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Antibacterial and Antifungal Activity Assesment of Nigella Sativa Essential Oils

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***Abstract*—**Antifungal activities of ether and methanolic extracts of volatiles oils of Nigella Sativa seeds were tested against pathogenic bacterias and fungies strains.The volatile oil were found to have significant antifungal and antibacterial activities compare to tetracycline, cefuroxime and ciprofloxacin positive controls.The ether and methanolic esxtracts were compared to each other for antifungal and antibacterial activities and ether extracts showed stonger activity than methanolic one.

***Keywords*—**Antifungal, antibacterial, essential oils, extraction, Nigella Sativa**.**

I. Introduction

A LARGE number of medicinal plants have therapeutic potentials. Seeds of Nigella sativa L.(Ranunculaceae), known commonly as “black cumin” have been employed for thousands years as a spice and food preservative. The oil and seed constituents have shown potential medicinal properties in traditional medicine. Recently, many biological activities of Nigella sativa L. seeds have been reported, including: antioxidant, anti-inflammatory, anticancer and antimicrobial and antifungal ones. [2]

Several pharmacological effects have been attributed to active principles of Nigella sativa L. which includes thymoquinone, thymohydroquinone, dithymoquinone, thymol,carvacrol, nigellicine, nigellimine-x-oxide, nigellidine and alpha-hedrin (Aljabre et al. 2005). [3],[7],[11] Nigella sativa L. seed extract inhibits fungal strains. In our study we have tested the antifungal and antibacterial properties of Nigella Sativa.

II. Experiments

A. Extraction of the Essential Oils

25 g seeds were crushed and extracted with petroleum ether for 4 h in a Soxhlet apparatus.After extraction, the solvents were removed by rotary vacuum and dried in a vacuum oven at 30ºC for.The same method was repeated by using methanol as extract agent.

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B. Materials and Methods

Staphylococcus Aerus ATCC 29737 Lot 58312397, Proteus Vulgaris ATCC 1978 Lot 0876523C, Escherichia coli, ATTC 8456 LOT 6543109, Canida Albicans ATCC 2091 Lot 7051869, Mueller--Hinton agar (Lot 685C2S, Code 060098), Dimethylsulfoxide (DMSO), Cefuroxime 30ug lot 1A320, Tetracyclini 30ug lot OD3313, Cyprofloxacini 5 ug Lot OM3189

C. Antimicrobial and Antifungal Activity af Essential Oil

The essential oil of samples M1- Ether extract and M2-methanol extract were tested for antibacterial activity by the disc diffusion method using 100µL of suspension of the tested microorganisms, containing 2.0 x 106 colony forming units (cfu mL–1) for bacteria and 2.0x105 spore mL–1 for fungalstrains. [11]

Fig.1 Essential Oils Inhibition Zone And Positive Controls vs /C.Albicans

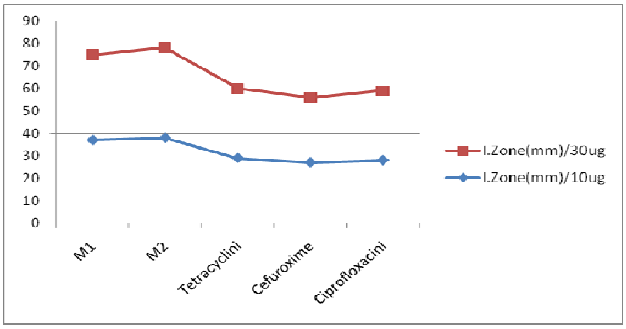
Mueller--Hinton agar and dextrose agar were distributed to sterilized Petri dishes with a diameter of 9 cm.

The filter paper discs (6 mm in diameter) were individually impregnated with10µL and 30µL of the essential oils dissolved in dimethylsulfoxide (DMSO). (Fig 1, Fig 2)

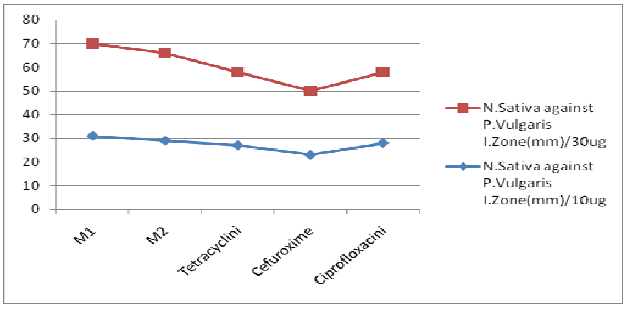
The Petri dishes were kept at 4°C for 2 h. The plates inoculated with bacteria incubated at 37°C for 24 h and at 30 °C for 48 h for the yeasts. The diameters of the inhibition zones were measured in millimetres. Negative controls were set up with equivalent quantities of DMSO. Studies were performed in triplicate. In addition, positive controls antibiotic discs such as Cefuroxime, Ciprofloxacine, Tetracycline and Nystatin were used for comparison.

II. Results And Discussion

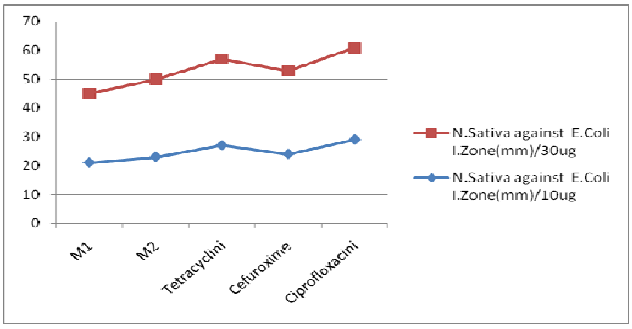
The results of disc diffusion assay are demonstrated on tab I.



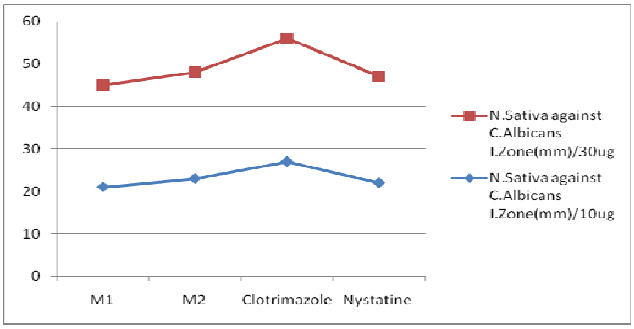
Graph .1 Essential Oils Inhibition Zone and Positive Controls vs / S.Aureus



Graph. 2 Essential Oils Inhibition Zone and Positive Controls vs /P.Vulgaris



Gragh .3 Essential Oils Inhibition Zone and Positive Controls vs /E.Coli



Graph .4 Essential Oils Inhibition Zone and Positive Controls vs /C.Albicans

Fig .2 Essential Oils Inhibition Zone And Positive Controls Vs /C.Albicans

III. Discussion

Nigella Sativa essential oils are more sensible against gram positive bacteria. **(** Graph 1) then those gram - negative ones. (Graph 2,3)

Nigella Sativa essential oil have stronger antibacterial properties compare to Cefuroxime, Tetracycline, **(** graph 1,2) and about the same strength compare to **(** graph 3) Ciprofloxacine and antifungal properties compare to Clomatrizol. **(** Graph 4)

Nigella Sativa essential oils with high concentration of (30 ug) carvacrol and thymol are more sensible against bacterias then those with lower concentrations (10 ug) maybe because they are responsible of the antibacterial activity. **(** Graph 1,2,3,4 and fig 1,2)

Nigella Sativa essential oils Methanol extracts have more antibacterial and antifungal properties than etheric ones.

IV. Conclusion

It may be concluded from this study that N. sativa seed extract has antimicrobial activity against Staphylococcus Aerus, Proteus Vulgaris, Escherichia Coli, Candida Albicans. It is expected that using natural products as therapeutic agents will probably not elicit resistance in microorganisms.It is essential that research should continueto isolate and purify the active components of this natural herb and use in experimental animals.

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TABLE I BACTERIAS AND FUNGI MEAN OF IHIBITION ZONE OF ETHER AND METHANOLIC EXTRACTS

Bacteria and Fungi	Ether extracts mean inhibition zone (mm)	Methanolic extracts mean inhibition zone. (mm)
Staphylococcus Aerus ATCC 29737 Lot 58312397	37±0.1	38±0.3
Proteus Vulgaris, ATCC 1978 Lot 0876523C	31±0.8	29±0.6
Escherichia Coli, ATTC 8456 LOT 6543109	21±0.7	23±0.4
Candida Albicans, ATCC 2091 Lot 7051869	21±0.5	24±0.8