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ANTIMICROBIAL ACTIVITY OF *NELUMBO NUCIFERA* LEAVES

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ABSTRACT

Medicinal plants assume a fundamental part in the disclosure of novel medicine used in current cure. The plants like *Nelumbo nucifera* (lotus) have broad scope of therapeutic Properties. Be that as it may, there are no evidences on *Nelumbo nucifera* leaves for hostile to microbial exploration. The target of present exploration views choose whether or not *Nelumbo nucifera* leaves have any antimicrobial legitimacies. The leaves of *Nelumbo nucifera* is extricated utilizing distinctive solvents along with ethanol, by means of numerous extraction techniques. The antimicrobial susceptibility studies carried out against gram (-) bacteria which includes E. Coli, *K. Pneumoniae* and *P. Aeruginosa* and gram (+) bacteria along with *S. auresa* and *S. Pyogene*. Among the examined extracts, ethanolic extract indicates top anti microbial interest.

Keywords: *Nelumbo Nucifera*, Antimicrobial, Alkoloids, Tannins, Modern Medicine.

INTRODUCTION:

Numerous typical vegetations apparent in the Kitchen nurseries or inside the compound or in the backwoods are used by the ancestral as medication medicines. The goals of the current examination are to report the counter microbial leisure activity of the medicinal plant *Nelumbo nucifera* (circle of family members - Nelumbonaceae) **[1]**. Among the normal cure, lotus leave is one of the blossoms which have a few restorative homes in it. The lotus kind which utilized in this examination is known as hallowed lotus *(N. nucifera),* extremely neighborhood to Asian, it's normally cultivated and widely

used in Chinese remedy **[2]**. The reason for this study is to decide that the extract of the lotus leaf have any antimicrobial **[3]** potential. There are numerous strategies to treat or mend the affliction. One of the evidence based belief of people that by utilizing and treating with medicine, that are gotten from plants and are ordinarily known detached from perspective impact, poisonousness influence and are generally excellent worth. The vast majority of the people don't know about such insights regarding Nelumbo nucifera. There is a thought that plants have intensifies which incorporate glycosides, carbohydrates, alkoloids, tannins, saponins, and flavonoids in them **[4]**.

Consequently to show the presence of these constituents inside the *N. nucifera* leaves, the pharmacognostic tests can be executed on the plant, to perceive whether the constituent are present inside the leaves of the plant **[5]**. This exploration furthermore assists with finding new type of medication for the impending unreasonable afflictions including microbial contamination comprehensive of tuberculosis **[6]**, diabetics, hypertension **[7]** and inflammatory issues and others. The active components from the lotus leaf are additional natural and considerably less chemical so it comprises significantly less poisonous, perspective outcomes and secure in contrast with synthetic medication. This new revelation of lotus leaf item will make center with respect to the addition of the lotus leaf use. This therapeutic medication appropriately endured by means of patients, with less unexpected outcomes than synthetic pills since it substantially less noxious and viewpoint impacts.

MATERIALS AND METHODS:

Collection and drying of plant materials:

Neoteric plant materials (leaves) were gathered from Sumera Talab of Lalitpur. The leaves of *Nelumbo nucifera* which floats on water were washed to eliminate soil garbage and mill into little pieces and dried for a long time at room temperature (25^0C to 30^0C).

Micronization and storage:

The dried leaves of *Nelumbo nucifera* were additionally diminished into little pieces and afterward pummeled into stringy powder utilizing clean electric blender. The dried plant materials ought to be set in plastic compartment or firmly closed bottles; earthy colored shaded bottles are liked as they limit crumbling due to sunlight **[8]**.

Preparation of plant extracts:

Ethanolic extraction of the air-dried and powdered leaves (200g) of plants material was completed by suspending 200 grams of the powder with *Nelumbo nucifera* in around

500ml of 95% ethanol and extraction was permitted to represent 72 hours at 27ºC±1ºC. The concentrates were separated through Whatman filter paper No.1, extricates were vanished to paste at 45ºC **[9]**. They were moved into sterile containers and kept in fridge until utilized.

Antimicrobial susceptibility testing:

Antibacterial action was resolved utilizing agar diffusion strategy for Boakye-yiadon. Five millimeter (ml) dics containing 1000µg/ml and 1500µg/ml of extracts were put on refined pathogenic microscopic organisms on agar plates and incubated at 37°C. The plates were checked for bacterial development following at least 18 hours and once in a while till 24 hours **[10]**. The breadth of the zone of inhibition was then estimated. Business plate of Chloramphenicol (30µg) was utilized as positive control (standard) and examination was done threefold for each extract.

Determination of Minimum Inhibitory Concentration (MIC):

MICs are thought of as the "highest quality level" for deciding the susceptibility of the living beings to antimicrobials. MIC of anti-microbials was assessed (threefold) utilizing standard micro broth dilution strategy against *Escherichia coli* **[11]** (gram negative) and *Staphylococcus aureus* (gram positive) Organisms **[12]**.

RESULTS AND DISCUSSION:

The *in vitro* antimicrobial activity of ethanolic extract of *N. nucifera* leaves against the microorganisms **[13]** employed was assessed qualitatively and quantitatively by the presence or absence of inhibition zones and zone diameters. The ethanolic extract of *N. nucifera* showed *in vitro* antimicrobial activities against tested microorganisms (*S. aureus* **[14]**, *S. pyogenes* **[15]**, *E. coli*, *K. pneumoniae* and *P. aeruginosa* **[16]**. In this study, the antimicrobial activities of ethanol extract were compared with standard streptomycin **[17]** and this was used as positive control. Results from the antimicrobial disc diffusion assays were shown in Tables 2 and 3. The data indicated that *S. aureus, Streptococcus spp* and *E. coli* were the most sensitive bacteria tested to the ethanolic extracts of *N. nucifera* with the highest inhibition zone of 25, 20 and 25 mm respectively. The *P. aureginosa* and *K. pneumoniae* were also found to be sensitive with the highest inhibition zones of 15 mm respectively. The ethanolic extracts of *N. nucifera* also showed excellent activity against tested gram-positive bacteria. *E. coli* was the most sensitive organism among gram-negative bacteria with the inhibition

zone of 25 mm which was even more than that of standard streptomycin which was 20 mm. From the results obtained it was apparent that the ethanolic extract of *N. nucifera* at 40 mg/ml concentration was the most effective as widest inhibitory zone were observed compared to other concentrations used. Phytochemical screening of ethanolic extract of *N. nucifera* shows the presence of flavonoids **[18]**, anthraquinones, cardiac glycosides **[19]**, saponins, tannins, alkaloids, and phenolics. Antimicrobial activity of *N. nucifera* against gram-positive bacteria isolate **(Table 2).**

Antimicrobial activity of *N. nucifera* against gram-negative bacteria isolates **(Table 3)**.

Table 1: Phytochemical analysis of the ethanol extracts of *N. nucifera* leaves

Plants constituents	Tests used	Occurrence
Flavonoid	General test	++
Alkaloids	Drangendorff s	+++
Phenolics	Frothing test	++
Saponins	General test	+
Tannins	General test	+
Anthruquinones	General test	+++
Cardiac glycoside	Leberman s test	+++

Keys: + = Present in small concentrations
++ = Present in moderately high concentrations
+ + + = Present in high concentrations

Table 2: Antimicrobial activity of *N. nucifera* against gram-positive bacteria isolate

Bacteria	Mean Zone of inhibition (MM)± *N. Nucifera*				Streptomycin
	10mg/ml	20mg/ml	30mg/ml	40mg/ml	15µg/ml
S. *aureus*	9 ± 1.0	12 ± 2.0	20 ± 2.5	25 ± 10	20 ± 2.0
S. pyogenes	8	10	13	15	25 ± 2.0

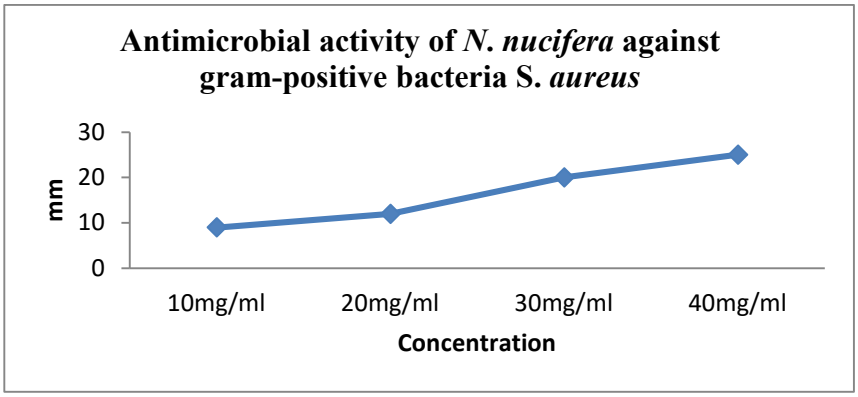

Figure 1: Antimicrobial activity of *N. nucifera* against gram-positive bacteria *S. aureus*

Figure 2: Antimicrobial activity of *N. nucifera* against gram-positive bacteria *S. aureus*

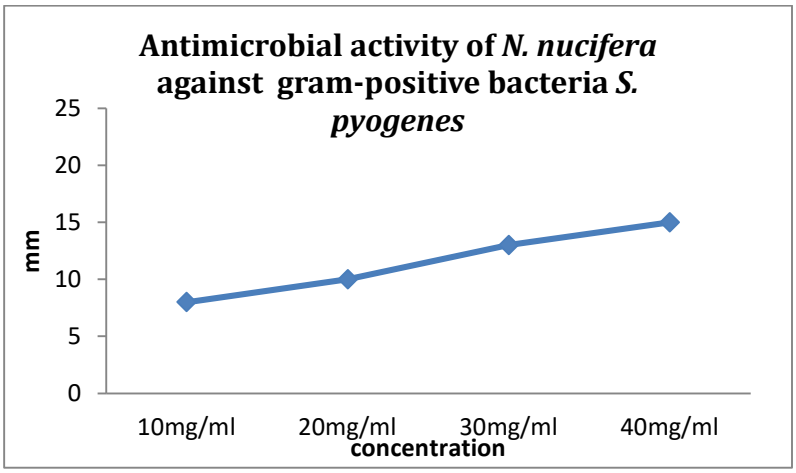

Figure 3: Antimicrobial activity of *N. nucifera* against gram-positive bacteria *S. pyogenes*

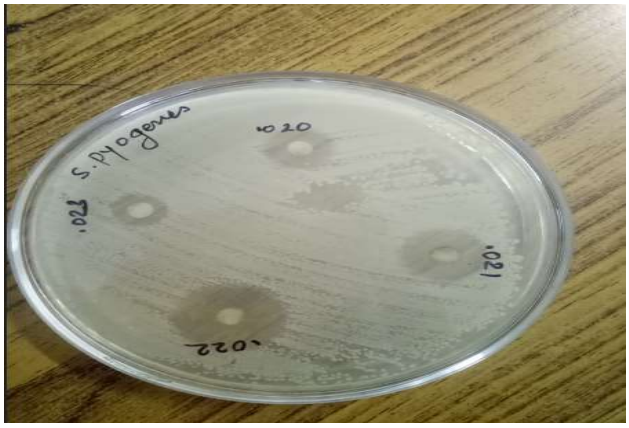

Figure 4: Antimicrobial activity of *N. nucifera* against gram-positive bacteria *S. pyogenes*

Table 3: Antimicrobial activity of *N. nucifera* against gram-negative bacteria isolates

Bacteria	Mean Zone of inhibition (MM) ±SD *N. nucifera*				Streptomycin 15µm/ml
	10mg/ml	20mg/ml	30mg/ml	40mg/ml	
E. coli	7 ±1 0	9 ± 1.0	14 ± 1.5	20 ± 2.5	22 ±2.5
K. pneumoniae	-	7 ± 0.5	15 ± 1.0	13 ± 0.5	20 ± 0.5
P. aureginosa	8.0 ± 1.0	8.0±1.5	12 ± 1.0	15 ± 1.5	18 ± 1.5

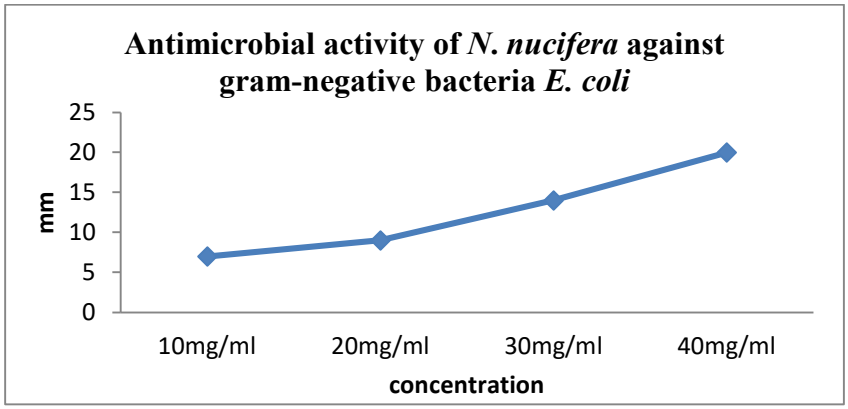

Figure 5: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *E. coli*

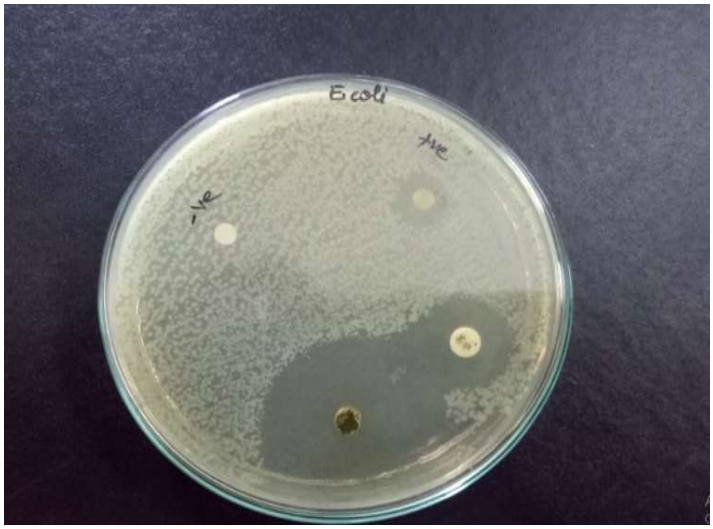

Figure 6: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *E. coli*

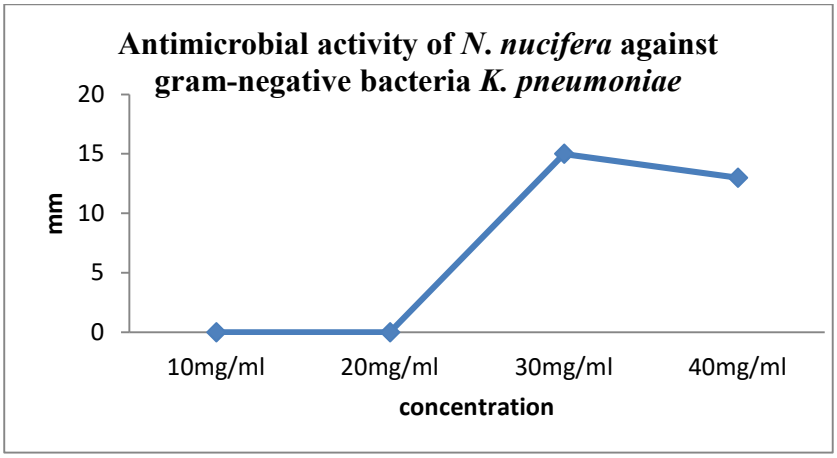

Figure 7: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *K. pneumonia*

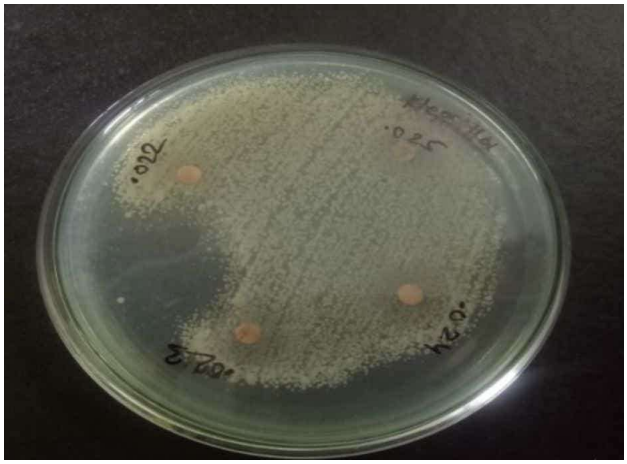

Figure 8: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *K. pneumonia*

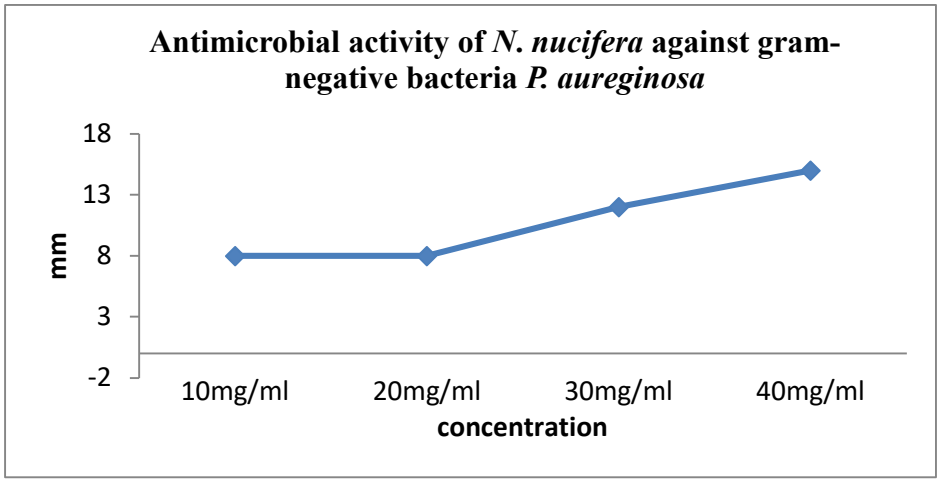

Figure 9: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *P. aureginosa*

Figure 10: Antimicrobial activity of *N. nucifera* against gram-negative bacteria *P. aureginosa*

CONCLUSION:

N. nucifera is involved by provincial and ancestral populace in our country for different issues like loose bowels, diarrhea, sinusitis, migraine, tonsil and so on the show of antimicrobial action of this plant against

both gram-negative and gram positive microorganisms meant that the plant is an expected hotspot for creation of medications with a wide range of action and this additionally upholds the conventional use of the plant and recommends that the plant extricates have compounds with antibacterial properties that can be utilized as antibacterial specialists in original medications for the treatment of wound diseases.

Conflict of interest: All the authors declared that there is no any conflict of interest.

REFERANCE:

[1] Brindha D, Arthi D, Antimicrobial activity of white and pink *nelumbo nucifera* gaertn flowers jphrc, 2010, 2, 147-155

[2] Zhao Ya-Nan, Ya-Fei Cao, Yan-Hong Zhang, Ye Lu, Xin Ping, Shao-Kun Qin, Shu-Ning Liu, Li Chu, Guo-Qiang Sun, Lin Pe, Nelumbo nucifera Gaertn Stems (Hegeng) Improved Depression Behavior in CUMS Mice by Regulating NCAM and GAP-43 Expression, Evidence-Based Complementary and Alternative Medicine, Volume 2020, https://doi.org/10.1155/2020/3056954

[3] Sundaramoorthy S, Gunasekaran S, Anitha U, Arunachalam S, Sathiavelu M, Endophytes for Antimicrobial Activity- A Review. Research J. Pharm. and Tech. 2015; 8(6), 742-748.

[4] Bishayee A, Patel PA, Sharma P, Thoutireddy S, Das N, Lotus (Nelumbo nucifera Gaertn.) and Its Bioactive Phytocompounds: A Tribute to Cancer Prevention and Intervention. Cancers 2022, 14, 529. https://doi.org/10.3390/cancers 14030529

[5] Ushimaru T, Silva G, Antibacterial activity of common plants against different bacterial strains, Food Chem., 2007, 29, 275-283

[6] Ratnikova IA, Sadanov AK, Gavrilova NN, Orazymbet SE, Kaptagai R Z, Selection of Medicinal Plants Suppressing Growth of Multidrug-Resistant Strain of Tuberculosis Causative Agent, Research Journal of Pharmacy and Technology. 2021; 14(4):2115-8.

[7] Chitra SM, Anbu N, Uma KS, Antihypertensive activity of Polyherbal Siddha Formulation Veppampoo Mathirai – A Review, Research Journal of Pharmacy and Technology. 2022; 15(3):1365-0.

[8] Rogger Y, Stanier L, Mark L, Assessment of antimicrobial and

antifungal activity of common medicinal plants, International Journal of Pharmacology, 2000, 3(6), 499-504.

[9] Ravindra T, Russel H, Willams T, Antifungal activity of methanolic extract of C*apparis pepiaria* against the tested fungal strains. J. Ethanopharmacol, 2007 8,109-114.

[10] Bose A, Mondal S, Gupta JK, Ghosh T, A study on antimicrobial activity of *Cleome rutidosperma* DC, Journal of Natural remedies, 2007, 7, 132-134.

[11] Sindhu. TJ, Arathi KN, Akhila D, Aswathi TA, Noushida M, Midhun M, Sajil SK, Synthesis, Molecular Docking and Antibacterial Studies of Novel Azole derivatives as Enoyl ACP Reductase Inhibitor in *Escherichia coli*. Asian J. Res. Pharm. Sci. 2019; 9(3): 174-180.

[12] Liu CP, Tsai WJ, Lin YL, Chen CF, Kuo YC, The extracts from *Nelumbo nucifera* suppress cell cycle progression, cytokine genes expression, and cell proliferation in human peripheral blood mononuclear cells, Life Science, 2004, 75, 699–716.

[13] Ki-Won Lee, Yong-Hwan Kim and Kyung-Ok Shin, In Vitro Antioxidant Activities and Antimicrobial Activity of Lotus (Leaf, Stem, and Seed Pod) Extracts, Korean J. Food Nutr. 2017, Vol. 30. No. 4, 771-779

[14] Haider QR, Ehasn FH, Ahmed HR, Najwan KI, Antibacterial action of Silver Nanoparticles against *Staphylococcus aureus* Isolated from wound infection, Research Journal of Pharmacy and Technology, 2022; 15(6):2413-6.

[15] Priya C, Shrikanth P, Antimicrobial Activity of *Ailanthus triphysa* (dennst.) Alston against some selected Pathogenic Bacteria. Research J. Pharm. and Tech 2018; 11(11): 4921-4923

[16] Amel HM, Majid RZ, Study the effect of Purified Pyoluteorin Produced from *P. aeruginosa*, Isolated from Rhizospheric Plant Wheat on some UTI Bacteria Biofilm Formation. Research J. Pharm. and Tech 2018; 11(12): 5529-5535.

[17] Mohammed KA, Duaa AK, Adnan KS, Saif AM, Combination Effect of Ciprofloxacin and Streptomycin with Cefotaxime against Multi-Drug Resistant *Pseudomonas aeruginosa*

from Different Clinical Samples. Research J. Pharm. and Tech. 2020; 13(9):4403-4408.

[18] Khan NI, Hatapakki BC, Tamboli AM, Isolation and Characterization of Flavonoids of the Ethanolic extracts of stems of *Mimosa hamata* (Willd.) by Chromatographic techniques, Research Journal of Pharmacy and Technology. 2021; 14(9):4602-8.

[19] Raja RR, Haribabu Y, Sajeeth CI, Cardiac Glycosides – The Review of Remedies in congestive heart Failure, Research Journal of Pharmacognosy and Phytochemistry. 2021; 13(4):187-0.