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SHORT COMMUNICATION

Phytochemical Screening of Hydroalcoholic Extract and Antimicrobial Activity of Active Principles of *Eclipta alba* (L.)

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ABSTRACT

Background and Objectives: Plants remain a major source of medicinal compounds and in the present scenario the medicinal plants were used to confirm the pharmacological properties which perform as pioneering anti-infectious agent for many diseases. The objective of the present research was to evaluate phytochemical compounds and antimicrobial activity of *Eclipta alba* root extract.

Materials and Methods: *Eclipta alba* root was extracted with a hydroalcoholic solvent using the maceration process. This extract was used to determine the extraction yield, phytochemical composition and antimicrobial activity. **Results:** In the present study the percentage extraction yield of *Eclipta alba* root was 2.5% w/w using the maceration process. The phytochemical screening of extract revealed the presence of Phenols, Diterpene, Carbohydrates and Saponins. The *Eclipta alba* root extract was also tested for antimicrobial activity using the zone of inhibition test against *Escherichia coli* and *Bacillus subtilis*. **Conclusion:** The result showed that the bioactive components of *Eclipta alba* have enormous potential against *E. coli* and *B. subtilis*.

Key words: *Eclipta alba*, hydroalcoholic extract, extraction yield, maceration process, phytochemical screening

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INTRODUCTION

Herbal medicine is frequently a part of a larger therapeutic system such as traditional medicine. It is necessary to evaluate, in a scientific base, the possible use of folk medicine for the treatment of infectious diseases produced by common pathogens. Medicinal plants might represent a substitute treatment in non-severe cases of infectious diseases. They can also be a possible source for novel effective antibiotics to which pathogen strains are not resistant^{1,2}.

Although they are extensively used for the design and development of new drugs in human medicine, plant antimicrobial compounds are also a promise for future plant disease controlling agents. *Eclipta alba* (L.) Hassk. (also known as *Eclipta prostrata* Roxb.) belongs to the Asteraceae family and is commonly known as a false daisy in English and bhringraj in India. It is regarded as a weed of ethnomedicinal significance. The Ayurvedic Pharmacopoeia of India considers this plant as a source of hepatoprotective phytochemicals like dimethyl-wedelolactone and wedelolactone. The traditional medicinal systems of the Indian subcontinent countries, as well as tribal practitioners, consider the plant to have diverse medicinal values Balakrishnan *et al.*³ and use it commonly for the treatment of gastrointestinal disorders, respiratory tract disorders (including asthma), fever, hair loss and greying of hair, liver disorders (including jaundice), skin disorders, spleen enlargement and cuts and wounds⁴. It is widely used in India as a cholagogue and deobstruent in hepatic enlargement, for jaundice and other ailments of the liver and gall bladder^{5,6}.

Plants contain phytochemicals with various bioactivities including antioxidant, anti-inflammatory and anticancer activities. The present study aimed to screen hydroalcoholic extract for phytochemical content and their antimicrobial activity for their standardization.

MATERIALS AND METHODS

Plant material collection: The plant *Eclipta alba* (L.) was collected from the local area of Bhopal (M.P.) in January, 2018.

Extraction of plant material: Dried powdered of *Eclipta alba* (L.) root was subjected to extraction with petroleum ether by maceration. The extraction was continued until the defatting of the material had taken place. Almost 50 g powdered of *Eclipta alba* root was extracted with hydroalcoholic solvent using the maceration process for 48 hrs, filtered and dried using vacuum evaporator at 40°C. This extract was used to determine the extraction yield, phytochemical composition and antimicrobial activity.

Determination of the extraction yield: The crude extracts so obtained after the maceration process were further concentrated on water bath evaporation to obtain the actual yield of extraction. The percentage yield of extraction is a very important phenomenon in phytochemical extraction to evaluate the standard extraction efficiency for a particular plant.

Phytochemical screening of the extract: A small portion of the dried extracts was subjected to the phytochemical test using the previous⁷ methods to test for alkaloids, glycosides, tannins, saponins, flavonoids and steroids separately. The extract was resuspended into the sterile distilled water to make a concentration of 1 mg mL⁻¹.

Antimicrobial activity: The pathogenic microbes used in the current study were two bacteria (*E. coli* and *Bacillus subtilis*) obtained from Microbial Culture collection from Scan Research Laboratories Bhopal (M.P.). The Bacterial cultures used in the study were obtained in lyophilized form. With the help aseptic techniques, the lyophilized cultures were inoculated in sterile nutrient broth and then incubated for 24 hrs at 37°C. After incubation, the growth was observed in the form of turbidity. These broth cultures were further inoculated on to the agar plates with a loop full of bacteria and further incubated for next 24 hrs at 37°C to obtain the pure culture and stored as stocks that are to be used in further research work.

The well diffusion method was used to determine the antibacterial activity of the extracts prepared from the *Eclipta alba* using standard procedure. There was 3 concentration used which are 25, 50 and 100 mg mL⁻¹ for antibiogram studies. The plates were incubated at 37°C for 24 hrs and then examined for clear zones of inhibition around the wells with a particular concentration of a drug.

RESULTS

The crude extracts so obtained after the maceration process, each extract was further concentrated on a water bath for evaporating the solvents completely to obtain the actual yield of extraction. To obtain the percentage yield of extraction is a very important phenomenon in phytochemical extraction to evaluate the standard extraction efficiency for a particular plant, different parts of the same plant or different solvents used. The yield of extracts obtained from the sample using Petroleum ether, hydroalcoholic as solvents is 2.5% w/v. The various chemical tests were performed for testing different chemical groups present in extracts. The results of the phytochemical analysis of the extract are summarized in Table 1. The results revealed the presence of medicinally active constituents such as Phenols, Diterpene, carbohydrates and Saponins. These bioactive constituents were responsible for the efficacy of the plants. The presence of some of these compounds has also been confirmed to have various pharmacological activities. The study also established quality control parameters of the plant including analytical and phytochemical standardization.

Table 1: Phytochemical screening of hydroalcoholic extract of *Eclipta alba*

Constituents	Hydro alcoholic extracts
Alkaloids	-
Dragendroff's test	-
Wagner's test	-
Mayer's test	-
Hager's test	-
Glycosides	
General glycosides test	-
Flavonoids	
Lead acetate test	-
Alkaline test	-
Phenolics	
FeCl ₃ test	+
Amino acids	
Ninhydrin test	-
Carbohydrates	
Molichs test	+
Diterpines	
Copper acetate test	+
Saponins	+

-: Negative, +: Positive results

Table 2: Antimicrobial activity of hydroalcoholic extract of *Eclipta alba* L.

Name of microbes	Zone of inhibition ($\mu\text{g mL}^{-1}$)				
	100	50	25	Standard (ciprofloxacin) 30	Control
<i>E. coli</i>	16 \pm 0.12	15 \pm 0.15	14 \pm 0.11	20 \pm 0.15	0
<i>Bacillus subtilis</i>	23 \pm 0.14	17 \pm 0.41	13 \pm 0.12	20 \pm 0.15	0

The present investigation in this research work, the antimicrobial activity of extract obtained from the root extract of *Eclipta alba* (L.) was evaluated against bacteria *E. coli* and *B. subtilis* used under the present study. The fresh pure 100% extracts obtained from the plant used to suitably dilute up to the concentrations of 100, 50 and 25 mg mL^{-1} and applied on to the test organism using well diffusion method. The positive results of antimicrobial activity seen on the hydroalcoholic extract of *Eclipta alba* are shown in Table 2. The maximum zone of inhibition has occurred at a concentration of 100 $\mu\text{g mL}^{-1}$.

DISCUSSION

The present studies represent the extraction yield of hydroalcoholic extract of *Eclipta alba* root is 2.5% w/w. Udayashankar et al.⁸ reported that the plant contains a broad array of active principles which includes coumestans, alkaloids, flavonoids, glycosides, polyacetylenes and triterpenoids. Findings of the current experiment reported the presence of medicinally active constituents such as phenols, Diterpene, Carbohydrates and saponins in the root extract of *Eclipta alba* (Table 1). These results are in accordance with the findings of Priya et al.⁹ and Wyson et al.¹⁰, were reported the presence of steroids, tannins, saponins, flavonoids, diterpenes and triterpenes in leaves extract of *Eclipta*.

The use of plant products as antimicrobial agents is an ancient idea¹¹, but the researches in the area are gaining attention lately. As a response to the acquired pathogen's resistance to antibiotics existing on the market, new alternatives should be designed for the treatment of infectious diseases. It is therefore desirable to explore the potential of plant extracts for the development and design of new antimicrobial agents^{12,13}, as this could be a solution for both medical and phytopharmaceutical industry. Some of the important pharmacological activities are antihepatotoxic, analgesic, antioxidant, antibacterial etc.¹⁴⁻¹⁸. Identification and isolation of the therapeutic antimicrobials and undergo further pharmacological screening that can be used as sources for new drugs. Tewtrakul et al.¹⁹ claimed that the water extract of *E. prostrata* (whole plant) exhibited the most potent inhibitory activity against antiviral activity HIV-1 integrase (HIV-1 IN). In this investigation, the maximum zone of inhibition was observed at the concentration of 100 $\mu\text{g mL}^{-1}$ against *E. coli* and *B. subtilis* (Table 2), which were pertinent with the various studies²⁰⁻²². Thus the present investigation also supports the traditional medicinal application of the plant and suggests that the plant extracts possess compounds with antibacterial properties that can be used as antibacterial agents in novel drug formulation for the treatment of bacterial infections. Also, there is a need for the characterization and isolation of the active ingredients.

CONCLUSION

Eclipta alba has been recently reported to possess various pharmacologic activities, as well as nutritional content. The results of the present study conclude that the selected plant *Eclipta alba* extracts evaluated for phytochemical analysis and was effective against the bacteria *E. coli* and *B. subtilis*. This research indicates that the root extract of *Eclipta alba* used to formulate drugs for human for the treatment of bacterial infection.

SIGNIFICANCE STATEMENT

These findings hold the traditional information of local users about their collection and extraction and herbal drug formulations of this plant sample as an antimicrobial agent and

it is a preliminary scientific rationale for the use of this plant. The data presented here could be helpful in the development of a suitable monograph, standardizing extracts and laying down the pharmacopoeial standards for *E. alba*.

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