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ANTIMICROBIAL ACTIVITY AND PHYTOCHEMICAL ANALYSIS OF ALECTRA THOMSONI HOOK FROM BULDHANA DISTRICT (M.S.), INDIA

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ABSTRACT

Alectra thomsoni a member of scrophulariaceae is newly reported ethnomedicinal plant from Buldhana district which is used by the tribals of this region to treat certain diseases. This root parasite is well known for its traditional curative values. Qualitative phytochemical analysis of rhizome of this plant confirms the presence of various phytochemicals like alkaloids, glycosides, phytosterols, tannins and proteins in the different solvent extracts. These phytoconstituents are the potential source of useful drugs.

Antimicrobial efficacy of Alectra thomsoni was assessed by disc diffusion method against pathogenic bacteria Escherichia coli, Salmonella typhi and Proteus vulgaris. The methanol extract exhibited highest zone of inhibition against Escherichia coli (17.0 mm) while chloroform extract exhibited highest zone of inhibition against Salmonella typhi (10 mm).

Keywords: Phytochemical analysis, Antimicrobial activity, Alectra thomsoni.

INTRODUCTION

Medicinal plants, which form the backbone of traditional medicine, have in the last few decades been the subject for very intense pharmacological studies; this has been brought about by the acknowledgement of the value of medicinal plants as potential sources of new compounds of therapeutics value and as sources of lead compounds in the drug development. In developing countries, it is estimated that about 80% of the population rely on traditional medicine for their

primary health care. There arises a need therefore to screen medicinal plants for bioactive compounds as a basis for further pharmacological studies.

The ethnomedicinal plants occupy a chief source of medicine in crude form in the tribal areas of country. In recent years, research on such plants has attracted attention on number of research workers. The medicinal properties can be significantly attributed to the phytochemical constituents synthesized in the plant tissues.

Ethno-pharmacologists, botanists, microbiologists, and pharma-chemists are to comb in the hunt for novel bioactive compounds "leads" which could be developed as an effective drug for treatment of various infectious diseases (Pushpangadan and Atal, 1984; Ved and Goraya, 2008). More than 70% of wound healing pharma products are of plant based, 20% are mineral based, and the remaining contain animal products as their base material. The plant based materials are used as first aid, antiseptic, coagulants, wound wash (extraction of pus), for infected wounds (Ignacimuthu et al, 2006).

Plants used for traditional medicine contain a wide range of substances that are used to treat chronic as well as infectious diseases (Gulcin and Nurten, 2003). The medicinal value of these plants lies in some chemical substances that have a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavanoids and phenolic compounds (Hill, 1952).

Phytochemistry is widely used in the field of Chinese medicine especially in the field of herbal medicine. Phytochemical techniques maintains the quality control of herbal medicine or Chinese medicine of various chemical components, such as saponins, alkaloids, volatile oils, flavonoids and anthraquinone.

Alectra thomsoni a member of scrophulariaceae is newly reported ethnomedicinal plant from Buldhana district which is used by the tribals of this region to treat certain diseases like paralysis, skin diseases, rheumatic pains and stomach disorder.

The present paper deals with qualitative phytochemical analysis and antibacterial activity of rhizome of an endangered root parasite Alectra thomsoni.

MATERIALS AND METHODS

Plant material

Plants of Alectra thomsoni were collected from the forest area of Buldhana district. After the completion of description, identification and noting of medicinal significance, the plant was scrutinized for phytochemical constituents through literature and screened for antibacterial activity. The voucher specimens were deposited to the Herbarium, Botany Department of Botany, Shri Shivaji Science and Arts College, Chikhli, Dist. Buldhana (M.S.). The rhizomes of Alectra thomsoni were separated, washed with running water to remove dust and shade dried.

Preparation of extracts

500 g rhizome powder of Alectra thomsoni was used to prepare extract with chloroform and methanol using Soxhlet's apparatus for 12-14 hr on a water bath separately. The organic extracts were separately filtered with Whatmann No. 1 filter paper and evaporated to dryness on water bath to obtain semi-solid mass. However, aqueous extraction is performed by using hot water maceration. The dried extracts were stored at 5^{o}C in the refrigerator until used for further studies.

Preliminary Screening of Phytochemicals:

The condensed extracts were used for preliminary screening of phytochemicals such as alkaloids (Mayer's test), glycosides (Libbermann Burchard's Test), tannins (Ferric chloride Test), phytosterols (Libbermann Burchard's Test) and proteins (Biurete Test) were carried out by the methods of Harborne (1992) and Evans (1989). Solvent free extract obtained as above was then subjected to qualitative test for identification of various plant constituents of each sample.

Antimicrobial screening

Test microorganisms

The antimicrobial activity was evaluated against common pathogenic microorganisms, Escherichia coli, Salmonella typhi and Proteus vulgaris were obtained from NCL, Pune, India

and they are used for the antibacterial activity against the prepared plant extracts. The bacterial cultures were grown and maintained on Nutrient Broth medium at 37^{o}C for 24h.

Antimicrobial activity

Disc Diffusion Method

Antimicrobial assay of the crude extracts was performed against ten tested pathogenic strains by disc diffusion method (Gould and Bowie, 1952). The nutrient agar plates and potato dextrose agar (PDA) plates were seeded with suspension) of the bacterial. The empty sterilized Whatmann No.1 filter paper disc (6 mm) were impregnated with 1mg/ml of extracts dried and placed aseptically on seeded plates with the help of a sterile forceps. Finally, the sensitivity discs were pressed with forceps to make complete contact with the surface of the medium. Later on these plates were kept at room temperature for 30 minutes (Pre diffusion time).

The standard discs (6 mm) impregnated with antibiotics chloroamphenicol (2µg/mL) was used as positive control. The plates were incubated at 37^{o}C for 24 h for bacterial strains. The diameter of the inhibition zone (mm) was measured. The experiment was done in triplicate and the mean values calculated for conclusion. The results of antibacterial activity were tabulated in Table-2.

RESULTS

It was clear from the experimental data presented in Table-1 that the substances like alkaloids, glycosides, phytosterols, tannins and proteins were medicinally active components of the rhizome of Alectra thomsoni. Chloroform extract confirms the presence of alkaloids, glycosides, tannins and proteins. Methanol extract confirms the presence of alkaloids, glycosides, phytosterols and proteins.

The results of antimicrobial screening of the extracts revealed that the methanolic extracts show significant antimicrobial activity than chloroform against almost all the test bacteria and showed zone of inhibition of 9-17 mm (Table-2). The chloroform extracts showed moderate activity against the microorganisms and showed zone of inhibition of 6-10 mm.

Table -1. Qaulitative phytochemical analysis of rhizome extracts of Alectra thomsoni. (Obtained by successive solvent extraction of plant material)

Plant part used	Test	Reagents	Chloroform extract	Methanol extract
Rhizome	Alkaloids	Mayer's	+	+
	Glycosides	Libbermann Burchard's Test	+	+
	Phytosterols	Libbermann's Burchard's Test	-	+
	Tannins	Ferric chloride solution Test	+	-
	Proteins	Biurete Test	+	+

(Present = +, Absent = -)

Table- 2. Showing antibacterial activity of rhizome extracts of Alectra thomsoni.

Test organisms	Zone of inhibition (in mm)	
	Chloroform	Methanol
Escherichia coli	09	17
Salmonella typhi	10	09
Proteus vulgaris	06	11

DISCUSSION

Nowadays, higher percentage of population prefer to use remedies of natural origin for curing illness as these claimed to produce less side effects (Tyagi and Bohra, 2002). The curative

properties of medicinal plants are perhaps due to the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, sterols etc.

Medicinal plants plays a vital role in covering the basic health needs in developing countries and these plants may offer a new source of antibacterial, antifungal and antiviral agents with significant activity against infective microorganisms (Munoz et. al., 2003; Coelho et. al., 2004). The presences of these bioactive components in the crude drugs have been linked to their activities against disease causing microorganisms and also offering the plants themselves protection against infection by pathogenic micro-organisms (El-Mahmood et. al., 2008).

The obtained results may provide a support to use of the plant in folk and traditional medicine. Based on this, further chemical and pharmacological investigations to isolate and identify minor chemical constituents in Alectra thomsoni to screen other potential bioactivities may be recommended.

This type of study will guide the pharmaceutical companies to select the required part of the plant which yields maximum quantity of required active ingredient for the therapeutic preparations.

CONCLUSION

The extracts of the plant part produced good inhibition zones against the test organisms. So it is expected that they could be used to treat infections and diseases caused by these organisms and if the active ingredients of the extracts are isolated and possibly crystallized, therapeutic antibiotics could be produced from these compounds. The inhibitions of growth of the test organisms that are known to cause infections justify the continued use of these plants in traditional system of medical practice.

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