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ANTIMICROBIAL ACTIVITY NUTRITIONAL PROFILE AND QUANTITATIVE STUDY OF DIFFERENT FRACTIONS OF *SENECIO CHRYSANTHEMOIDES*

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ABSTRACT

The in vitro antibacterial and antifungal activities of petroleum ether, chloroform, ethyl acetate, acetone, methanolic, ethanolic and water extracts of *S. chrysanthemoides* were tested against ten bacterial strains and three fungal strains by disc diffusion method. The methanolic extracts of *S. chrysanthemoides* showed significant activity (18 mm) against Klebsiella pneumonia. The medicinal plant contain ash value, (total ash) moisture; crude fat and crude fiber, extractive values were studied fresh part weight.

KEYWORDS: Antibacterial, antifungal, nutritional value.

INTRODUCTION

The side effects and resistance pathogenic micro-organisms build against the antibiotics, muchattention has been paid to extracts and biologically active compounds isolated from plant species used in herbal medicine. Medicinal plants may offer a natural and new source of antibacterial agents for use.[1] *Senecio* species are used in folk medicine for the treatment of wounds and as antiemetic, anti-inflammatory, antimicrobial andvasodilator. The parts mostly used are leaves, stems, flowers,[2] The pyrrolizidine alkaloids (Pas) and the furanoeremophilaneses quiterpenoids are the most important constituents of this genus and thought to be responsiblefor all of pharmacological activities.[5]

The genus *Senecio*, which belongs to the tribe Senecioneae, is the largest and most complex genus in the family of the Asteraceae (Compositae) and includes more than 1500 species with a worldwide distribution.[6] The chemical constituents of the genus *Senecio*include notably sesquiterpenoids, monoterpenoids,[7,8] diterpenoids,[9] triterpenoids,[10] phenolic and flavonoid compounds,[11-16] essential oils[17] and pyrrolizidinealkaloids.[5]

The genus *Senecio*is represented in India by 43 species including *S. chrysanthemoide* which grows endemically in all over india.[18]

In continuation of our phytochemical and antibacterial studies of the himalayan medicinal plants,[19–21] we reporthere the findings of our studies on the characterization of secondary metabolites and evaluation of antimicrobialactivity of *S. chrysanthemoide*. To the best of our knowledge, there are no reports about the chemical content and biological activity of this species

MATERIAL AND METHODS

Plant Material

The aerial parts of *S. chrysanthemoides* were collected in may 2014 (flowering stage) in chopta rudraprayag. The plant was identified by Department of botany Hnbgusrinagargarhwal University. A voucher specimen was deposited at the Botany Department, Hnbgu Srinagar, under the code number 24446.

Preparation of plant Extract

The plant material was separated into its selected parts (bark, leaf, root and fruit) air dried ground to moderately fine powder and Soxhlet extracted with increasing polaritysolvent (Petroleum ether, chloroform, ethyl acetate,acetone, methanolic, ethanolic and water).[22] Each extract was evaporated to dryness underreduce pressure using rotary evaporator. The coarsepowder of fruit bark and root was subjected to successivehot continuous extraction with various solvent each timebefore extracting with next solvent the powdered materialwill be air dried (weight of crude extract 100gm). The various concentrated extracts were stored in air tightcontainer for further studies.

Media

Nutrient broth, Nutrient agar, Muller Hinton agar, Maltextract broth and Sabouraud dextrose agar, Alcohol,Hydrochloric acid, alcohol, and sulphuric acid, Distilledwater etc all product of Himedia Laboratories Mumbai(India) were used in this study.

Bacterial Strains

Ten bacterial strains were used namely Escherichia coli, Klebsiella pneumoniae, Enterobacter gergoviae, salmonella entericatyphim, shigella flexneri, Staphyloccusaureus, staphyloccus epidermidis, streptococcuspyogenes and Bacillus cereus, The bacterial strainswere supplied by the Microbial Type Culture Collectionand Gene Bank, Institute of Microbial Technology, Chandigarh, India. (Customer no. 5671).

Fungal Strains

Three fungal strains were used namely Candida albicans, Aspergillus flavus and Aspergillus parasiticus, The fungal strains were supplied by the Microbial Type Culture Collection and Gene Bank, Institute of Microbial Technology, Chandigarh, India.

Antibacterial assay

The disc diffusion assay methods were used to determine the growth inhibition of bacteria by plant extracts.[23] Diluted bacterial culture (100µl) was spread over nutrient agar plates with a sterile glass L-rod. 10mg/ml and 50mg/ml of the each extracts were applied to each filter paper disc (Whatman No. 1, 5 mm diam.) and allowed to dry before being placed on the agar plate. Each extract was tested in triplicate (3 discs/ plate) and the plates were inoculated at 37°C for 24 h. After incubation, the diameter of inhibition zones was measured with a caliper.

Antifungal assay

The antifungal activity was tested by disc diffusion method.[24,25] The Sabouraud dextrose agar plates were each similarly seeded with each fungal strain The 24 hrs. broth culture of each bacterium and 7 days inoculated fungus culture were used to seed sterile Sabouraud dextrose agar at 45°C respectively and fungal plates were incubated at 25-28°C for 7 days after which diameter of zones of inhibition were measured. Each disc filled with extract

Nutritional and Mineral assay

The number of water molecule is contain % of moisture, Pt. ether and hexane soluble part is called crude fat and the non soluble part of acid- base medium is called crude fibre (cellulose and lignin) and mineral estimated by flame photometry.[26,27]

RESULT AND DISCUSSION

Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the in vitro antimicrobial activity assay.[28] The results of antibacterial, antifungal, nutritional value and phytochemical screening activity, table 1, 2 and 3 reveals that antibacterial, antifungal, nutritional and phytochemical screening activity of bark and fruit explants of *S. chrysanthemoides* was evaluated against ten bacterial and three fungal pathogenic strains.

Table 1: Antibacterial activity of ten bacterial strains against *S. chrysanthemoides* plant extract. Disc size, 5 mm, Inhibitory zone size±1 mm, mm means (millimetres) and – indicate (NIZ) No inhibitory zone.

Bacterial Name	Petroleum ether Extract		Chloroform Extract		Ethyl acetate Extract		Acetone Extract		Methanol Extract		Ethanol Extract		Water extract	
Genus/Species/Subspe.	10 Mg/ml	50 Mg/ml	10 Mg/l	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml
Bacillus cereus	-	-	-	-	-	02	-	06	03	12	-	07	06	15
Escherichia coli	-	-	-	-	-	05	-	-	-	15	-	06	05	12
Klebsiella pneumonia	-	-	-	-	-	03	07	07	-	18	-	09	10	11
Salmonella entericatyphim	-	-	-	-	-	07	07		05	13	-	10	11	10
Staphyloccus aureus	-	-	-	-	-	05	-	02	-	15	-	11	05	08
Staphyloccus epidermidis	-	-	-	-	-	10	-		06	11	-	06	-	09
Streptococcus pyogenes	-	-	-	-	-	09	05	04	-	16	-	09	07	11

Table 2: Fungal activity of three fungal strains against *S. chrysanthemoides* plant extract. Disc size, 5 Mm, Inhibitory zone size ±1 Mm, Mm means (millimetres) and – indicate (NIZ) No inhibitory zone.

Fungal	Petrolium ether extract		Chloroform extract		Ethyl acetate		Acetone extract		Methanol extract		Ethanol extract		Water extract	
Genus/Species/Sub spe.	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml	10 Mg/ml	50 Mg/ml
Candida albicans	-	-	-	-	-	-	-	-	-	**07**	-	**08**	-	-
Aspergillus flavus	-	-	-	-	-	-	-	-	-	**08**	-	**06**	-	-
Aspergillus parasiticus	-	-	-	-	-	-	-	-	-	**07**	-	**07**	-	-

Table 3: Nutritional value of *S. chrysanthemoides*.

Nutrients	Value
Moisture (%)	43.20 ± 0.15
Ash (%)	5.06 ± 0.08
Total nitrogen (%)	0.73 ± 0.07
Total protein (%)	3.06 ± 0.04
Crude fat (%)	3.71 ± 0.25
N (Mg/100gm)	0.73± 0.12
Ca (Mg/100gm)	2.54 ± 0.13
Mg (Mg/100gm)	1.92± 0.15
K (Mg/100gm)	0.58± 0.25
P (Mg/100gm)	0.88 ± 0.20
Crude fibre (%)	21.65 ± 0.09
Carbohydrate	17.78± 0.16
Organic matter	53.90± 0.22
Ascorbic acid	1.83± 0.15
Energy value K Cal	97.37± 0.15

CONCLUSION

In conclusion, the results of this investigation revealed that antimicrobial and antifungal activity against selected bacterial and fungal strains. The differentiating activities against variety of microorganisms of these five fraction encourage developing a novel broad spectrum antimicrobial formulation in future. Now our research will be directed to develop a broad spectrum antimicrobial herbal formulation with this plant. Even at low concentrations, these species showed high antimicrobial and antifungal activity nearly equal to that of the commercial fungicide used as a positive control. Further studies are needed to determine the chemical identity of the bioactive compounds responsible for the observed antimicrobial and antifungal activity. Natural plant-derived fungicides may be a source of new alternative active compounds, they can be used in the treatment of infectious diseases caused by resistant microbes.

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