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ANTIMICROBIAL POTENTIAL OF *AZADIRACHTA INDICA* AGAINST PATHOGENIC BACTERIA AND FUNGI

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Abstract
Drugs from natural sources are used for treating various diseases since the ancient times. The oil *of A. indica* leaves, was tested against the different infectious microorganisms (Gram positive bacteria and Gram-negative bacteria), such as bacterial strains; *S. aureus, E.coli H, B. cerus, P. vulgaris, S. typhi, K. prtcumoniise, S dysenteriae and* Fungal strains; *F. oxysporum. A. flaws, A. fumigates, A. niger, C. albicans, Cladosporium* sp., *M. canis, M. gypseum, T. rubrum, T. mentnagrophytes, P. notatum* and *P. citrinum* etc. The results showed that level of antimicrobial activities of the *A. indica* oil depends on both the protein and carbohydrate contents. Generally, the high level of protein and carbohydrate contents of extract had better antimicrobial activities.

Keyword: Antimicrobial Activity, Antifungal Activity, Pathogenic, *Azadirachta indica.*

Introduction
Nature has provided a complete store house of remedies to cure all diseases of mankind. The natural or herbal remedies are still the backbone of medicines. All the herbs produced bewildering variety of phytochemicals like primary metabolites (carbohydrates, fats, proteins) and secondary metabolites (Alkaloids, flavonoids, steroids, saponins, polyphenols, etc.) for their normal metabolic activities. These secondary metabolites showed various biological activities and act in plant defense mechanisms. The chemical profile of a single plant may vary over time as it reacts to changing conditions. The secondary metabolites have therapeutic actions, which produced drugs.

Material and Methods
The neem seeds were collected, repeatedly washed and subsequently dried in an oven at 50°C for 24 hours to attain constant moisture content, and size reduction was conducted using laboratory mill. A 500 ml soxhlet apparatus was utilized with the organic solvent n-hexane. The measured powder of the sample was added to a thimble and placed in a condenser. The parameters were adjusted to a temperature of 50-80°C, and a time of 60-180 min. At the time interval, the oil was collected in the volumetric flask, then centrifuged to separate the solid part from the solution, and evaporated, using a rotary evaporator to get solvent-free oil.

Result and Discussion
More than 135 compounds have been isolated from different parts of neem. The compounds have been divided into two major classes: isoprenoids like diterpenoids and triterpenoids containing protomeliacins, limonoids, azadirone and its derivatives, gedunin and its derivatives, vilasini type of compounds and C-secomeliacins such as nimbin, salanin and azadirachtin) and non-isoprenoids, which are proteins/amino acids and carbohydrates (polysaccharides), sulphurous compounds, polyphenolics such as flavonoids and their glycosides, dihydrochalcone, coumarin and tannins, aliphatic compounds, etc. Sulphur-containing compounds such as cyclic trisulphide and tetrasulphide isolated from the steam distillate of fresh, matured neem leaves have antifungal activity against *Trichophyton mentagrophytes.* Nimbidin, a major crude bitter principle extracted from the oil of seed kernels of *A. indica* demonstrated several biological activities. From this crude principle some tetran or triterpenoids, including nimbin, nimbinin, nimbidinin, nimbolide and nimbidic acid have been isolated. Neem oil also contains steroids (campesterol, beta-sitosterol, stigmasterol) and a plethora of triterpenoids of which Azadirachtin is the most well-known and studied. The Azadirachtin content of Neem Oil varies from 300 ppm to over 2000 ppm. The extract of neem leaf was found to offer protection against paracetamol induced liver necrosis. The elevated levels of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and gamma glutamyl transpeptidase (GGT) indicative of liver damage were found to be significantly reduced on administration of the aqueous leaf extract. The antioxidant activity of neem seed extract has been demonstrated *in vivo*, which is associated with low levels of lipoxygenase activity and lipid peroxides. Varying degrees of central nervous system (CNS) depressant

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activity in mice was observed with the leaf extract. The extract of stem barks and root bark showed hypotensive, spasmolytic and diuretic activities.
The chemical composition of neem leaves was characterized by low values of lipid, respectively. A search for the biological activities of oily extracts, *in vitro,* done to evaluate them as antimicrobial agents.

Table: Average composition of neem oil fatty acid

Common Name	Acid Name	Composition range
Omega -6	Linoleic acid	6 -16 %
Omega -9	Oleic acid	25 -54 %
Palmitic acid	Hexadecanoic acid	16-33 %
Stearic acid	Octadecanoic acid	9-24 %
Omega -3	Alpha –linolenic acid	? %
Palmitoleic acid	9 –Hexadecenoic acid	? %

Antibacterial and Anti-Fungal Activities:
. The Neem oil showed considerably activity against bacterial (Gram-positive bacteria: example, *Staphylococcus species* and the Gram-negative bacteria: example *Escherichia coli* and fungal strains. The antibacterial activity against microbial cultures namely: Bacterial Strain; *Escherichia coli. Bacillus cerus, Proteus vulgaris, Salmonella typhi, Klebsiella pneumonias, Shigella dysenterae* and Fungal strain; *Fusarium oxysporum, Aspergillus flams, Aspergillus fumigates, Aspergillus niger, Candida albicans, Cladosporium* sp., *Microsporum canis, Microsporum gypseum, Trichophyton rubrum, Trichophyton mentagrophytes, Penicillum notatum* etc. The oil was not able to inhibit *Proteus vulgaris.* It was observed that the oil exhibited inhibitor effects against most of the microorganisms tested. Moreover, the aqueous extract of plant has been previously reported to show antifungal activity. In this study the antibacterial and antifungal activities of the extracts was studied from leaves oil. The crude oil is generally active against bacteria and fungi.

Conclusions –
In this study, Neem oil showed antimicrobial activity revealed the significant antimicrobial potential of the oil against various strains of bacteria and fungi. However, the future effectiveness of antimicrobial therapy is somewhat in doubt. Microorganisms are becoming resistant more quickly than new drugs are being found. Thus, future research in antimicrobial therapy may focus on finding how to overcome resistance to antimicrobials, or how to treat infections with alternative means. So, it is worthwhile to study plants and plant products for activity against resistant bacteria.

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