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Research

Integrated Study on Neem (Azadirachta Indica) Seed Constituents, Extraction and Anti-Microbial Screening

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Abstract

Screening of medicinal plants for bioactive compounds leads to less expensive new antimicrobial agents with improved safety & efficacy. Azadirachta indica (Neem) is a multipurpose tree with multipurpose tree multiple health benefits. Different parts of the plants are shown to exhibit antimicrobial effects against a wide variety of microorganism. In present study we compared the anti-microbial efficacy of aqueous extracts of seeds of a Azadirachta indica human pathogenic bacteria (Staphylococcus aureus, Escherichia coli pneumonia and skin disease are some types of severe infections occur worldwide. Due to pathogenic bacteria such as Escherichia coli(E.coli) Staphylococcus aureus (S. aureus). These bacteria's do contribute towards other infection in human and thus lead to towards unhealthy life. Agar well diffusion method and micro-broth dilution methods were used to determine the minimum inhibitory concentration(MIC). Results showed that seed extracts exhibited strong anti-microbial activity against bacteria at all the concentration tested (100,200 & 300μg/ml). Our results suggest that aqueous extracts of Azadirachta indica seed exhibit high anti-microbial activity.

Keywords: Azadirachta indica, Agar plate diffusion method, Anti-bacterial, pathogenic microorganisms, neem seeds.

INTRODUCTION

The antimicrobial effects of extracts of neem seed (Azadirachta indica A. Juss.) were investigated using microbial growth inhibition assays. The people of India have long revered the neem tree; for centuries, millions have cleaned their teeth with neem twigs, smeared skin disorders with neem-leaf juice, taken neem tea as atonic and placed neem leaves in their beds, books, grainbins, cupboards, and closets to keep away troublesome bugs. The neem oil is used for hair for growth of hair Given the use of various neem-derived products as pesticides and the realistic chances of residues derived from the treatments still being present at the time of consumption, there may be a risk for consumers. Study of chemical composition of natural products. Understanding biosynthesis of medicinal compounds in organisms. Standardization and quality control of herbal medicines study of traditional medicine systems .example: Ayurveda, Unani, & systems of medicines. These herbs formed an essential part of

Indian culture's medical science – Ayurveda.[5] Currently, practitioners of traditional medicines worldwide have described the therapeutic effects of many plant species for multiple disorders, either in the forms of natural herbs or their various extracts.[6] The bulk of the population in developed countries also harness traditional folk medicines extracted from plant materials. Herbal medicines are a significant source of novel drugs which make up the ingredients in conventional medicinal systems, pharmaceutical intermediates, modern medicines, nutraceutical food supplements, lead compounds in synthetic drugs, and bioactive principles.[7]

However, the significance and value of medicinal plants are still not recognized by many new generation people. Neem leaves have been reported to elicit various therapeutic effects such as antioxidant, anti-inflammatory, antimalarial, antiulcer, antihyperglycemic, antimutagenic, antidiabetic, anticarcinogenic, immunomodulatory and anticancer. Neem leaves and paste are also conventionally used to cure allergic skin reactions and treat smallpox and chickenpox.[8] Furthermore, neem leaves have shown antifungal and antibacterial activities against various pathogenic microorganisms and antiviral effects for treating measles, Chikungunya, Vaccinia and Coxsackie B viruses.[9][10][11][12] In addition, neem leaves have been reported for effects on antifertility.[13][14] spermicidal and contraception.[15][16][17].As this form of herbal contraception is non-hormonal and has reported no side effects.[18][19]

MATERIAL AND METHODS

COLLECTION AND AUTHENTICATION OF PLANT

Seed of Neem (Azadirachta indica) family meliaceae were collected from the nearby locality from herbal garden of Sri Ramakrishna institute of Paramedical Sciences, Coimbatore, Tamil Nadu, June 2025. Herbariums was prepared and deposited in SRIPMS, Pharmacognosy lab. The plant were identified and authenticated from Botanical Survey of India (TNAU), Coimbatore.

PREPARATION OF EXTRACT

The seed, seed coat were shade dried at room temperature and coarse powdered, each taken 50g and extracted with 50ml of Petroleum ether, Toluene, Chloroform, Acetone at room temperature using maceration process for 74 hours and then filtered. The solution was evaporated giving Yellowish brown residue of neem seed. The total extract was stored in an air tight glass container.[4]

ANTIMICROBIAL STUDIES

In vitro antibacterial and screening were with total Neem seed solvent extract of Azadirachta indica, neem against bacteria standard well plate method. Nutrient agar medium was used for determining antibacterial activity. This activity extends to both gram- negative and gram – positive bacteria, suggesting a broad spectrum of effectiveness. The extract also demonstrates potential synergistic effects when combined with certain antibiotics. The antimicrobial activities were determined by measuring the diameter of the inhibitory zones in mm using a zone reader, the diameter of the zones of inhibition by the samples were then compared with the diameter of the zone of inhibition produced by the standard antibiotic solutions used.

PREPARATION OF DILUTIONS

The dilutions like 100mg/ml, 200mg/ml, 300mg/ml is made by using the total alcoholic extract of neem seed.

ANTIBACTERIAL STUDIES

Screening of Antibacterial activity.

MEDIA USED

Nutrient broth
Agar Agar

INGREDENTS

Agar
Distilled water

PROCEDURE

Muller Hinton Agar media was prepared ascetically, collected was poured into a sterile Petridis and allowed sometime to solidify. Then the culture containing microorganisms was ascetically inoculated into the sterile petridish by using cotton swab.Using the borer, wells are made and the antibiotic solutions of methanol (50µl) and neem seed extract of petroleum ether, Toluene, Chloroform, Acetone are poured. Allow to diffuse by keeping it in refrigerator. Then the Petridis was kept in room temperature till they attain room temperature. These Petridishes were incubated in an incubator for 24hrs. Then the observations were incubated the zones and the depending upo the diameter of the zones the activities antimicrobial agents were found.[3]

Fig 1: Dilution of Chloroform

Fig 2: Dilution of Acetone

Fig 3: Dilution of Petroleum ether

Fig 4: Dilution of Toluene

ANTIMICROBIALSTUDIESPREPARATION OF DILUTION

The dilutions like 100mg/ml ,200mg/ml, 300mg/ml is prepared with total neem seed solvent extraction.

ANTIBACTERIAL STUDIES

Antibacterial activity of the total Neem seed extract of Azadirachta indica was screened and reported.

Table 1: Antibacterial Studiesof Seed Extract Of Azadirachta Indica

ORGANISM	STANDARD (mm)	CONTROL (mm)	SEED			
			Petroleum Ether	Toluene	Chloroform	Acetone
SA	34	-	-	-	28	30
EC	40	-	-	-	33	34
SA	30	-	-	-	-	-
EC	36	-	-	-	30	32

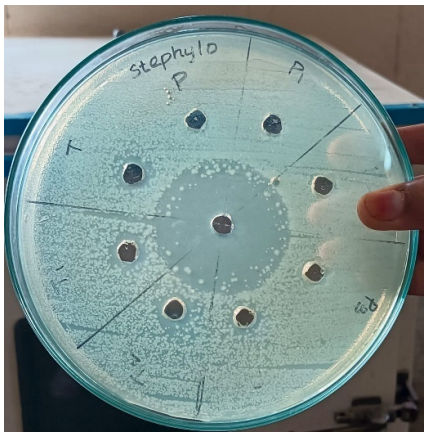

Fig 5: Gram Positive Bacteria Staphylococcus Aureus

Fig 6: Gram Positive Bacteria Bacillus Subtills

Fig 7: Gram Negative E.Coli

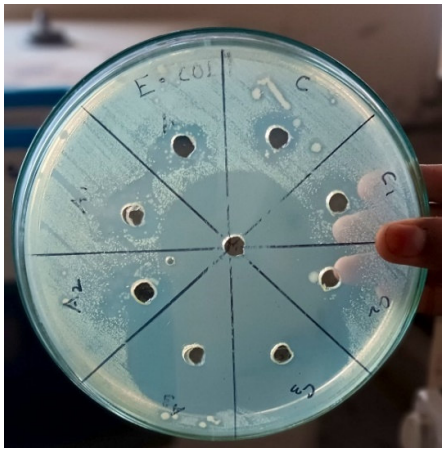

Fig 8: Gram Negative E.Coli

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CONCLUSION

The traditional use of the plant as medicine provide a basic for including which of its components and constituents maybe useful for specific medical condition are safe and without side effect. The plant selected for the present study was identified as Azadirachta indica. Neem by the Botanical Survey of India. Tamilnadu, Agricultural University, Coimbatore. Neem is the best nontoxic biological sources for development of modern drugs. Medicinal plants & phytochemicals are receiving growing consideration in recent years for the prevention and treatment of various diseases including cardiovascular disease and cancer,because of their relative safety &efficacy. The antimicrobial studies were conducted using different concentration of total alcoholic extract of Azadirachta indica (Neem). It shows moderate antibacterial activity Azadirachta indica. Neem can be used as antibacterial activities. Additionally, the potential of neem oil an industrial & hospital cleaning product is highlighted, exploring its antimicrobial, antibacterial and biodegradable properties.

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