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ANTIMICROBIAL EFFICACY OF METHANOLIC EXTRACT OF WHOLE PLANT OF *NELUMBO NUCIFERA* GAERTN.

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ABSTRACT

The aim of the present investigation was to evaluate the antimicrobial efficacy of methanolic extract of whole plant of *Nelumbo nucifera* Gaertn. The methanolic extract of *Nelumbo nucifera* were tested for antibacterial efficacy against three gram positive bacteria & three gram negative bacteria and antifungal activity against three fungal strains by disc diffusion method. In present study Ciprofloxacin 100 mcg/ml (antibacterial) and Ketakonazole 100 mcg/ml (antifungal) used as a reference standard. The methanolic extract of *Nelumbo nucifera* at the concentration of 150mcg/ml were found significant antimicrobial activity against the entire organism was tested. This study scientifically supports the usage of whole plant as a remedy for various superficial bacterial and fungal infections in traditional medicine.

INTRODUCTION: The number of multi-drug resistant microbial strains and the appearance of strains with reduced susceptibility to antibiotics are continuously increasing. This increase has been attributed to indiscriminate use of broad-spectrum antibiotics, immunosuppressive agent, intravenous catheters, organ transplantation and ongoing epidemics of HIV infection [1, 2, 3, 4]. In addition, in developing countries, synthetic drugs are not only expensive and inadequate for the treatment of diseases but also often with adulterations and side effects. Therefore, there is need to search new infection-fighting strategies to control microbial infections [5]. The search for compounds with antimicrobial activity has gained increasing importance in recent times, due to growing worldwide concern about the alarming increase in the rate of infection by antibiotic-resistance microorganisms [6]. Recently, Multiple drug resistance has developed due to indiscriminate use of commercial antimicrobial drugs commonly used in the treatment of infectious diseases [7] making it a global growing-problem.

Nelumbo nucifera Gaertn (Family Nymphaeaceae) commonly known as "Padma" (Bengali), "Kanwal" (Hindi) and "Pankaj" (Sanskrit) is an aquatic herb with stout creeping yellowish white coloured rhizome [8]. It has reported that rhizome extract showed anti-diabetic and anti-inflammatory effects [9], stalks extract showed anti-pyretic effect [10] leaves and stamens extracts showed anti-oxidant effect [11, 12] and seeds extract showed hepatoprotective and free radical scavenging effects [13]. The leaf of *Nelumbo nucifera* is bitter, sweet and neutral. It is aromatic and blue-green in colour. It is best for cleaning heat, resolving summer heat and stop bleeding [14].

However, information pertaining to the systematic studies on the antimicrobial properties of methanolic extract of whole plant of *Nelumbo nucifera* Gaertn is lacking. In view of the above fact, in the present study the possible to evaluate the antimicrobial efficacy of methanolic extract of whole plant of *Nelumbo nucifera* Gaertn.

MATERIAL AND METHODS:

Plant materials: The whole plant of *Nelumbo nucifera*, were collected from Ranipet in Vellore District of Tamil Nadu, India. Taxonomic identification was made from botanist Mrs.Sasikala Ethirajulu, Asst.Director (pharmacognosy), Siddha Central Research Institute, Arumbakkam, Chennai. The whole plant of *Nelumbo nucifera,* were dried under shade, segregated, pulverized by a mechanical grinder and passed through a 40 mesh sieve.

Preparation of Extracts: The above powered materials were successively extracted with methanol by hot continuous percolation method in Soxhlet[15] apparatus. The extract were concentrated by using a rotary evaporator and subjected to freeze drying in a lyophilizer till dry powder was obtained.

Microorganisms Used: The following microbial strains were obtained from Institute of Microbiology, Madras Medical College, Chennai. Stapylicoccus aureus ATCC NO 6538P,Bacilllus aureus ATCC NO 11778, Micrococcus luteus ATCC NO 9341, Escherichia coli ATCC NO 25922, Pseusomonas aeruginosa ATCC NO 9027, Klebsiella pneumonia ATCC NO 29665, Candida albicans ATCC 2091, Aspergillus niger ATCC 9029, Aspergillus fumigates ATCC 46645.

Evaluation of Antimicrobial Activity:

Disc Diffusion Method: A suspension of the organism was added to sterile nutrient agar medium at 45°C. The mixture was transferred to sterile petridishes and allowed to solidify sterile disc (5mm)in diameter (made from Whatmann filter paper previously sterilized in UV-lamp) was

dipped in solution of different concentrations of compounds standards (Ciprofloxacin-antibacterial and Ketakonazole- antifungal) and a blank were placed on the surface of agar plate. Leave the plates to stand for 4hrs at room temperature as a period of preincubation diffusion to minimize the effects of variation in time between the applications of the different solutions. Then the plates were incubated for 37±1°C and observed for antimicrobial activity. The diameter of zone of inhibition was observed and recorded in table.

RESULT AND DISCUSSION: Antimicrobial activity of methanolic extract of *Nelumbo nucifera* was investigated on nine clinical isolates and standard strains by agar well diffusion assay. The disc diffusion method for antimicrobial activity showed significant reduction in microbial growth in terms of zone of inhibition around the disc. **Fig. 1 & 2** was illustrated the antibacterial activity of methanolic extract of *Nelumbo nucifera.* The methanolic extract of *Nelumbo nucifera* at the concentration of 150mcg/ml was found significant antibacterial activity when compared with standard drug Ciprofloxacin (100mcg/ml).

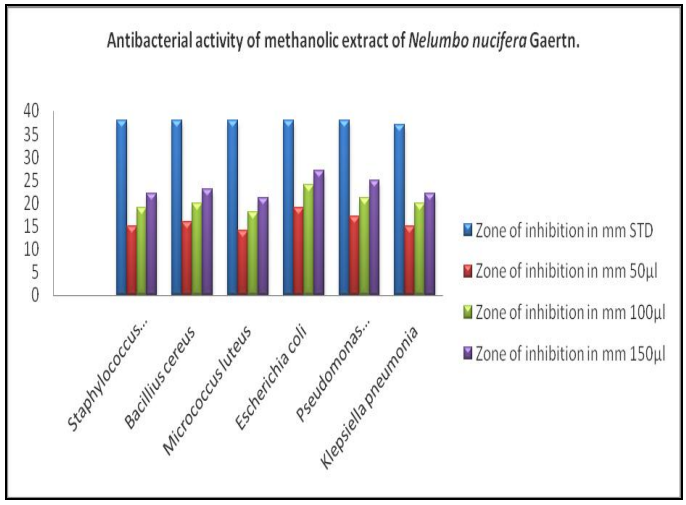
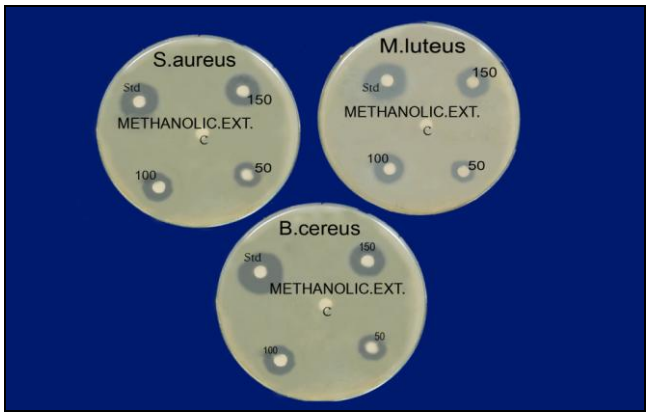
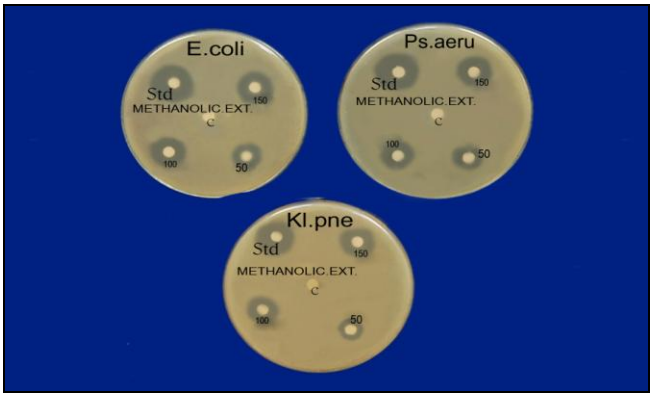


FIG 1: ANTIBACTERIAL ACTIVITY OF METHANOLIC EXTRACTS OF *NELUMBO NUCIFERA* GAERTN.



(GRAM POSITIVE BACTERIA)



(GRAM NEGATIVE BACTERIA)

Table 1 was summarized the antifungal effect of methanolic extract of *Nelumbo nucifera* and Standard drug (Ketakonazole). The significant antifungal activity of methanolic extract of *Nelumbo nucifera* was found at the concentration of 150mcg/ml. The zone of inhibition increased on increasing the concentration of extract in disc. It was showed the concentration dependent activity.

The active principles of *Nelumbo nucifera* are responsible for antibacterial activity. Hence it can be concluded that the methanolic extract of *Nelumbo nucifera* possess a powerful antimicrobial action against the entire organism were tested. This also stands as a scientific support for the usage of this plant for treating Fever and in traditional medicine.

TABLE 1: ANTIFUNGAL ACTIVITY OF METHANOLIC WHOLE PLANT OF *NELUMBO NUCIFERA* GAERTN.

Test microorganism	Zone of inhibition in mm			
	50mg/ml	100mcg/ml	150mcg/ml	Std(100mcg/ml)
Aspergillus niger	16	24	35	40
Aspergillus fumigates	19	25	32	40
Candida albicans	16	23	29	38

CONCLUSION: The results of the above study revealed that the methanolic extract of *Nelumbo nucifera* was exhibit antimicrobial activity at the concentration of 150mcg/ml which might be helpful in preventing the progress of various diseases and can be used in alternative system of medicine. Further, these findings could be used to develop suitable dosage forms such as cream, ointment, and lotion as per the requirement of the treatment.

REFERENCES:

1. Graybill, J. R. Systemic fungal infections: diagnosis and treatment. I. Therapeutic agents. Infectious Disease Clinics of North America 1988, 805-825.
2. Ng, P. C. Systemic fungal infections in neonates. Arch Dis of Childhood 1994, 71: F130-F135.
3. Dean, D. A. and Burchard, K. W. Fungal infection in surgical patients. Am J Surg 1996, 171: 374-382.
4. Gonzalez, C. E., Venzon, D., Lee, S., Mueller, B. U., Pizzo, P. A and Walsh, T. J. (1996). Risk factors for fungemia in children infected with human immunodeficiency virus: a case-control study. Clin Infect Dis. 23: 515-521.
5. Sieradzki K, Wu SW and Tomasz A. (1999). Inactivation of the methicillin resistance gene mecA in vancomycin-resistant *Staphylococcus aureus*. Micro. Drug Resist. 5(4): 253-257.
6. Davis, P. H. Flora of Turkey and East Eagean Island, Edinburg. Edinburg University Press. 1982; 7: 947.
7. Service RF. Antibiotics that resist resistance. Science 1995, 270: 724-727.
8. Raghunathan K, Mitra R. Pharmacognosy of indigenous drugs: Central Council for Research in Ayurveda and Siddha, India 1982:806-33.
9. Mukherjee, P.K., Saha, K., Saha, B.P. Effect of *Nelumbo nucifera* rhizome extract on blood sugar level in rats. Journal of Ethnopharmacology 1997, 58: 207-213.
10. Shinha, S., Mukherjee, P.K., Mukherjee, K., Pal, M., Mandal, S.C., Saha, B.P. Evaluation of antipyretic potential of *Nelumbo nucifera* stalk extract. Phytotherapy Research 2000, 14: 272-274.
11. Jung, H.A., Kim, J.E., Chung, H.Y., Choi, J.S. Antioxidant principles of *Nelumbo nucifera* stamens. Archives of Pharmacal Research 2003, 26: 279-285.
12. Wu, M.J., Wang, L., Weng, C.Y., Yen, J.H. Antioxidant activity of methanol extract of the lotus leaf (*Nelumbo nucifera* Gertn.). American Journal of Chinese Medicine 2003, 31: 687–698.
13. Sohn, D.H., Kim, Y.C., Oh, S.H., Park, E.J., Li, X., Lee, B.H., 2003. Hepatoprotective and free radical scavenging effects of *Nelumbo nucifera*. Phytomedicine 2003, 10: 165–169.
14. Bensky, D., Clavey, S., Stoger, E. (Eds.). Materia Medica, third ed. Eastland Press Inc., USA, 2004. 193–194.
15. Harborne J.B. Phytochemical methods 11 Edn. In Chapman &, Hall. New York 1984: 4-5.

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