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Research Article

Antioxidant and Antimicrobial Activity of *Eclipta prostrata* Leaf Extract

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Abstract

This study investigated the antioxidant and antimicrobial activity of *Eclipta prostrata* leaf extract. Fresh and healthy leaves of *Eclipta prostrata* leaves were collected and extracted using ethanol. Assessment of antioxidant activity of the ethanolic leaf extract was carried out for DPPH radical scavenging activity. *Eclipta prostrata* showed 77.41% DPPH radical scavenging activity compared to the standard ascorbic acid. *Eclipta prostrata* leaf extract exhibited antibacterial activity against clinical isolates like *Streptococcus pyogens, Staphylococcus aureus, Escherichia coli*, *Proteus mirabilus* and *Pseudomonas aeruginosa.* The ethanolic leaf extract of *Eclipta prostrata* can be explored further for its biological activities.

Keywords: Antioxidant, antimicrobial, *Eclipta prostrata*, radical scavenging, clinical isolates.

Introduction

Eclipta prostrata also known as false daisy, Gunta kalagaraku and Karisalankanni in Tamil. This plant species comes in the sunflower family and it is widely spread across the world (Lansdown and Beentje, 2017). This species grows well in moist places and warm temperate of tropical areas worldwide. It is widely distributed in worldwide specifically in India, Nepal, China, Thailand and Brazil. The plant has been traditionally used in Ayurvedic medicinal practices. The taste of the plant taste is bitter, hot, sharp and dry. Dalal *et al.* (2010) reported the antibacterial activity of methanol and ethyl acetate extract of *Eclipta prostrata* against *Staphylococcus aureus, S. epidermidis*, *Shigella flexneri, Salmonella typhimurium*, *Escherichia coli* and *Pseudomonas aeruginosa*. Both methanol and ethyl acetate extract showed good antimicrobial activity against all tested bacterial pathogens. Ethanolic extract recorded significant antibacterial activity against *Entrobactericeae* family like *Escherichia coli, Klebsiella pneumoniae, Shigella dysenteriae, Salmonella typhi* and *Pseudomonas aeruginosa.* It also works well against of some gram positive bacteria namely *Bacillus subtilis* and *Staphylococcus aureus*. Ethyl acetate extract recorded medium level of antimicrobial activity against gram positive and negative organisms (Karthikumar *et al.,* 2007). Petroleum ether, benzene, chloroform, acetone, methanol, and aqueous extracts of *Eclipta prostrata* were found to be active against clinical isolates of oral cancer cases (Mansoorali *et al.,* 2012).

Materials and methods

Collection and extraction of plant materials: Good and healthy *Eclipta prostrata* plants were collected from local agricultural form in Dharmapuri, Tamil Nadu, India (Fig. 1). Leafs were washed in distilled water and dried in the shadow. The fully dried samples were converted into fine powder and exhaustively extracted by soxhlet apparatus with using ethanol as solvent. The extracts were stored at 4°C until further use.

Fig. 1. *Eclipta prostrata* in its natural habitat.

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Anti-oxidant (DPPH) assay: Assessment of antioxidant activity was carried out using 2,2-diphenyl-1-picryl-hydrazyl (DPPH) radical scavenging activity. The ability of the extract to scavenge DPPH radicals were determined by the method of Lee *et al.* (2005) with minor modifications. A blank was prepared with 3.8 mL of methanol without adding extract and 200 µL of DPPH. About 3.7 mL of methanol was added and then 100 µL of Ascorbic acid standard solution was added without the sample extract and 200 µL solution of DPPH. About 3.7 mL of methanol and 200 µL of DPPH solution were added to 100 µL of the extract solution. All the test tubes were made up to 4.1 mL and incubated for 30 minutes in darkness and at ambient temperature. The resultant absorbance was measured at 517 nm. The lower the absorbance of the sample or the reaction mixture indicates high free radical scavenging activity. The capability to scavenge the DPPH radical was calculated using the following equation.

% DPPH radical scavenging = [(Abs. of control – Abs. of test Sample)/(Abs. of control)] x 100.

Antibacterial activity of Eclipta prostrata extract: Extraction of *Eclipta prostrata* samples were used to analyze its antibacterial activity against human pathogens. *Streptococcus pyogenes* and *Staphylococcus aureus* are gram positive bacteria which cause urinary tract infection and wound infection. There are three Gram negative bacteria used in this study namely *Escherichia coli*, *Proteus mirabilis* and *Pseudomonas aeruginosa*.

Disc diffusion method: The paper disc (No.1 Whatmann) was cut down into small discs (6 mm diameter) and sterilized at 180°C for 30 min in hot air oven. After sterilization, the discs were impregnated with the extracts of *Eclipta prostrata.* The disc was left without any disturbance for 1-4 h at room temperature for drying. The dried discs were placed on the surface of MHA medium which was inoculated with the bacterial pathogens. Subsequently, the inoculated plates were incubated for 18-24 h at 37°C. After the incubation period, the diameter of the circular zones of inhibition was measured (Prescott *et al.*, 2005).

Results and discussion

The DPPH radical scavenging assay is an easy rapid and sensitive method for the antioxidant screening of plant extracts. A number of methods are available for the determination of free radical scavenging activity but the assay employing the stable 2,2-diphenyl-1-picryl-hydrazyl radical (DPPH) has received the maximum attention owing to its ease of use and its convenience. In the antioxidant analysis, stable free radical DPPH (dark violet color) react and convert into 1,1-diphenyl-2-picryl hydrazine and the colored component changed into discoloration.

Fig. 2. DPPH radical scavenging activity of *Eclipta prostrata.*

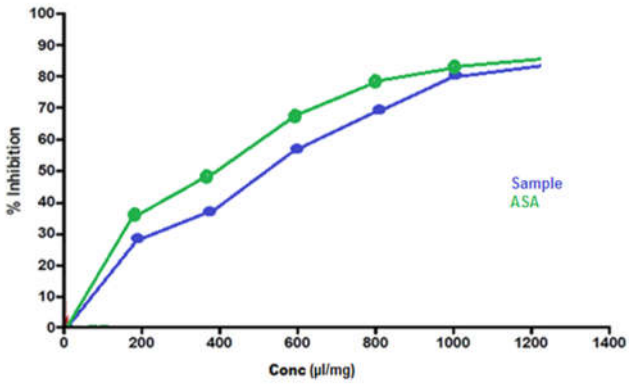

Table 1. DPPH radical scavenging activity of *Eclipta prostrata.*

Sample concentration (µL/mg)	Percentage of inhibition	
	Eclipta prostrata	Ascorbic acid
20	29.31	35.48
40	38.11	48.13
60	59.19	68.19
80	67.22	73.32
100	77.41	79.16

Eclipta prostrata showed 77.41% DPPH radical scavenging activity compared to standard ascorbic acid (Table 1). The findings of the study falls in line with Mazina (2017) report who reported the inhibition based on the concentration of samples.

Eclipta prostrata leaf extract exhibited antibacterial activity against clinical isolates namely *Streptococcus pyogens, Staphylococcus aureus, Escherichia coli*, *Proteus mirabilis* and *Pseudomonas aeruginosa* (Table 2). The maximum zone of inhibition was recorded against *Pseudomonas aeruginosa.* Mohammed and Mohammed (2008) reported that the solvent extracts of *E. prostrata* leaves recorded significant antimicrobial activity against of all test bacterial strains. Solvent extracts showed broad spectrum of antibacterial activity against of *E. coli, K. pneumoniae, S. dysenteriae, S. typhi, P. aeruginosa, B. subtilis* and *S. aureus.*

Table 2. Zone of inhibition of *Eclipta prostrata* leaf extract against clinical isolates.

Name of the pathogen	Zone of inhibition
Staphylococcus aureus	19 mm
Streptococcus pyogenes	18 mm
Escherichia coli	19 mm
Proteus mirabilis	18 mm
Pseudomonas aeruginosa	20 mm

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