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PHYTOCHEMICAL SCREENING AND EVALUATION OF ANTIBACTERIAL ACTIVITY OF ALKALOIDS EXTRACT OF *SENECIO CHRYSANTHEMOIDES*

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ABSTRACT

The development of bacterial resistance to presently available antibiotics has necessitated the search for new antibacterial agents. The present work focuses essentially on the phytochemical and antibacterial screening of Senecio chrysanthemoides. The results revealed the presence of some chemical groups such as flavonoids, terpenes, alkaloids and saponins. The crude alkaloid extract was evaluated for their antimicrobial activity against four bacteria by the disc diffusion assay. The findings showed a broad spectrum of activity according to the following order in the sensitivity as indicated by the corresponding inhibition zone diameters: Escherichia coli > Salmonella typhimurium> Staphylococcus aureus> Pseudomonas aeruginosa

KEYWORDS: *Senecio chrysanthemoides*, phytochemical Screening, antibacterial activity.

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

MATERIALS AND METHODS

Plant Material

The aerial parts of *S. chrysanthemoides*were collected in may 2014 (flowering stage) in choptarudraprayag. 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.

Extraction and detection of chemical groups

25 of powdered dried plant was extracted with petroleum-ether in a continuous extraction apparatus soxhlet. The ether extracts were combined, filtered and concentrated up to 40-50 mL. The remaining dry vegetable product was extracted by refluxing three times with methanol for 20-40 minutes. The vegetable product residue was then extracted with warm water for 20 minutes. The constituents were identified as follows:

Identification of volatile oils

The ether extract was evaporated to dryness. The residue has a characteristic pleasant odor, thus the plant product contains volatile oils. The vegetable product is distilled with water in a Neo-Clevenger apparatus to extract the volatile oils.

Identification of fatty acids

An alkaline aqueous solution exhaustively extracted with ether and acidified by HCl (pH=3-4). The acidic aqueous

solution becomes opalescent. The fatty acids are extracted by ethyl ether and evaporated. If the residue is oily, fatty acids are present.

Identification of carotenoids
The ether extract is evaporated to dryness and 3 drops of saturated solution of antimony trichloride in chloroform were added (Carrprice's reaction). The pigments are firstly blue and later become red, denoting the presence of carotenoids.

Identification of flavone aglycones
The residue of ether extract is dissolved in 2 mL of methanol at 500 C. Metallic magnesium and 5 drops of concentrated HCl were added. A red or orange color indicates the presence of flavones aglycones (Shibata's reaction).

Identification of anthracenosideaglycone (emodols)
1 mL of 25% of NH4OH were added to ether extract and shaken (Bortrager reaction). A red color shows the presence of emodols.

Identification of sterols and triterpenes
The residue of ether extract is dissolved in 0.5 mL acetic anhydride and then in 0.5 mL of chloroform. Then 1 mL of concentrated sulfuric acid is added (Libermann-Burchards reaction). At the contact zone of the two liquids a brownish red ring is formed denoting the presence of sterols and triterpenes.

Identification of tannins
The water extract (1mL) was diluted with water (2 mL) and the diluted solution of ferric chloride (3 drops) was added. The occurrence of a blackish blue or blackish green color indicates the presence of tannins.

Identification of reducing compounds
1 mL of Fehling solution was added to the alcohol extract then the mixture was heated. A brick red precipitate.

Identification of coumarins
The residue of ether extract or alcohol extract is dissolved after dryness in hot water. The solution is divided intotwo equal volumes: one of which contains the reference, and the second is made alkaline with 0.5 mL of 10% ammonia solution. The occurrence of an intense fluorescence under UV light indicates the presence of coumarins and derivatives.

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Identification of polyuronides (pectins, mucilage and gums)
2 mL of the extract were added drop-wise in a test tube, where 10 mL of acetone have already been placed. A thick precipitate was formed indicating the presence of polyuronides.

Identification of anthocyanosides

The alcohol extract was acidified. The acidic solution turns red at pH=7 and did not change to green or violet at alkaline medium indicates the presence of *anthocyanosides*.

Identification of carbohydrates

3-4 drops of the alcoholic solution saturated with thymol (Molish's reagent) were added. The occurrence of a red color denotes the presence of carbohydrates (oses, polyoses).

Extraction procedure for alkaloids

After drying and powdering, the crude material was extracted with MeOH in soxhlet apparatus. The solvent was evaporated to dryness. The crude residue was taken up in a 2% aqueous HCl. The aqueous acidic phase was extracted with dichloromethane. The CH2Cl2 extract was evaporated to give a crude alkaloid mixture.

RESULTS AND DISCUSSION

Antibacterial Activity

The present work is focused essentially on the phytochemical and antimicrobial screening of *S. chrysanthemoides* which has been screened for 17 chemical groups. It is worth noting the absence of flavone aglycones, anthocianosides, emodols, coumarins and saponins. Nevertheless, the flavone glycosides, sterols or triterpenes, tannins, carotenoids and alkaloids are present in all organs and have not previously been reported in the literature (Table 1).

The genus Senecio is known to contain pyrrolizidine alkaloids. sesquiterpenes with a furanoeremophilane skeleton are reported as the major components of the genus Senecio. The Macrocyclicsenecionine type are secondary metabolites characteristic for most species of the genus *Senecio* (Asteraceae). These compounds are deterrent and toxic to most vertebrates and insects and provide plants with a chemical defense against herbivores. Moreover, this study involves the antibacterial activity of crude alkaloid extracted *from S.chrysanthemoide*aerial parts. the extract prevented the growth of all the tested microorganisms with an inhibition zone medium diameter increasing proportionally with the concentrations of the tested samples. The obtained inhibition on bacteria strains varied from 7 to 24 mm with a highest inhibition zone recorded with *E.coli* at 8mg/ml, and a moderate inhibition effect with the same concentration on *Staphylococcus aureus, and Salmonella sp*.

It should be mentioned that there are no background antibacterial study on *S. chrysanthemoide*while in genus *senecio* some studies have been reported.[26-32]

Table 1: Phytochemical screening of *Senecio chrysanthemoides*.

Ext.	Chemical Groups	Senecio chrysanthemoids				
		R	L	ST	FI	F&S
	Volatil oils	_	+	+	+	
	Sterols and triterpenes	+	+	+	+	+
	Carotenoids	-	+	-	±	-
A	Fatty acids	±	±	±	±	±
	Alkaloids	-	-	-	-	-
	Flavone Algycones	-	-	-	-	-
	Coumarins	-	-	-	-	-
	Sterols or triterpenesagl.	+	+	+	±	+
	Carotenoids	-	+	-	+	-
	tannins	±	+	+	+	+
	Reducing compounds	-	+	+	+	+
B	Alkaloids	-	-	-	-	-
	Anthracene glycoside	-	-	-	-	-
	Coumarins	-	-	-	-	-
	Steroid glycosides	-	-	-	-	-
	Triterpene glycosides	+	+	-	-	+
	Flavone glycosides	-	-	++	-	-
	Anthocianosides	-	-	-	-	-
	Polyuronides	-	+	-	+	++
	Reducing compounds	-	++	-	++	++
	Osespolyoses	++	++	++	-	-
	Saponins	-	-	-	-	-
	tannins	+	+	+	+	+

C	Alkaloids	+	++	+	+	+
	Anthracene glycoside	-	-	-	+	-
	Coumarins	-	-	-	-	-
	Steroid glycosides	-	-	-	+	+
	Triterpene glycosides	-	+	-	-	-
	Flavone glycosides	+	+	+	+	+
	Anthocianosides	-	-	-	-	-
D	Alkaloids	-	-	++	-	+
	Anthracene glycoside	+	+	-	-	-
	Coumarins	-	-	-	-	-
	Steroid glycosides	+	+	-	++	+
	Triterpene glycosides	+	+	+	-	-
	Flavone glycosides	-	-	-	+	+
	Anthocianosides	-	+	-	+	++

A: Ether extract B: Ethyl acetate extract C: Methanol extract D:Waterextrac

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