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Antimicrobial activity of Chrysanthemum indicum Plant extract

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ABSTRACT:
The antimicrobial activity of Chrysanthemum indicum (whole plant) extract was tested against pathogenic bacteria like Pseudomonas aeruginous and E.coli and fungi like Aspergillus Niger and Candida at a dose of 1:20 mg/ml and 2:40 mg/ml by using cup plate diffusion method. Varioussolvents such as organic solvents(methanol, ethanol) and inorganic solvents (water) were used for extracts. The results reveal that ethanolic extract at a dose of 20 mg/ml has shown significant activity against E.coli and Pseudomonas aeruginouswhereas, in fungi, the methanolic extract showed significant activity against Aspergillus Niger and Candida. Both the methanolic and ethanolic extracts have significant effects on the inhibitory zone but the aqueous extract has the less inhibitory zone. The zone of inhibition was measured and compared with standard Streptomycin, Fluconazole (1 mg/ml). However, in none of the above-mentioned extracts the inhibition zone was not more than that found in standard i.e., Streptomycin, Fluconazole.

KEYWORDS:
Chrysanthemum indicum, antimicrobial activity, Streptomycin, Fluconazole.

I. INTRODUCTION:

Traditional medicine is in practice for many centuries by a substantial proportion of the population of many centuries. It is recognized that in most countries, plants are the main medicinal source to treatvarious infectious diseases. Plant extracts represent a continuous effort to find new compounds against pathogens. Approximately 20% of the plants found in the world have been submitted to the pharmacological or biological test, for particular medicinal uses and anumber ofnew antibiotics are being introduced on the market whichis obtained either from natural or semisynthetic resources Chrysanthemum indicum is a flowering plant commonly called Indian chrysanthemum belongs tothefamily Asteraceae and genus Chrysanthemum Chrysanthe mumindicum grows up to 0.6 m (24 in) by 0.6 m (24 in). It usually blooms from the month of August to October. It must be grown outside under sunlight with moist soil. They normally have yellow or white flowers with yellow pollen. As Moul says, it is suitable for light (sandy), medium (loamy), and heavy (clay) soils. Suitable pH: acid, neutral, and basic (alkaline) soils.Chrysanthemum indicum is a plant of the temperate zone but it can be grown successfully outside the area such as in tropical areas as it is often cultivated in Southeast Asia with moist soil (pH around 6.5) in sunny weather. It can handle temperatures down to −10 °C (14 °F). Seeds can be sowed between the ranges of August to October. It usually starts to grow in 10 to 18 days at 15 °C (59 °F).

II. MATERIALS AND METHODS:

Collection of Plant material:

The plant Chrysanthemum indicum was collected in and around the Chembrambakkam. This plant was basically authenticated in the department of botany, THE TAMILNADU Dr.MGR MEDICAL UNIVERSITY.

ExtractionofPlantMaterial:

The whole plant of Chrysanthemum indium was air-dried and crushed to a small piece using Mortar and Pestle and powdered in an electric grinder. The powdered plant material was subjected to successive soxhlet extraction by using the solvent methanol, ethanol,and Distilled water. The extracts were concentrated to dryness.

Preparation of the Extract:

The plant material was shade dried, powdered, and subjected to Soxhlet extraction (1kg) with solvents. The extracts were concentrated to dryness in a flask evaporator under reduced pressure and controlled temperature. All the extracts were prepared in Tween-80 (1%) Suspended in distilled water. The plant extracts were prepared by using soxhlet apparatus collected and stored in air-tight containers for further purposes.

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Disc Preparation:

The 6mm (diameter) discs were prepared from Whatman No. 1 filter Paper the discs were sterilized by autoclave at 12°C. After the sterilization, the moisture discs were dried ina hot air oven at 50°C.Then various solvent extract discs and control discs were prepared.

Antimicrobial Activity of Chrysanthemum indicum:

The antimicrobial activity studies were carried out by disc diffusion technique. The sterile nutrient agar plates and potato dextrose agar plates were prepared. The bacterial test organisms like Pseudomonas aeruginosa, and Escherichia coli were spread over the nutrient agar plates by using separate sterile cottonbuds. Then the fungal test organism like Aspergillus niger and Candida were spread over the potato dextrose agar plates After the microbial lawn preparation three different extracts of plant disc were placed on the organism inoculated plates with equal significant differences between the extract used and also distance control discs were also prepared. All bacterial plates were incubated at 27°C for 24 hrs and fungal plates at 24°C for 72hrs. The diameter of the minimum zone of inhibition was measured in mm. For each test, three replicates were performed.

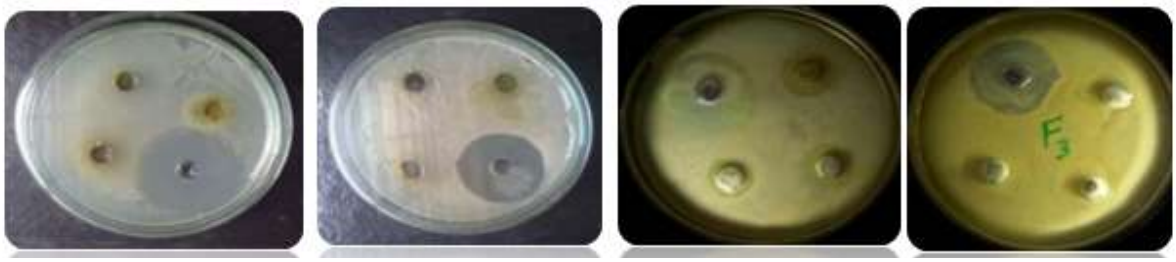
Statistical Analysis:

Data were expressed as mean standard deviation. The data obtained were subjected to an ANOVA test to determine whether there was a significant difference between the extract used and also between the lengths ofincubation.

III. RESULTS:

The present study was carried out on the Chrysanthemum indicum revealed to evaluate the antimicrobial activities of various extracts. The successive extracts usingmethanol, ethanol, and Distilled water ofChrysanthemum indicum were tested for their antimicrobial efficiency against pathogenic bacteria and fungi (Pseudomonas aeruginosa, E.coli,) and fungi like (Aspergillus Niger, Candida) at dose 1: 20mg/ml and 2:40mg/ml. The standard drugs used for comparison were Streptomycin and Fluconazole against bacteria and fungi. Among the extracts tested for their antibacterial activity, theextracts showed moderate to high activity against both gram-positive and gram-negative bacteria. The extracts using methanol, ethanol, and Distilled water of Chrysanthemum indicum showed active antimicrobial activity against Pseudomonas aeruginosa, E.coli, and antifungal activity against Candida and Aspergillus Niger. The methanolic and ethanolic extracts showed the highest inhibition zone at a higher concentration (i.e. 40mg/ml). Overall the organic solvent extracts showed greater inhibition of all pathogenic microorganisms used when compared to aqueous extracts.

The extracts of methanol at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Pseudomonas aeruginosa is 16mm, 21mm and E.coli 14mm, 17mm. The extracts of methanol at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Aspergillus Niger is 19mm, 23mm and Candida 16mm, 20mm. The extracts of ethanol at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Pseudomonas aeruginosa is 20mm, 25mm and E.coli 17mm, 20mm. The extracts of ethanol at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Aspergillus niger is 15mm, 18mm, and Candida 14mm, 17mm. The aqueous extracts at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Pseudomonas aeruginosa is 10mm, 13mm and E.coli 9mm, 11mm. The aqueous extracts at a dose level of 20mg/ml and 40mg/ml showed the inhibition zone of Aspergillus niger is 8mm, 12mm, and Candida 9mm, 14mm.



P. aeruginosa E.coli A.Niger Candida

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		Zone of inhibition in mm			
S:NO	Plant extract.	P.aeruginosa	E.coli	A. niger	Candida
1.	Methanol extract 20mg/ml	16 mm	14mm	19mm	16mm
2.	Methanol extract 40mg/ml	21mm	17mm	23mm	20mm
3.	Ethanol extract 20mg/ml	20 mm	17 mm	15 mm	14 mm
4.	Ethanol extract 40mg/ml	25 mm	20 mm	18 mm	17 mm
5.	Aqueous extract 20mg/ml	10 mm	09mm	08mm	09mm
6.	Aqueous extract 40mg/ml	13 mm	11 mm	12 mm	14 mm
7.	Standard 20mg/ml Streptomycin	26 mm	14mm		
8.	Standard 40mg/ml Streptomycin	29 mm	17mm		
9.	Standard 20mg/ml Fluconazole			17mm	16mm
10.	Standard 40mg/ml Fluconazole			20mm	20mm

IV. DISCUSSION:

In this present study,the organic solvent extracts have shown a high zone of inhibition whereas the inorganic solvent distilled water has shown a minimal zone of inhibition when compared to the zone of inhibition with standard drugs like Streptomycin andfluconazole. The plant extracts have been shown almost equal to the standard drug. The above parameter supports the strong scientific basis for the use of these plants in the traditional treatment of microbial diseases. The antimicrobial activity of the extracts and their potency were quantitatively assessed by the presence or absence of inhibition zone and zone diameter. Only alcoholic extract was found to be a better solvent for the extraction of antimicrobial active substances compared to water. The antimicrobial analysis it was confirmed that these plantextracts showed positive results against bacterial species such as Pseudomonas aeruginosa,Escherichia coli, and fungi Aspergillus niger and candida. Hence, it can beconcluded that plant extracts ofChrysanthemum indicum effectively act as an antimicrobial agent which hasthe ability to replace most of the medium medicines of this era.

V. CONCLUSION:

The present study has revealed the importance of natural products to control antibiotic-resistant bacteria, which have been a threat to human health. It is, therefore highly essential that medicinal plants whose properties have not been fully characterized should form an agenda in developing nations whose citizens are sometimes unable to afford expensive orthodox medicine. This study has revealed the presence of many secondary metabolites in theplant extracts. It hasfurther confirmed that the plant extracts could be used for the treatment of various infections including skin-transmitted infections. The results lend credence to the folkloric use if this plant in treating microbial infection and shows that Chrysanthemum indicum could be exploited for new potent antimicrobial agents.

REFERENCE:

[1]. Al-Hashimi, A. G. (2012). Antioxidant and antibacterial activities of Hibiscus sabdariffa L. extracts. Afr. J. Food Sci. 6, 506–511.

[2]. Altemimi, A., Watson, D. G., Choudhary, R., Dasari, M. R., and Lightfoot, D. A. (2016). Ultrasound-assisted extraction of phenolic compounds from peaches and pumpkins. PLoS One 11:e0148758. doi: 10.1371/journal.pone.0148758.

[3]. Alzoreky, N. S., and Nakahara, K. (2003). Antibacterial activity of extracts from

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some edible plants commonly consumed in Asia. Int. J. Food Microbiol. 80, 223–230. doi: 10.1016/S0168-1605(02)00169-1.

[4]. Field, W., and Hershberg, R. (2015). Alarmingly high segregation frequencies of quinolone resistance alleles within human and animal microbiomes are not explained by direct clinical antibiotic exposure. Genome Biol. Evol. 7, 1743–1757. doi: 10.1093/gbe/evv102.

[5]. Francino, M. P. (2015). Antibiotics and the human gut microbiome: dysbioses and accumulation of resistances. Front. Microbiol. 6:1543. doi: 10.3389/fmicb.2015.01543.

[6]. M. Fayyaz, I. A. Mirza, Z. Ahmed, S. A. Abbasi, A. Hussain, and S. Ali, "In vitro susceptibility of chloramphenicol against methicillin-resistant Staphylococcus aureus," Journal of the College of Physicians and Surgeons—Pakistan: JCPSP, vol. 23, no. 9, pp. 637–640, 2013.

[7]. G. Zengin, M. F. Mahomoodally, M. Y. Paksoy, et al., "Phytochemical characterization and bioactivities of five Apiaceae species: natural sources for novel ingredients," Industrial Crops and Products, vol. 135, pp. 107–121, 2019.

[8]. M. Yusuf, M. M. Al-Oqail, E. S. Al-Sheddr, A. J. Al-Rehaily, and M. A. Rahman, "Diversity of medicinal plants in the flora of Saudi Arabia 3: an inventory of 15 plant families and their conservation management," International Journal of Environment, vol. 3, no. 3, pp. 312–320, 2014.

[9]. M. M. Al Akeel, W. M. Al Ghamdi, S. Al Habib, M. Koshm, and F. Al Otaibi, "Herbal medicines: Saudi population knowledge, attitude, and practice at a glance," Journal of Family Medicine and Primary Care, vol. 7, no. 5, pp. 865–875, 2018.

[10]. E. Bouchouka, A. Djilani, and A. Bekkouche, "Antibacterial and antioxidant activities of three endemic plants from Algerian Sahara," ActaScientiarumPolonorum. TechnologiaAlimentaria, vol. 11, no. 1, pp. 61–65, 2012.