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Comparative study on antimicrobial activity of tulsi (*Ocimum sanctum*) and neem (*Azadirachta indica*) methanal extract

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Abstract- This study was focussed on to compare the antimicrobial activity of methanolic leaf extracts of Tulsi and Neem. I chase Tulsi and Neem to compare their antimicrobial activity toward Gram-Positive (*Staphylococcus aureus*) and Gram-negative (*Escherichia coli*) bacteria. Nutrient agar plates were inoculated with the above mentioned microorganisms by spreading bacterial inoculum on the surface of the media. Wells (6mm in diameter) were punched in the agar. The phytochemical extracts of Neem and Tulsi were allowed to diffuse into the medium and after incubation of 24h at 37°C, the zones of inhibition were observed. Statistical analysis showed that Tulsi was more effective toward *E. coli.*

Key words: Zone of inhibition, Antimicrobial activity, *O. sanctum, A. indica, E. coli, S. aureus,*

INTRODUCTION

Azadirachta indica is commonly known as Neem. Neem is a member of the Meliaceae family. It possesses many constituents that are of great importance for the treatment of various diseases, and the constituents also modulate the genetic pathways or metabolic activities of the host body.[1] Neem is widely used in the field of Pharmaceuticals, Agriculture, as Fertilizer, etc, due to the presence of biologically important phytochemicals.[2]

Ocimum sanctum, commonly known as Tulsi has been used since ages in Ayurveda due to its healing property. It is a member of family Lamiaceae. Due to its powerful savor, it is regarded as the elixir in Ayurveda and believed to promote lifespan.[3] Tulsi has been effective in improving the liquid profile and basal metabolic rate.[4] The extract of Tulsi is commonly known for the treatment of Cold, Headache, Stomach disorders, etc.[5] *O. sanctum* extract shows anticancer activity by decreasing cell proliferation, increasing reactive Oxygen species, and by altering mitochondrial membrane potential.[6] Since ages dried leaves of Tulsi have been used for repealing insects in grains.

Escherichia coli, Gram-negative bacteria, is the major cause of diarrheal diseases, peritonitis, colitis, and infant mortality.[7] *E. coli* acquires its pathogenicity through virulence factors.[8] *E. coli* responsible for urinary tract infection has become resistant to the drug that has been used to cure it, so need of new and plant extract as a medicine is increasing several folds. *Staphylococcus aureus,* which is a Gram-Positive bacteria, can cause life threatening diseases, such as sepsis, endocarditis, and pneumonia. *S. aureus* is considered notorious due to its ability to become drug resistant and resistant to antibiotics such as penicillin and methicillin.

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MATERIALS & METHODS

Plant Leaf Collection

The leaves of *A. indica* (Neem) and *O. sanctum* were collected. Leaves were manually separated, cleaned, and air-dried for 4-5 days. Subsequently, the leaves were pulverized to a coarse powder through mortar and pestle. Approximately 50 g power of both the leaves was weighted and stored in an airtight bottle.[9]

Preparation of extracts

Although 250 ml. of methanol was added in a separate conical flask with 50 g of each leaves power to make a stock solution of 0.2g/ml, 0.3g/ml, 0.4g/ml, 0.5g/ml, 0.6g/ml and 0.7g/ml was prepared n the basis of the formula C1V1=C2V2.

Where,

C1= Concentration of Stack Solution,

C2= Final Concentration of a new Solution.

V1= Volume of Stack Solution.

V2= Final Volume of new Solution.

Test Organisms:

Two bacterial cultures were used to evaluate the antimicrobial activity, *E. coli* and *S. aureus.*

Antimicrobial Activity Test:

Nutrient agar plates were inoculated with the above mentioned microorganisms by spreading the bacterial inoculum on the surface of the media (Spread plates technique), Wells (6mm in diameter) were punched in the agar.[10] 50 ml. extract of Neem, Tulsi of each concentration is allowed to diffuse out into the agar medium in separate petridishes, after incubation of 24h at 37°C, the zones of inhibition were observed uniformly circular as there was a confluent down of growth. Moreover, finally, the diameter of the zone of inhibition (ZOI) was measured in millimeters by vernier scale.[11]

RESULT & DISCUSSION

The quantitative assessment for antimicrobial activity of the extracts was performed by measuring the diameter of ZOI at six different concentrations such as 0.2g/ml, 0.3g/ml, 0.4g/ml, 0.5g/ml, 0.6g/ml and 0.7g/ml method extract of both the Neem and Tulsi.

ZOI has been taken as absolute values neglecting I 0.2 mm of standard error.

ZOI for *S. aureus*

With Neem for the above discussed concentrations, 4mm, 7mm, 8mm. 8mm, 10mm and 12mm diameter, ZOI has been observed. In Tulsi for 0.2g/ml and 0.3g/ml concentrations, n ZOI was observed, whereas for other concentrations, 4mm, 12mm, 17mm and 20mm diameter ZOI was observed.

Table 1- Neem methanolic leaf extracts at various concentrations (0.2g/ml – 0.7g/ml) and their particular ZOI for *S. aureus*

Concentration (Neem) (g/ml)	ZOI (*S.aureus*) (mm)
0.2	4
0.3	7
0.4	8
0.5	8
0.6	10
0.7	12

Table 2- Tulsi methanolic leaf extracts at various concentrations (0.2g/ml - 0.7g/ml) and their particular ZOI for *S. aureus*

Concentration (Tulsi) (g/ml)	ZOI (*S.aureus*) (mm)
0.2	0
0.3	0
0.4	4
0.5	12
0.6	14
0.7	20

Table 3- Neem methanolic leaf extracts at various concentrations (0.2g/ml - 0.7g/ml) and their particular ZOI for *E. coli*

Concentration (Neem) (g/ml)	ZOI (*E.coli*) (mm)
0.2	2
0.3	5
0.4	8
0.5	12
0.6	16
0.7	18

Table 4- Tulsi methanolic leaf extracts at various concentrations (0.2g/ml - 0.7g/ml) and their particular ZOI for *E. coli*

Concentration (Neem) (g/ml)	ZOI (*E. coli*) (mm)
0.2	0
0.3	0
0.4	6
0.5	12
0.6	14
0.7	20

ZOI for E. coli:

For the discussed concentration of Neem, 2mm, 5mm, 8mm, 12mm, 16mm and 18mm ZOI has been observed, respectively. In Tulsi for 0.2g/ml and 0.3g/ml concentrations, no ZOI has been observed. Whereas, for other concentrations i.e. 6mm, 12mm, 14mm, and 20mm diameter ZOI has been observed.

CONCLUSION

The leaf extract of both *A. indica* and *O. sanctum* has shown antimicrobial activity against *E. coli* and *S. aureus*. The methanolic leaf extract of *A. indica* has greater antimicrobial activity against *S. aureus,* whereas the O. *sanctum* was found to be more effective against *E. coli.*

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