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VITEX NEGUNDO: A GROWTH INHIBITORY AGENT AGAINST PROTEUS MIRABILIS

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KEYWORDS

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ABSTRACT

In the present study the leaf extracts of *Vitex negundo* were analyzed for their phytochemical constituents and growth inhibitory impact against *Proteus mirabilis* by agar disc diffusion method. The phytochemical screening revealed the presence of alkaloids, tannins, saponins and flavonoids. The concentration of tannins was highest and that of flavonoids was lowest. The inhibitory impact of the extract was measured as zone of inhibition (ZOI). The results were compared with standard antibiotic gentamycin. The study revealed that, the leaf extracts of *Vitex negundo* successfully inhibited the growth of *Proteus mirabilis*. The inhibitory impact of leaf extract of *Vitex negundo* against *Proteus mirabilis* seems to be due to presence of tannins, which are known for their antimicrobial impact. The antibacterial activity of *Vitex negundo* against *P. mirabilis* is indeed a promising development, which will help in the development of future antimicrobials.

INTRODUCTION

India is endowed with a rich wealth of medicinal plants. Herbs has always been playing chief role in medicinal formulations. The herbal medicines are gaining grounds throughout developing countries as people strive to stay healthy. India has recognized more than 2500 plant species which have medicinal values. However, large flora is still waiting for investigation for validation of their medicinal properties (Kirtikar and Basu, 1995). *Vitex negundo* belongs to family verbenaceae, known as Five leaf Chaste tree, is a large, aromatic shrub; with typical five foliate leaf pattern. It is found throughout the greater part of India at warmer zones and ascending to an altitude of 1500 m in outer western Himalayas. The shrub is one of the common plants used in Indian Medicines. It has been claimed to possess many medicinal properties. The plant has been reported to have high medicinal value (Rajith, 2011). *Proteus mirabilis* is a gram negative, facultatively anaerobic, rod shaped bacterium. It shows swarming motility and urease activity. *Proteus mirabilis* causes 90% of all infections in humans. It is widely distributed in soil and water. This rod shaped bacterium has the ability to produce high levels of urease, which hydrolyzes urea to ammonia (NH₃). Which makes the urine more alkaline. If left untreated the increased alkalinity can lead to formation of crystals or struvite, calcium carbonate, which can result in kidney stones. *Proteus mirabilis* is generally susceptible to most antibiotics apart from tetracycline and nitrofurantoin; 10 - 20 % of *Proteus mirabilis* strains are also resistant to first generation cephalosporins and ampicillin (O' Hara *et al.*, 2000). The paper deals with growth inhibition of *Proteus mirabilis* by the methanolic extract of *Vitex negundo*.

MATERIALS AND METHODS

Plant Materials

The fresh tender leaves of *Vitex negundo* were collected and were washed with deionised water and disinfected with 0.1% HgCl₂ solution for 5 min and dried in shade for 15 days. The dried materials were ground to fine powder with help of electric grinder (Kumar *et al.*, 2013a; 2013b; 2013c).

Extract Preparation

50g of sieved powder was weighed and subjected to extraction in Soxhlet apparatus using methanol. The obtained extract was concentrated with the help of vacuum rotary evaporator and stored in air tight container (Kumar *et al.*, 2013d; 2013e).

Phytochemical Screening

Qualitative and quantitative phytochemical screening was conducted as per previously published standards (Kumar *et al.*, 2015a; 2015b).

Antibacterial Screening

The extract of *Vitex negundo* was used to screen the antibacterial action against *Proteus mirabilis* MTCC 1429

Agar Disc Diffusion Method

The agar disc diffusion method was used to analyse the antibacterial activity of

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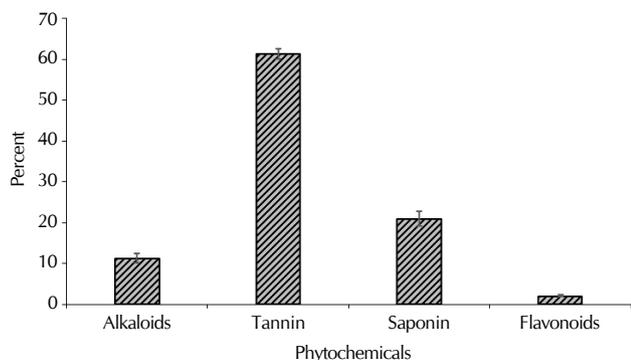


Figure 1: Showing the results of phytochemical screening of leaf extract of *Vitex negundo*

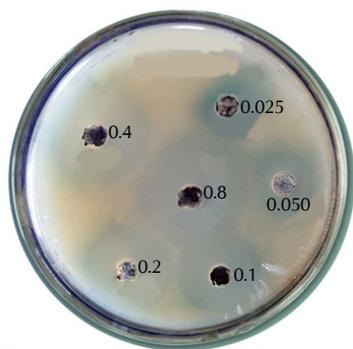


Figure 3: Showing Zone of Inhibition of gentamycin against *P. mirabilis*

Vitex negundo leaf extract against *Proteus mirabilis*. Initially the stock cultures of bacteria were revived by inoculating in broth media and grown at 37° C for 18 hrs. the agar plate of above media were prepared and wells were made in the plate. Each plate was inoculated with 18h old cultures (100 µL, 104 cfu) and spread evenly on the plate. After 20 min, the wells were filled with different concentrations of samples. The control wells were filled with gentamycin along with solvent. All the plates were incubated at 37°C for 24h and the diameter of inhibition zones were noted.

RESULTS AND DISCUSSION

Phytochemical Screening

The results of phytochemical screening of leaf extracts of *Vitex negundo* is presented as figure 1. The results reveal the presence of alkaloids, tannins, saponin, flavonoids. Tannins were found in highest concentration in leaf extract of *Vitex negundo*. Similar results were reported by Kumar *et al.*, (2013d). Several phytochemicals have been known to possess antibacterial properties. Tannins, alkaloids, saponins, flavonoids have been found to have growth inhibitory impact against *P. mirabilis*. Tannins have been reported to form irreversible complexes with prolene rich protein resulting in inhibition of cell synthesis of bacteria (Mamtha *et al.*, 2014)

Antibacterial analysis

The antibacterial analysis revealed that the leaf extract of *Vitex*

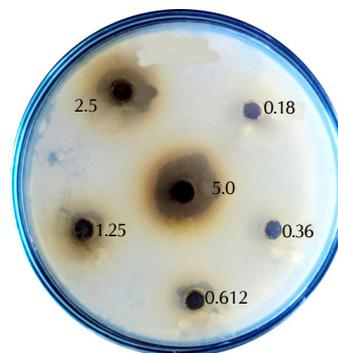


Figure 2: showing Zone of inhibition of *Vitex negundo* against *P. mirabilis*

negundo successfully inhibited the growth of *P. mirabilis*. The antibacterial activity is shown as agar plates in figure 2. The impact of standard antibiotic gentamycin against *P. mirabilis* is shown in figure 2. The extract showed a Zone of inhibition of 3, 4, 9 and 12 mm respectively for 0.612 mg, 1025 mg, 2.5 mg and 5 mg of extract concentration. Several phytochemicals have been known to possess antibacterial properties. Tannins, alkaloids, saponins, flavonoids have been found to growth inhibitory impact against *P. mirabilis* (Kumar *et al.*, 2013d).

The antibacterial activity of *Vitex negundo* against *P. mirabilis* is indeed a promising development, which will help in development of future antimicrobial formulations against *Proteus mirabilis*.

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