity of methanol extracts of different parts of N. nimmoniana was tested against two bacteria. The similar work was carried out by John De Britto and Herin (2011a) in Datura metel. For that plant the leaves and flowers showed significant inhibitory effects. But in the present work, the seeds of the selected plant exhibited potential inhibition against the selected bacteria. John De Britto and Herin (2011b) reported the biocontrol of Xanthomonas campestris using the methanol extracts of different parts of Azadiracta indica. Hence to achieve the successful results in bio control of pathogens and screen the potential medicinal properties of N. nimmoniana, the present work was carried out. The investigation provides successful positive results.

KEY WORDS: ***Azadiracta indica, N. nimmoniana Aeromonas hydrophila***

INTRODUCTION:

Plants are rich in a wide variety of secondary metabolites such as tannins, alkaloids and flavonoids, which have been found *in vitro* to have antimicrobial properties [1]. *Nothapodytes nimmoniana* (Graham) Mabb. is commonly called as Perum pulagi. It is a small, lower canopy tree belonging to family Icacinaceae. The distribution is highly patchy. It is found in different types of forests ranging from secondary forests, moist deciduous forests, semi-evergreen forests to disturbed evergreen forests. It prefers forest edges as microhabitat and commonly referred to as stinking tree because of the foetid smell it emits while flowering. It is an important medicinal plant used in various types of cancer, HIV, anaemia [2], malaria [3], anti bacterial [4], anti fungal and anti inflammatory [5]. Pathovars of *Xanthomonas* are known to cause diseases on several vegetable and cash crops and are reported to have developed resistance to ampicillin, penicillin and streptomycin [6]. *Aeromonas hydrophila* is one of the causative agents for diarrhoeal infections in children and immunocompromised patients [7]. To control the disease causing pathogens in biocontrol, the present study is focused to screen the antibacterial activity, MIC (Minimum Inhibitory Concentration) and phytochemical constituents of different parts of *N. nimmoniana.*

MATERIALS AND METHODS

Collection and extraction of plant materials

Fresh plant and plant parts were collected from Ooty, Tamilnadu, India. Fresh plant material was washed; shade dried and then powdered using the blender and stored in air tight bottles. The methanol extracts were prepared from the collected plant parts followed by standard procedures [8].

Phytochemical analysis and antibacterial assay

Phytochemical analysis of methanol extracts of different parts of *N. nimmoniana* was conducted following the standard procedure [9]. The antibacterial activity of methanol extracts of different parts of *N. nimmoniana* was tested by disc diffusion method [10]. The MIC of the aqueous and methanol extracts of different parts of the selected plant was determined by serial dilution technique [11].

Statistical analysis

All data were expressed as mean ± SD. Statistical analyses were evaluated by one-way ANOVA followed by Tukey HSD test. Values with $P< 0.005$ were considered statistically significant.

RESULT AND DISCUSSION

Phytochemical analysis

The preliminary phytochemical analysis of the leaves, stem and flowers of *N. nimmoniana* showed the presence of steroids, triterpinoids, reducing sugars, sugars, alkaloids, phenolic compounds, flavonoids and tannins (Table 1).

Antibacterial activity assay

The ANOVA analysis of the data revealed that among the five parts of *N. nimmoniana* ($p<0.005$) the leaves showed highly significant activity against the tested pathogens (Table 2) when compared to the other parts. Tukey HSD analysis of the data revealed that *A. hydrophila* was highly susceptible than *X.campestris*. Antibacterial activity of methanol extract of leaves of *N. nimmoniana* was highly significant when compared to Kanamycin and Neomycin.

Minimum Inhibitory Concentration (MIC)

The methanol extracts of seeds and leaves of *N. nimmoniana* showed inhibition of bacterial growth even at low concentrations (Table 3). Among these five parts, the MIC value of leaves of the selected plant is the lowest against the two selected pathogens (16µg/ml and 8µg/ml). Hence the leaves show significant ($p<0.005$) bactericidal activity compared to other parts.

In the present study the antibacterial activity of methanol extracts of different parts of *N. nimmoniana* was tested against two bacteria. The similar work was carried out by John De Britto and Herin (2011a) in *Datura metel*. For that plant the leaves and flowers showed significant inhibitory effects. But in the present work, the seeds of the selected plant exhibited potential inhibition against the selected bacteria. John De Britto and Herin (2011b) reported the biocontrol of *Xanthomonas campestris* using the methanol extracts of different parts of *Azadiracta indica.* Hence to achieve the successful results in bio control of pathogens and screen the potential medicinal properties of *N. nimmoniana,* the present work was carried out. The investigation provides successful positive results.

CONCLUSION

The results of the present study also indicate that the plant parts possess many phytochemicals which could be responsible for the observed antibacterial activities of the plant.

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Table 1: Phytochemical analysis of methanol extracts of *N. nimmoniana*

Compounds	Leaves	Stem	Flowers
Steroids	+	+	+
Triterpinoids	+	-	-
Reducing sugars	+	-	-
Sugars	+	+	-
Alkaloids	+	+	+
Phenolic compounds	+	+	-
Flavonoids	+	+	+
Catechins	-	-	-
Saponins	+	-	-
Tannins	+	+	-
Anthroquinones	-	-	-
Amino acids	-	-	-

Table 2: Antibacterial activity of different parts of selected plant (zone of inhibition in mm)

Samples	*X. campestris*	*A.hydrophila*	Neomycin	Kanamycin
Leaves	18.35±0.47	21.45±0.92	17.00±0.82	08.00±1.60
Stem	08.00±0.82	11.60±1.25		
Flowers	10.30±0.47	12.45±0.82		
Seed coats	09.23±0.45	13.25±0.82		
Seeds	17.00±1.00	20.30±0.47		

Data given are mean of three replicates ± standard error. $P < 0.005$

Table 3: MIC Values of methanol extracts different parts of the selected plants (µg/ml)

Samples	*X. campestris*	*A.hydrophila*
Leaves	16.00±0.00	08.00±0.00
Stem	124.00±0.00	124.00±0.00
Flowers	64.00±0.00	64.00±0.00
Seed coats	64.00±0.00	64.00±0.00
Seeds	64.00±0.00	32.00±0.00

Results are mean from three sets of experiments, each set in triplicate ± SD, $p < 0.005$

REFERENCES:

1. Lewis K. and Ausubel F.M: Prospects of plant derived antibacterials. Nat. Biotechnol., 2006; 24, 1504-1507.
2. Priel E, Showalter SD. and Blair DG, The topoisomerase I inhibitor, camptothecin, inhibits equine infectious anemia virus replication in chronically infected CF2Th cells. AIDS Research and Human Retroviruses, 1991, 7, 65-72.
3. Bodley AF, Cumming, JN and Shapiro, TA, Effects of camptothecin, a topoisomerase-I inhibitor, on *Plasmodium falciparum*. Biochem Pharmacol., 1998, 55, 709.
4. Kumar, RN, Vishwanathan H, Suresh T and Mohan PS, Anti bacterial activity of *Mappia foetida* leaves and stems. Fitoterapia, 2002, 78, 734-36.
5. Sheeja E, Edwin E, Dhanbad SP and Suresh B, Anti inflammatory activity of the leaves of *Nothapodytes foetida* Miers. Indian Journal of Pharmaceutical Science, 2005, 67, 251-3.
6. Mandavia MK, Gajera HP, Andharia J.H, Khandar R.R and Parameshwaram M: Cellwall degradation enzymes in host pathogen interaction of Fusarian wilt of chicken pea: Inhibitory effects of phenolic compounds. Ind Phytopathol., 1999;50, 548-551..
7. Agger, W.A., McCornick JD and Gurwith MJ: Clinical and microbiological features of *Aeromonas hydrophila* associated diarrhoea. J Clinical Microbio., 1985; 21,909-913.
8. Harbone J.B: Phytochemical Methods. London: Chapman and Hill., 1973; p. 17.
9. Brinda, P, Sasikala B and Purushothaman KK, Pharmacognostic studies on *Merugan kilzhangu*, BMEBR., 1981; 3, 84 – 96.
10. Bauer AW, Kirby WM, Sherries JC and Tuck M, Antibiotic susceptibility testing by a standardized disc diffusion method. Amer J Clin Pathol., 1966; 45, 493-496.
11. Reiner R: Antibiotics- An Introduction, F. Hoffman La Roche and Co., Basle, Switzerland., 1982; p.70.
12. John De Britto A. and Herin Sheeba Gracelin D: *Datura metel* Linn. - A plant with potential as antibacterial agent. I J App Biol Pharmal Tech., 2011a; 2, 429-433.
13. John De Britto, A. and D. Herin Sheeba Gracelin: *Azadiracta Indica* A Juss. - A potential antimicrobial agent against *Xanthomonas campestris*. I J App Biol Pharma Tech., 2011; 2, 374- 378.