Research Article

In-virto Antimicrobial activity of Medicinally Important Plant-*Cardiospermum helicacabum Linn*. against Pathogenic Bacteria

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ABSTRACT

The present studies designed as *In vitro* antimicrobial activity of the whole plant of *Cardiospermum halicacabum Linn*. The traditional Indian system of medicine has a very long term history of usage in a number of diseases and disorders, but lacks recorded safety and efficacy data. However the main cause for their scientific neglect is multi constituent mainstay and the mechanism of action being unclear. Development of standardized, safe and effective herbal formulations with proven scientific evidence can also provide an economical alternative in several disease areas. Herbs have been used as a source of drugs to combat diseases since time immemorial. The effectiveness, easy availability, low cost and non-toxic nature popularized herbal remedies. In spite of the dramatic development of synthetic drugs and antibiotics as the major therapeutic agents, herbs continue to provide basic raw material for some of the most important drugs. Its roots are used for medicinal purposes. In this study Methanol and acetone leaf & root extract of *Cardiospermum halicacabum Linn* were investigated for *in vitro* antibacterial property by agar disc diffusion method. The crude extract of *Cardiospermum halicacabum Linn*, the acetone and Methanol root extract showed good antimicrobial activity against the Salmonella typhi & Proteus mirabilis. Leaf extract of ethanol showed good antimicrobial activity against the Proteus mirabilis. Leaf extract of acetone showed moderate inhibition activity against the Staphylococcus aureus.

Keywords: Antimicrobial, *Cardiospermum halicacabum Linn,* salmonella typhi, staphylococcus aureus

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INTRODUCTION

Cardiospermum halicacabum Linn. is one of the members of soapberry family, Sapindaceae. It is an herbaceous climber widely distributed in tropical and subtropical regions. It is originated all through the plains of Africa, America, Bangladesh, India, Malacca and Pakistan. Common names are balloon vine, heart vine, heart pea, love-in-a-puff, and heart seed.

The whole plant [1] is diaphoretic, diuretic, emetic, laxative, refrigerant, stomachic and sudorific in folk. It is also used in the treatment of rheumatism, chronic bronchitis and stiffness of the limbs and [2, 7]. Varieties of chemical constituents have been isolated from its *Viz.* β- arachidic acid, apigenin, apigenin-7-O-glucuronide, chrysoeriol-7-O-glucuronide and 80 luteolin-7-O-glucuronide [8,9]. Numbers of fatty acids were also isolated from seed oil [10]. The plant was reported as antiulcer [11], analgesic [12], antiparasitic [13], antimalarial [14], antifilarial [15], antipyretic action [16]. Plants have been used as curative mediator from the most primitive day of human's survival [17] and made it obligatory to study them in details in order to classify the kinds, working for different purposes [18]. Therefore, in present study we were screen the whole plant for its microbial analysis.

MATERIALS AND METHODS:

Preparation of Plant Extracts:

The roots of the plant *Cardiospermum helicacabum* was shade dried and powdered. A weighed quantity of 2500g was taken for chemical investigation. The bark was dried in

the shed and coarsely powdered. The powder was extracted with Methanol in a soxhalet apparatus for 72h. The Methanol extract was evaporated in vacuous giving the residue (24%). The Methanol extract obtained was suspended in distilled water in small amounts and was extracted successively and exhaustively with petroleum ether (60-80°C), benzene, chloroform and acetone in the order of increasing polarity. The left over fraction was considered as aqueous fraction. The extract and fractions were concentrated in a rotary evaporator at reduced pressure.

Figure 1: ***Cardiospermum helicacabum Linn***

Figure 2: Seeds of ***Cardiospermum helicacabum*** **(1)**

Scientific classification

Kingdom	**Plantae**
(Unranked)	Angiosperms
(Unranked)	Eudicots
(Unranked)	Rosids
Order	Sapaindales
Family	Sapindaceae
Sub family	Sapindoideae
Genus	Cardiospermum
Species	C. halicacabum
Binomial name	
Cardiospermum halicacabum	

Test organisms used for the study

They were tested against four bacterial strains three gram negative bacterium *Salmonella typhi, Proteus mirabilis & Escherichia coli* and gram positive bacterium *Staphylococcus aureus.* Muller Hinton agar medium was prepared by using clean sterile conical flask and kept it for sterilization. After sterilization the medium was poured into the sterile Petri plates and allowed to solidify. The bacterial culture was inoculated in the peptone water and kept in the shaker for **7**-8 hours. Then the culture was swabbed on the surface of the Muller Hinton Agar medium by using sterile cotton swabs. The sample was added into the sterile disc, which kept on hot plate different concentrations (75µl, 100µl, 125µl and 150µl) by using sterile tips. Then the plates were incubated into the incubator for 24 hours at 37ºC. The zones of inhibition of the tested microorganism by the extracts were measured using a Fisher-cilly antibiotic zone reader model 290(U.S.A) The zone of inhibition were measured.

RESULTS AND DISCUSSION

The Methanol and acetone extracts were selected for antimicrobial activity and tested against Gram- positive and Gram-negative microorganisms *Staphylococcus aureus, Salmonella typhi, Proteus mirabilis and Escherichia coli.* The results revealed that the extracts showed moderate to high antimicrobial activity against all the tested microbial strains. The antimicrobial

activity was evaluated from the zone of inhibition (Table-1&2). Among the two crude extract of *Cardiospermum halicacabum Linn*, the acetone and Methanol root extract showed good antimicrobial activity against the *Salmonella typhi* & *Proteus mirabilis*. Leaf extract of ethanol showed good antimicrobial activity against the *Proteus mirabilis.* Leaf extract of acetone showed moderate inhibition activity against the *Staphylococcus aureus*. The root extract of *Cardiospermum halicacabum Linn* have a good antimicrobial activity compare to the leaf extract of *Cardiospermum halicacabum Linn.*

Table 1: Effect of Methanol and Acetone leaf extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms

S. No	Zone of Inhibition (mm)	Micro organisms			
		Escherichia coli	*Salmonella typhi*	Proteus mirabilis	*Staphylococcus auras*
1.	Methanol extract (µl)75	14	16	12	15
2.	Methanol extract (µl)100	14	17	12	16
3.	Methanol extract (µl)125	15	17	13	18
4.	Methanol extract (µl)150	16	18	14	18
5.	Acetone extract (µl)75	14	16	12	16
6.	Acetone extract (µl)100	15	17	12	17
7.	Acetone extract (µl)125	15	18	14	18
8.	Acetone extract (µl)150	16	19	15	19

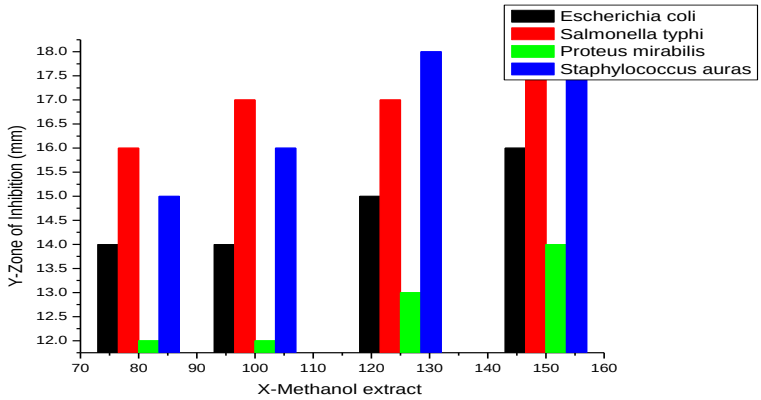

Figure 3: Effect of Methanol leaf extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms

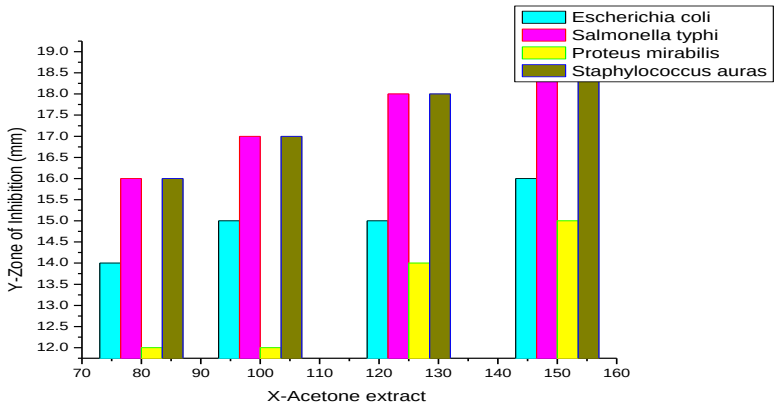

Figure 4: Effect of Acetone leaf extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms

Table 2: **Effect of Methanol and Acetone root extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms**

S. No	Zone of Inhibition (mm)	Micro organisms			
		Escherichia coli	*Salmonella typhi*	Proteus mirabilis	*Staphylococcus auras*
1.	Methanol extract (µl)75	12	13	11	12
2.	Methanol extract (µl)100	12	14	12	14
3.	Methanol extract (µl)125	13	15	14	15
4.	Methanol extract (µl)150	14	16	15	16
5.	Acetone extract (µl)75	10	12	13	14
6.	Acetone extract (µl)100	10	13	14	15
7.	Acetone extract (µl)125	11	14	15	16
8.	Acetone extract (µl)150	12	15	15	17

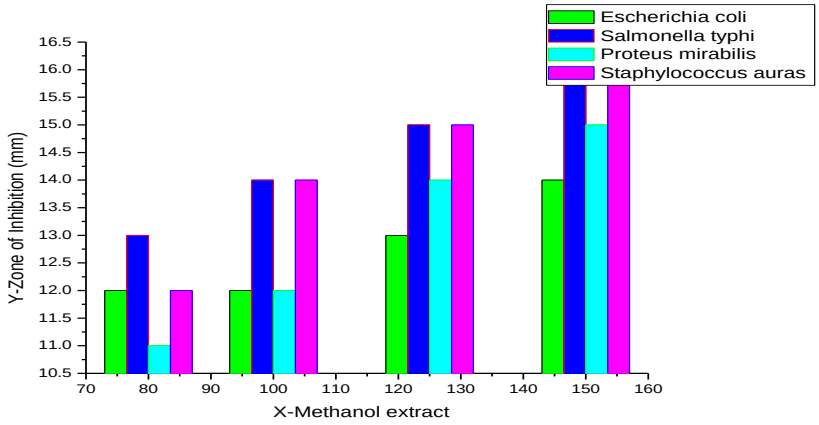

Figure 5: Effect of Methanol root extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms

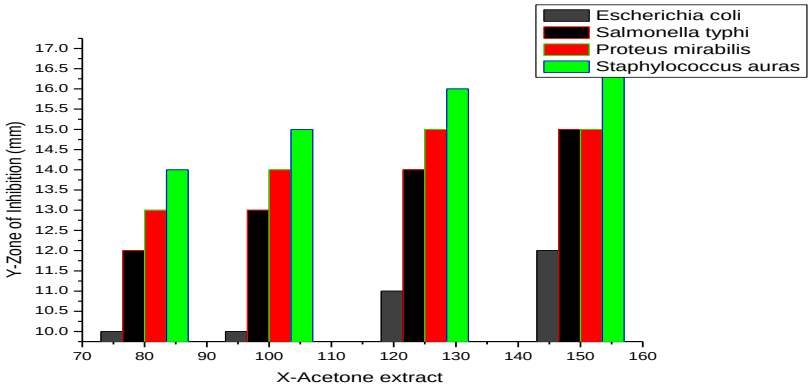

Figure 6: Effect of Acetone root extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms

CONCLUSION

The results of this study have shown that the root and leaf extracts of *Cardiospermum helicacabum Linn* (Sapindaceae) have great potential as antimicrobial agents in the treatment of infectious organisms. Further detailed investigation of the active components of the plant for the exact mechanism of action will contribute greatly to the development new pharmaceuticals.

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