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Original Research Article

Phytochemical Analysis and Anti-microbial Activity of *Eupatorium glandulosum*

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A B S T R A C T

Eupatorium glandulosum is important medicinal plant with varied pharmacological spectrum. The plant shows the presence of many phytochemical constituents which are responsible for varied pharmacological and medicinal property. Phytochemical analysis of the plant extracts showed the presence of various compounds like Alkaloids, Tannins, Glycosides, Sapnonins, Carbohydrates, Phenolic compounds. The dried leaf extract of *Eupatorium glandulosum* was found to possess antimicrobial activity. The antimicrobial activity of hexane, toluene, chloroform and acetone extracts of *Eupatorium glandulosum* were inspected against the selected experimental pathogens such as *Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa* and *Streptococcus pyogens* by disc diffusion methods. The results showed that extract from the plant had antimicrobial activity in which acetone extract showed a higher activity.

Introduction

Nature has been a source of medicinal agents since times immemorial. It has bestowed on us a very rich botanical wealth and a large number of diverse types of plants grow in different parts of the country [5]. Natural products are important sources for biologically active drugs. *Eupatorium glandulosum* is popularly known as Nilgiri weed, cat weed, Mexican devil in different parts of the world. Within the recent years, infections have increased to a great extent and antibiotics resistance effects become an ever-increasing therapeutic problem. Natural products of higher plants may possess a new source of antimicrobial agents with possibly novel mechanisms of action. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials [9]. Therefore, it is of great interest to carry out a screening of these plants in order to validate their use in folk medicine and to reveal the active principle by isolation and characterisation of their constituents [15]. Systematic screening of them may result in the discovery of novel active compounds.

According to World Health Organization (WHO) more than 80% of the world's population relies on traditional medicine for their primary healthcare needs [10]. Medical plants contain large varieties of chemical substances which possess important therapeutic properties that can be utilized in the treatment of human diseases.. The medicinal value of plants lies in some chemical substances that produce a definite physiologic action on the human body [3]. *Eupatorium glandulosum* grows into an erect herb (occasionally into a subshrub) of one to three meters in height, with trailing purplish to chocolate-brown branches that strike roots upon contact with soil, resulting in dense thickets. The base of the plant is woody and densely clothed with stalked glandular hairs. Leaves are dark green, opposite, deltoid-ovate, serrate, and purple underneath, and each grows to about 10 cm in length. Flowers are white and borne terminally in compound clusters in spring and summer.

Eupatorium glandulosum is a native of Mexico, but has naturalized in many countries. It was introduced into several parts of the world as an ornamental in the nineteenth century, but it is known in many other parts of the world as an introduced species and often a noxious weed [16]. It causes great economic loss in agriculture thereby threatening the native biodiversity. The leaves of this plant are used traditionally by the tribes of Nilgiris to heal wound and small injuries. Thus, the present study was carried out to determine the Antimicrobial properties and phytochemicals from the extracts by using solvents hexane, toluene, chloroform and acetone.

Materials and Methods

Plant Collection and Sample Preparation

Leaves of *Eupatorium glandulosum* were collected from its natural habitat from the Nilgiris district of Tamil Nadu. The leaves were cleaned and dried under shade. The samples were prepared by powdering the leaves and the powdered samples were stored. The samples were packed and the compound separation was carried out using soxhlet extraction at 60 – 80o. The samples were extracted using hexane, toluene, Chloroform and acetone. The extracted samples were filtered with whatmann No 1 filter paper and the filtrates were dried and the antimicrobial analysis was proceeded.

Antimicrobial Activity of Extracts

Antimicrobial assay was performed by agar disc diffusion method (Bauer et al., 1966) for aqueous extract and agar well diffusion method (Perez et al., 1990) for solvent extract. The microorganism used for the analysis were *E.coli, Staphylococcus aureus, Streptococcus pyogens, Pseudomonas aeruginosa.* For each bacterial strain controls were maintained where pure solvents were used instead of the extract. The result was obtained by measuring the zone diameter. The experiment was done three times and the mean values are presented. The results were compared with the standard antimicrobics piperacillin (100 μg/disc) and gentamicin (10 μg/disc).

Phytochemical Analysis

The freshly prepared extracts were chemically tested for the presence of different phytochemical constituents such as alkaloids, Carbohydrates, Phenolic compounds, Proteins, saponins, tannins, glycosides using standard methods.

Results and Discussion

Antimicrobial Activity

The dried leaf extract of *Eupatorium glandulosum* was found to possess

antimicrobial activity. The antimicrobial activity of hexane, toluene, chloroform and acetone extracts of *Eupatorium glandulosum* were inspected against the selected experimental pathogens such as *Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa* and *Streptococcus pyogens* by disc diffusion methods.

Phytochemical Analysis

Phytochemical analysis of the plant extracts showed the presence of various compounds under the extraction using various solvents. Hexane showed the presence of Alkaloids, Tannins, Glycosides and Sapnonins while toluene showed a good response in the extraction of Carbohydrates, Phenolic compounds. The chloroform extract showed the presence of Phenolic compounds and Glycosides. The acetone extracts showed the presence of Phenolic compounds and Tannins.

The present research work concludes that *Eupatorium glandulosum is* important medicinal plant with varied pharmacological spectrum. The plant shows the presence of many phytochemical constituents which are responsible for varied pharmacological and medicinal property. Since this plant is not yet explored, we have made a first attempt to find its properties. Because of its wide availability and medicinal properties, it can be well used for commercial products. The evaluation needs to be carried out on *Eupatorium glandulosum* in order to use and formulate the plant in their practical clinical applications, which can be used for the welfare of the mankind.

Table.1 Effect of various extracts on selected microorganisms

S.NO	EXTRACT	Hexane	Toluene	Chloroform	Acetone
1.	*Escherichia coli*	2.5	3	4	2.8
2.	*Staphylococcus aureus*	3	2.3	2.5	3
3.	*Streptococcus pyogens*	2.4	1.4	1.2	0.9
4.	*Pseudomonas aeruginosa*	-	0.9	-	2.4

Table.2 Estimation of various compounds from *Eupatorium glandulosum*

S.NO	PHYTOCONSTITUENTS	HEXANE	TOLUENE	CHLOROFORM	ACETONE
1.	Alkaloids	+	-	-	-
2.	Carbohydrates	-	+	-	-
3.	Proteins	-	-	-	-
4.	Tannins	+	+	-	+
5.	Phenolic Compounds	-	+	+	+
6.	Glycosides	+	+	+	-
7.	Saponins	+	+	-	-

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