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## Antimicrobial activity in pulp extract of Neem (*Azadirachta indica* Linn.)

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### Abstract

*Azadirachta indica* (Neem) is a multipurpose tree with multiple health benefits. Different parts of the tree were shown to exhibit antimicrobial effects against a wide variety of microorganisms. Screening of this medicinal plant for bioactive compounds may lead to development of less expensive new antimicrobial agents with improved safety and efficacy. The aim of this study was to assess the antimicrobial activity of *Azadirachta indica* (Neem) against pulp extract human pathogenic bacterial pathogens. *Azadirachta indica* pulp extract showed strong antimicrobial activity against selected bacterial species studied at all the concentrations tested and had exhibited a potent antibacterial activity against various strains of bacterial pathogens. Phytochemical analysis of the aqueous extracts of the pulp revealed the presence of alkaloids, reducing sugars, saponins etc, in them which was used for enteric fever in Siddha medicine.

**Keywords:** *Azadirachta indica*, antimicrobial effects, Phytochemical analysis .

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### Introduction

*Azadirachta indica* (*A. indica*) belongs to the botanic family *Meliaceae*, commonly known as Neem. It is used in Siddha medicine as a source of many therapeutic agents. *A. indica* (leaf, bark and seeds) are known to contain antibacterial and antifungal activities against different pathogenic microorganisms; in addition to antiviral activity against vaccinia, chikungunya, measles, and Coxsackie B viruses<sup>1</sup>. Different parts of Neem (leaf, bark and seeds) have been shown to exhibit wide pharmacological activities such as antioxidant, antimalarial, antimutagenic, anticarcinogenic, anti-inflammatory, antihyperglycaemic, antiulcer, and anti-diabetic properties<sup>2</sup>. The biological activities are attributed to the presence of many bioactive compounds in its different parts. Aqueous extract of Neem pulp extract has a good therapeutic potential as an antihyperglycaemic agent in insulin-dependent and non-insulin-dependent diabetes mellitus<sup>3</sup>.

Furthermore, Neem leaves may be used for the treatment of various diseases including eczema, ringworm, acne, inflammation, hyperglycaemia, chronic wound infections, diabetic foot, and gas gangrene<sup>4</sup>. They may also remove toxins from the body, neutralize the free radicals present in body, and purify blood. Recently they were reported to act as anticancer agents; and they were shown to have hepato-renal protective activity and hypolipidemic effects<sup>5</sup>.

Hence the purpose of our study is to investigate the antimicrobial activity of Neem pulp against human pathogenic bacteria.

## Materials and Methods

### Selection of plant

The plant neem (*Azadirachta indica*) was selected for study. Its pulp were collected from Sivaraj Siddha Medical College Garden in Salem District, Tamil nadu. The collected pulp were identified and authenticated by the experts of the department of Gunaadam(Pharmacology).

### Preparation of aqueous extracts from dried plant materials

For preparation of extracts, 20 g of powdered plant material were soaked each in 250 ml of distilled water. The mixtures in different containers were kept for 24 hours in shaking water bath fewer than 40 °C. The mixtures were filtered using a filter paper<sup>5</sup>.

### Preparation of inoculums

Stock cultures were maintained at 4°C on slopes of Mullar Hinton agar. Active cultures for experiments were prepared by transferring a loopful of microorganism from the stock cultures to test tubes of Mullar Hinton broth and SDA, and incubated for 24 hrs at 37°C. The cultures were diluted with fresh Mullar Hinton broth<sup>6</sup>.

### Preparation of Media

The medium was prepared by dissolving the different ingredients in water and autoclaved at 121°C for 15 minutes. This was used for antimicrobial studies.

### Antimicrobial susceptibility test

The agar well disc diffusion method was used to screen the antimicrobial activity. In vitro antimicrobial activity was screened by using Mullar Hinton agar (MHA) obtained from Himedia (Mumbai). The MHA plates were prepared by pouring 15 ml of molten media into sterile petriplates. The plates were allowed to solidify and 0.1 % inoculum suspension was swabbed uniformly and the inoculum was allowed to dry for 5 minutes. The different extracts were loaded on 3mm sterile disc till saturation. The loaded disc was placed on the surface of medium and the compound was allowed to diffuse for 5 minutes and the plates were kept for incubation at 37°C for 24 hrs<sup>7</sup>. At the end of incubation, zone of inhibition formed around the disc were measured with transparent ruler in millimeter. Aqueous extracts were subjected for antimicrobial activity against the strains of *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*.

### Anti microbial assa:

Anti microbial assay was carried out by agar well diffusion method using mullerhinton agar for *Escherichia coli*, *Salmonella typhi* *Staphylococcus aureus*.

## Results and Discussion

This study showed that the aqueous extract of pulp showed effective inhibitory action against *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*(table 1).The zone of inhibition of pulp extract of Neem against *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus* was measured about 23mm, 22mm, 23mm respectively.

**Table-1. Antimicrobial activity of pulp extract of Neem:**

S.no	Organism	Concentration of aqueous extract (mg/ml)	Zone of inhibition (mm)
1.	<i>Escherichia coli</i>	100	23
2.	<i>Salmonella typhi</i>	100	22
3.	<i>Staphylococcus aureus</i>	100	23

So we conclude the pulp extract of neem are good for human consumption. Thus further studies in vivo is required to establish the use of this siddha drug in closing future. Thus this laboratory evidence on the antimicrobial activity provides a rationale for the

traditional use of these drugs as antibacterial. The phytochemical profile of the pants could be further referred for exploring the active constituents responsible for antibacterial activity.

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