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ANTIMICROBIAL & ANTIOXIDANT ACTIVITY OF ROOT EXTRACT OF *CISSUS QUADRANGULARIS*

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ABSTRACT

Antimicrobial substances could be defined as those substances which shows inhibitory effects against various microorganisms. In this contemporary world, medical science focuses mainly on the use of synthetic drugs to treat various diseases as well as to heal various injuries. Even though, they are highly effective, synthetic drug has many side effects. Due to this reason many people prefer traditional medicine which uses plants or other natural sources. One such plant which has medicinal properties is *Cissus quadrangularis*. It is an annual or perennial herb which requires warm tropical climate and is generally propagated by stem cutting method in the months of June and September. A lot of research has been done regarding the antimicrobial activity of the stem extract of *Cissus quadrangularis* but the root extract of the same plant remains an undiscovered territory, so we have tried to establish the same. The present study shows the Antimicrobial and Antioxidant activity of *Cissus quadrangularis*. Methanol, Ethanol, and Chloroform extracts were prepared and the antimicrobial activity was determined using disc diffusion method. The Antioxidant activity of this plant was determined using Phosphomolybdate assay.

KEYWORDS:- Extracts, Antimicrobial, Antioxidant, Phosphomolybdate assay.

INTRODUCTION

Since ancient times human beings are using plants for treating various diseases as well as healing various injuries. The pharmaceutical industry is equally dependent on natural resources as existing medicines can have various side effects which may result in recall of drug or potential fines. This can cause not only huge losses to pharmaceutical industries but also shutdown in some cases. In this new age of drug development, molecules of various

parts of plants are isolated and examined on the basis of their traditional use. One such plant that is of utmost therapeutic benefit is *Cissus quadrangularis*, also called as Hadjod in Marathi language and Edible stemmed vine in English. This plant has various medicinal as well as healing properties but it is better known for its Antimicrobial and Antioxidant properties. This plant is generally grown by stem cutting method during the rainy season. No systematic studies have been reported for Antimicrobial and Antioxidant activity of root extract of *Cissus quadrangularis*, hence an effort has been made to establish the same. Many systems of Classification can be used to Identify the plant but the Botanical system of classification is the most authentic which is as following.

Classification

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Eudicots

Clade: Rosids

Order: Vitales

Family: Vitaceae

Genus: *Cissus*

Species: *quadrangularis*

METHODS AND MATERIALS

Sample collection

Plant sample was collected from Saramkundi village in Maharashtra and was authenticated in the Botany department of Savitribai Phule Pune University.

Extraction process

The plant sample was washed with both tap as well as distilled water to get rid of mud and dirt. The roots and stem of this plant were separated and kept for shade drying for three days. The roots were grinded with the help of a grinder to get fine powder. 15 mg of powder was mixed with 150 ml of each Methanol, Ethanol, and Chloroform and kept on a mechanical shaker for three days. Mixtures were then filtered with the help of Whatman filter paper and the filtrates were stored in Eppendorf tube at room temperature.

Antimicrobial activity

The Antimicrobial activity was determined using Disc diffusion method. The organisms that were used are *Escherichia coli, Klebsiella sp, Pseudomonas sp, Salmonella sp.* These organisms were sub cultured on Nutrient Agar Slant and then saline suspensions were prepared and spread plate method was performed on Mueller- Hinton agar plates. Sterile disc was dipped in the respective extract and placed on the four corners of the plate. The plates were incubated at 37°C for 24 hours.

Observation

Table no. 1: Methanol extract.

	Root	**Stem**	**Root + Stem**
Pseudomonas Sp	12 mm	11mm	13 mm
Klebsiella Sp	11mm	10mm	12 mm
Salmonella Sp	10mm	9 mm	10 mm
Escherichia coli	11mm	11mm	12 mm

Table no. 2: Chloroform extract.

Organisms	**Root**	**Stem**	**Root + Stem**
Pseudomonas Sp	9mm	9mm	10mm
Klebsiella. Sp	10mm	9mm	11mm
Salmonella. Sp	11mm	12mm	13mm
Escherichia. Coli	9mm	10mm	10mm

Table no. 3: Ethanol extract.

Organisms	**Root**	**Stem**	**Root + Stem**
Pseudomonas. Sp	14mm	13mm	16mm
Klebsiella. Sp	14mm	13mm	16mm
Salmonella. Sp	15mm	13mm	17mm
Escherichia. Coli	13mm	12mm	14mm

RESULT AND DISCUSSION

A clear zone of inhibition was seen in all the Plates, which indicates that root extract also has antimicrobial activity. Maximum zones were observed in samples extracted in Ethanol. The samples extracted in Methanol had moderate zones and samples extracted in Chloroform had smaller zones. The Extracts prepared by mixing equal amount of root and stem powder showed highest antimicrobial activity as compared to that of individual root and stem extract.

Qualitative estimation of Antioxidant activity of root extract of *Cissus quadrangularis*

Requirements

Phosphomolybdate Reagent – To make this we need three chemicals

1. (28 mM) Sodium Phosphate
2. (0.6 M) Sulfuric Acid
3. (4mM) Ammonium molybdate

All these chemicals were added in equal amount to produce Phosphomolybdate reagent.

Procedure

0.1 ml of Methanolic extract was added in a test tube to which 1 ml of Phosphomolybdate Reagent was added and the contents were mixed thoroughly. The tubes containing the mixture were covered with cotton and were incubated for 90 minutes at 95°C, after the Incubation the tubes were allowed to cool down at room temperature. Methanol was used as blank.

RESULT AND OBSERVATION

Colour change from transparent to bluish green was observed which indicates the presence of antimicrobial agents.

CONCLUSION

The root extract of *Cissus quadrangularis* has shown considerable amount of Antimicrobial as well as Antioxidant activity. Phytochemical evaluation can be carried out to reveal its multidisciplinary use. Various research projects can be conducted to check its Antiprotozoal, Antifungal, Antitumor, Anti-inflammatory, Antiviral activities of root extract of this plant. This research must be upgraded to next level with the help of HPLC, HPTLC, NMR to isolate and characterise the active components present in plant extract.

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