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An evaluation of preliminary screening of phytochemicals and antibacterial activity of leaf and flower extract of Synedrella nodiflora (L.) Gaertn. (Asteraceae)

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Abstract

Aim of the present study was designed to evaluate the preliminary phytochemical screening and an antibacterial potential of Synedrella nodiflora (L.) Gaertn. leaf and flower extracts. The ethanolic extract of leaf and flower were studied on the preliminary phytochemical screening and antibacterial activity was studied by disk diffusion method. The results of the present study was observed that both leaves and flower was active against the all the tested bacteria.

Keywords: Phytochemcials, antibacterial, activity, medicinal plants, disk diffusion method.

1.INTRODUCTION

Microbial diseases are responsible for millions of deaths every year worldwide. Today's, microbial infections, resistance to antibiotic drugs, have been the biggest challenges, which threatened the human health [1]. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action because there has been an alarming increase in the incidence of new and re-emerging infectious diseases [2]. The use of plants and plant part as medicines has a long history in the treatment of various diseases. The plant-derived compounds have a long history of clinical use. To date, 35,000-70,000 plant species have been screened for their medicinal purposes. Fabricant and Farnsworth, (2001) reported that, 80% of 122 plant derived drugs were related to their original ethnopharmacological purposes [3].

Synedrella nodiflora (L.) Gaertn. is belonging to the family Asteraceae. It is a native to tropical America, and now spreading on tropically and occurring throughout the south-east Asian region, India, West Africa, Bangladesh, Japan, Spain, China and England. Weeds of S. nodiflora (L) Gaertn is used for the treatment of epilepsy and pain [4], and also they are use the leaves for threatened abortion, hiccup, laxative and as a feed for livestock [5-6]. The use the leaves of the plant as post-harvest protectants [7]. In Nigeria, some indigenous tribes traditionally use the whole plant for treating cardiac problems and to stop wound bleeding [4]. In Malaysia and Indonesia, the plant is used for poulticing sore legs, headaches, earaches, stomach aches and rheumatism [8]. Literature review of this plant is earlier reported that the aqueous extract of the leaves of *Synedrella nodiflora* (L.) Gaertn is toxic [9] or causes cellular degeneration of the seminiferous tubules in Wistar rat at the dose of 100mg/rat [10]. *S. nodiflora* contains a high content of estradiol [11]. The aim of the present study was to evaluate the preliminary screening and antibacterial activity of ethanolic extract of both parts of leaf and flower of *Synedrella nodiflora.*

2 MATERIALS AND METHODS

2.1 Preparation of Plant Extract

The plant materials of *Synedrella nodiflora* were collected from the Rajagopalapuram, Tirunelveli District, Tamilnadu and identified by the help of reginal flora. The collected plant materials were air - dried and coarsely powdered. 250gm powdered materials were extracted with 750ml of ethanol in soxhlet apparatus for 4 hr. Finally, the collected extract was then concentrated to get dried extract for further analysis of antibacterial activity.

2.2 Selected Pathogens

Bacillus subtilis, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa and Staphylococcus aureus. All the bacterial cultures were maintained in nutrient agar and stored at 4^{o}C.

Antibacterial activity testing

Inoculums for antibacterial testing were prepared by transferring pure bacteria strains grown on nutrient agar media to 5 ml sterile physiological saline solution (0.85% NaCl *w/v*). The suspended turbidity was adjusted to 0.5 McFarland standards corresponding to 1.5×10^8 CFU/ml [12]. The antibacterial activity testing of the plants was done by using a disc diffusion method [13]. The standardized suspension of bacterial strains of 1.5×10^8 CFU/ml was prepared and diffused on the Mueller Hinton agar (MHA) media with sterile swabs. Sterile filter paper discs of 6 mm

diameter were impregnated with a 200 mg concentration of the plant extracts dissolved in 1 ml of DMSO, then placed on swabbed agar and incubated at 37° C for 24 h. The diameters of zones of inhibition were measured in millimeters using a ruler and the average of triplicate results were presented. A positive and negative control was done by 1% phenol solution and DMSO (without plant extracts) respectively.

3. RESULTS AND DISCUSSION

3.1 Phytochemical screening

The results of the present study was preliminary phytochemical screening of both parts of leaves and flower extract of *Synedrella nodiflora* seen in the table-1. Previous studies on the confirm the presence of tannins, saponins and flavonoids in this plant of aqueous extract of aqueous extract of Bidens pilosa Linné [14]. Ethanolic extract of the stems of *Tagetes erecta* L. was confirmed the presence of alkaloids, saponin glycosides, flavonoids, phenol, proteins and amino acids, cardiac glycosides, steroids, tannin and phenolic compounds [15].

Table- 1: Preliminary identification of active compounds of leaves and flower extract of *Synedrella nodiflora*

Sl. No.	Tested active principles	Presence of Active compounds	
		Leaves	**Flower**
1	Alkaloids	+++	+++
2	Flavonoids	++	+++
3	Terpenoids	++	++
4	Tannins	++	+++
5	Saponins	+++	+++

3.2 Antibacterial activity

The results of the antibacterial activity of ethanolic extract of leaves and flower extract of *Synedrella nodiflora* seen in the table-2. Earlier reported that ethanolic extract of *tagetes erecta* more active against *Staphyllococcus aureus* and *Escherichia coli* [16]. The extracts of the plants achieved varying zones of inhibition against both isolate and reference (standard) bacteria species. The highest zone of inhibition (19 mm) was achieved with leaves extract against *Pseudomonas auruginosa*. The bioactive constituents have different mechanism of action against bacterial cells. Tannins and Flavonoids act on bacterial cells through the formation of a complex with cell walls, binding to proteins, disruption of membranes and inhibition of enzymes. Antibacterial effects of saponins are achieved through inactivation of extracellular medium and membranes of the bacterial cell [16]. Saponins-rich extracts are less active against *S. aureus* compared to gram negative bacteria like *E.coli* and *P. aeruginosa* [17]. Studies indicated that most pathogenic bacteria such as *S. aureus* and *E.coli* isolated from the hands of health workers are resistant to many antimicrobial agents [18-19]. The conclusion of the present study observed that an antibacterial activity may be act as active compound present in this plants.

Table- 2: Antibacterial activity of leaves and flower extract of *Synedrella nodiflora*

Sl. No.	Tested bacteria	Zone of Inhibition (mm)	
		Leaves	**Flower**
1	Bacillus subtilis	11.6 ± 1.5	13.0 ± 2.0
2	Escherichia coli	15.3 ± 1.5	14.7±1.5
3	Klebsiella pneumonia	18.7 ± 1.57	16.0 ± 2.0
4	Pseudomonas aeruginosa	19.3 ± 1.5	18.7 ± 2.1
5	Staphylococcus aureus	16.6667±2.1	17.6667±1.2

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