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# Phytochemical analysis and antimicrobial activity of vitex negundo

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**Abstract**
*Vitex negundo* has been traditionally in use since time immemorial. The current study was done to analyze the phytochemicals present in the plant and also to evaluate its antimicrobial activity against Salmonella typhi. Leaves of Vitex negundo were grinded and were extracted using distilled water. Preliminary phytochemical screening of the extract confirmed the presence of alkaloid, flavonoids, proteins, amino acids, glycosides, tannins, carbohydrates, coumarins and saponins. The Protein concentration of the extract was found using Lowry's method. The presence of these bioactive constituents is associated with the antimicrobial activity of the plant. By disc diffusion method, the bacterial pathogen Salmonella typhi was found to be susceptible in leaf extracts of the vitex negundo and showed good activity against the pathogen.

**Keywords:** vitex negundo; phytochemical analysis; Lowry's method; antibacterial activity; salmonella typhi

## Introduction
*Vitex negundo* (verbenaceae) commonly known as Nirkundi or Nallanocci is an aromatic large Shrub or small tree about 3min height with quadrangular branches and almost found throughout India, ascending to 1500m in outer Himalaya, fairly common in waste lands, on road side, the banks or streams or in moist places near deciduous forests [1]. The essential oil of Vitex negundo leaves showed significant antifungal activity against trichloroderma viride, fusarium sp., collectrotrichumand helminthosporium. An ointment made from the juice is applied as hair-tonic. It is constituent of the Ayurvedic preparations "Vishagarba thailla" [1, 2]. The extraction of the leaves showed anti-cancer activity against Ehrlich ascites carcinoma cells. The ash of the plant is a source of potassium carbonate and is reported to be used as alkali in dyeing [3, 5]. The present study is designed to explore the preliminary phytochemical and antimicrobial analysis of *vitex negundo* which is responsible for its pharmacological properties [3]. *Vitex negundo* is used for treating stored garlic against pests and as a cough remedy in the Philippines. Roots and Leaves are used in eczema, ringworm and other skin diseases, liver disorders, spleen enlargement, rheumatic pain, gout, abscess, backache; seeds are used as vermicide [10, 12]. This plant is also proved for its cardioprotective property [15]. It is also used to control population of mosquitoes. In the USA, hardiness zone 6 to 9, its purple flowers bloom most of the summer and it is a popular plant visited by bees and butterflies. *Vitex negundo* also finds use as a food crop and source of timber [2].

**The present study was designed with the following objectives**

a. To estimate and analyse the phytochemicals present in the studied plant.
b. To estimate the quantity of protein in the studied plant.
c. To evaluate the anti-microbial activity of the plant extract against *Salmonella typhi.*

## Materials and Methods
Nature of the extract: The colour of the water extract was Sap Green Colour.
Phytochemical analysis of *Vitex negundo*: Phytochemical screening of *Vitex negundo* revealed the presence of Alkaloids, Flavanoids, Proteins and Amino Acids, Glycosides, Tannins, Carbohydrates, Coumarins, Saponins.

- The details of Phytochemical Analysis have been tabulated in Table 2.
- Quantitative Protein Estimation has been done by Lowry's Method (Figure 16).
- Antimicrobial activity against known human pathogen *Salmonella typhi* done by well diffusion method (Figure 17).

## Results

**Table 2:** Phytochemical analysis of *Vitex negundo* Leaf.

| Phytochemicals | | Aqueous Extract |
|---|---|---|
| | | Leaves |
| Steroids | Salkowski | - |
| Terpenoids | Salkowski | - |
| Alkaloids | Wagner's Test | + |
| Flavanoids | Alkaline Reagent Test | + |
| | Sulphuric Acid Test | - |
| | Lead Acetate Test | - |
| Tannins | Lead Acetate Test | + |
| Glycosides | Keller-Kiliani Test | + |
| Carbohydrates | Benedict's Test | + |
| | Fehling's Test | - |
| | Molisch's Test | + |
| Proteins and Amino Acids | Xanthroproteic Test | + |
| | Ninhydrin Test | + |
| Coumarins | | + |
| Saponins | Froathing Test | + |

+: Present -: Negative

Phytochemical screening of *Vitex negundo* revealed the presence of Alkaloids, Flavanoids, Proteins and Amino

Acids, Glycosides, Tannins, Carbohydrates, Coumarins, Saponins.

**Standard Curve for Quantitative Estimation of Protein by Lowry's Method**

Concentrations of protein in the sample (µg/ml) in x-axis against optical density in y-axis.

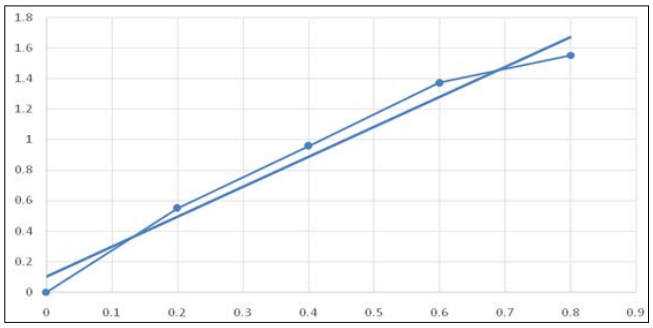


**Fig 1**

Table 4. Antimicrobial activity of aqueous extract of *Vitex negundo* against *Salmonella typhi*.

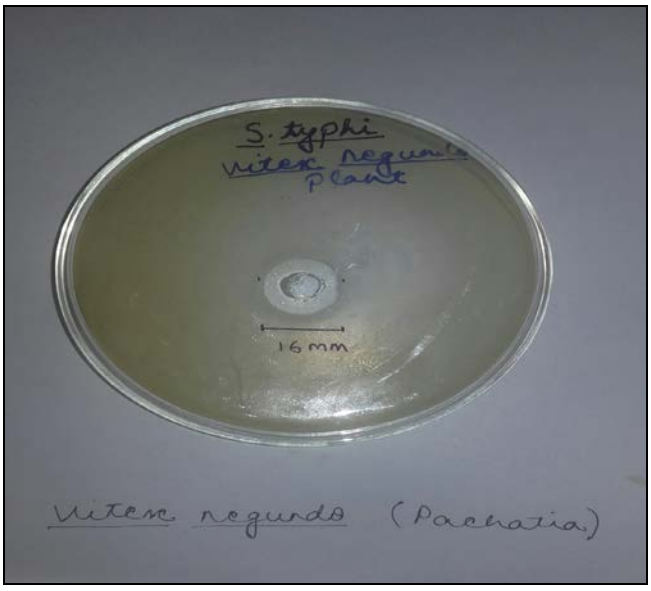


**Fig 2**

It is shown that the aqueous extract of *Vitex negundo* leaf has effect on *Salmonella typhi*, nutrient agar with a zone of inhibition 16mm.

**Discussion and Conclusion**

Phytochemical screening of the extracts of *Vitex negundo* revealed the presence of Alkaloids, Flavonoids, Tannins, Glycosides, Carbohydrates, Proteins and Amino acids, Coumarins and Saponins. These compounds have significant application against human pathogens like analgesic, antipyretic, anti-inflammatory, antimalarial property and is also used as insect repellent in mosquito coils. Similar results by Prasanna *et al*. (2014) on phytochemical screening of *Vitex negundo* revealed the presence of flavonoid, phenols, saponins, terpenoids and volatile oils. Again, results by Rose *et al*. (2011) showed the presence of simple phenols, terpenoids, flavonoids, anthraquinones, aminoacids, quiones, starch and carotenoids. Another by Ullah *et al*. (2012) on V. negundo revealed the presence of different classes of natural products including essential oil, triterpenes, diterpenes, sesquiterpenes, lignan, flavonoids, flavones glycosides, iridoid glycosides, and stilbene derivative.

By agar disc diffusion method, the extract of vitex negundo express a very clear inhibitory activity against*Salmonella typhi* withzone of inhibition as 16mm. This shows that the plant is very much effective in treating Typhoid disease.

Similar research has been done by Rose *et al*. (2011) found that the leaf extracts of *Vitex negundo*solvented by ethanol, showed the spectrum of inhibition on *Salmonellaparatyphi*. Most of the bacterial pathogens like *Salmonella paratyphi*, *Klebsiella pneumonia*, *Vibrio cholera*, *Streptococcus mutans* and *E.Coli* were found to be susceptible in leaf extracts of the *Vitex negundo*. Petroleum ether leaf extract of Vitex negundo showed good activity against *Salmonella paratyphi* and Entrobacter.

Another research by Jeyaseelan *et al*. (2010) on *Vitex negundo* against phytopathogens namely Pseudomonas solanacearum and Xanthomonas axonopodispv. citri. showed inhibitory effect on both of the test pathogens and the diameter of inhibition zone ranged from 9.9 ± 0.5 mm to 48.5 ± 1.3 mm and the inhibitory effect differed significantly ($P<0.05$) among the samples. Ethyl acetate extract of flower of Vitex negundo L. showed significantly ($P<0.05$) higher inhibition on Pseudomonas solanacearum and Xanthomonas axonopodispv. citri.

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**Conflict of Interest:** None

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