

Antibacterial activity of Nirgundi (*Vitex negundo* Linn.)

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Abstract

The antibacterial activity of Nirgundi (*Vitex negundo*) extracts were tested against bacterial dental infections (*Staphylococcus aureus*, *Streptococcus mutans*, *S. sanguis*, *S. salivarius* and *Lactobacillus acidophilus*) and some other pathogens (*Bacillus subtilis*, *E. coli*). The aqueous, methanolic and petroleum ether extracts of plants were tested for their antibacterial activity using well diffusion method at the sample concentration of 200 mg/ ml. The methanolic extract showed maximum activity as compared to other extracts. The methanolic extract was most active against *S. salivarius* followed by *Staphylococcus aureus*, *Streptococcus mutans*, *S. sanguis* and *Lactobacillus acidophilus*.

Keywords: *Vitex negundo*, dental plaque, Antibacterial activity.

Introduction

The different systems of medicine practiced in India, Ayurveda, Siddha, Unani, Amchi and local health traditions, Utilize large number of plants for the treatment of human diseases. Most of these medicinal plants have been identified and their uses are well documented and described by different authors (Nadkarni, 1976, Dastur, 1985, Saradamma, 1990, Jain, 1991, Kirtikar and Basu, 1991), but the efficacy of many of these plants are yet to be verified. In order to evaluate the efficacy of these plants by scientific investigations, an interdisciplinary programme was started with the aim of screening plants for their antimicrobial activity. Selection of the plants from the literature were made on the basis of their common use in the treatment of infectious diseases like fever, bronchitis, ulcer, diarrhoea, dysentery and skin disease. The medicinal herbs represent a rich source of antibacterial and antifungal activity (Ahmad *et al.*, 1998). *Vitex negundo* has shown activity against *Escherichia coli*, *Klebsiella aerogenes*, *Proteus vulgaris*, *Pseudomonas aerogenes* (Perumal Samy, 1998). But there is no record of its antibacterial property against dental infections caused by *Streptococcus mutans*, *S. sanguis*, *S. salivarius*, *S. aureus* and *Lactobacillus acidophilus*. In this paper the antibacterial activity of *V. negundo* is presented along with references to their traditional uses.

Materials and Method

Plant material & extracts

The plant was collected from the foot hills of Shivalik range of Himalayas in Haridwar and identified at Botanical Survey of India, Dehradun, Uttarakhand. The plant was shade dried at room temperature and then powdered plant material was loaded in soxhlet assembly and extracted in four different solvents such as petroleum ether, acetone, methanol and water. The polarity of the solvents would leach out compounds

Table-1: Antibacterial activity of *Vitex negundo* extracts in different solvents.

Inhibition Zone (mm)*					
Microorganisms	Extracts				Antibiotic
	Pt. ether** 100 mg/ml	Acetone** 100 mg/ml	Water** 100 mg/ml	Methanol** 100 mg/ml	Ampicillin 100 mg/ml
<i>Staphylococcus aureus</i>	20	21	22	20	24
<i>Streptococcus mutans</i>	19	20	22	21	25
<i>S.salivarius</i>	21	23	22	23	26
<i>S.sanguis</i>	17	17	20	19	21
<i>L.acidophilus</i>	18	17	19	21	23
<i>B. subtilus</i>	9	10	12	11	21
<i>E. coli</i>	13	14	17	16	22

soluble in particular solvents .The extracts were concentrated by using vacuum evaporator.

Antibacterial assay

The well diffusion or cup plate method is used for antibacterial activities. The 8mm diameter wells were punched in the agar and filled with extracts and respective solvents for control and standard antibiotic ampicillin (100 mg /ml) was used as positive control, the plate were incubated at 37 °C for 24 hours. The antibacterial activity was evaluated by measuring the diameter of inhibition zone in mm.

Results and discussion

The plant shows broad spectrum antimicrobial activity (Table 1) i.e. the methanol, water, acetone and petroleum ether extracts were active against both gram positive and gram negative bacteria. The *V. negundo* extracts were found to be less effective as compared to ampicillin. The methanolic extracts exhibited the highest degree of antibacterial activity as compared to aqueous, acetone and petroleum ether extracts. The extracts were highly inhibitory to *S. mutans* and *S. salivarius*, but the maximum inhibition zone 23 mm was attained with methanol extract of *V. negundo*.

The medicinal plants are used by large proportion of the Indian population because there is a true improvement of disease condition after herbal treatment with no harmful side effects and high cost of other forms of treatment. *V. negundo* extracts show broad spectrum of action against microbes causing dental

caries. Ampicillin is more effective against microorganisms because it is used in a pure form as compared to crude extract of *V. negundo* in different solvents.

The methanolic extracts exhibited the highest degree of antimicrobial activity as more compounds i.e. alkaloids, steroids, terpenoids and glycosides are extracted by methanol in comparison to petroleum ether and acetone.

Further work is going on to locate the active principle from the various extracts and these preliminary results of this investigation indicates that *V. negundo* has a wide spectrum of antibacterial activity.

References

- Kirtikar, K. R. & Basu, B.D., 1991. *Indian medicinal plants* 2nd ed , Bishen Singh Mahendra Pal Singh, Dehradun, India.
- Jain, S. K., 1991. *Dictionary of Indian folk medicine and ethanobotany*. Deep Publications A-3/27A, DDA Flat, New Delhi.
- Dastur, J. F., 1995. *Medicinal plants of India and Pakistan*. D. B. Taraporevala, Bombay.
- Nadkarni, K. M., 1976. *India materia medica*. Bombay popular Prakashan, India.
- Saradamma, I., 1990. *All India co-ordinated research project on ethnobiology*. Final technical report. RRI Drug research, CCRAS, Government of India, Poojapura, Trivandrum, Kerala, India.
- Valsaraj, R., Pushpangadan, P., Smith, V. W., Adersen, A. & Nyman, V., 1997. Antimicrobial screening of selected medicinal plants from India.. *Journal of ethanopharmacology*, 58: 75-83.
- Ahmad, I., Mehmood, Z. & Mohammad, F., 1998. Screening of some Indian medicinal plants for their antimicrobial properties. *Journal of ethanopharmacology*, 62: 183-193.
- Perumal Samy, R., Ignacimuthu, S. & Sen, A., 1998. Screening of 34 Indian medicinal plants for antibacterial properties. *Journal of ethanopharmacology*, 62: 173-182.