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ISSN: 0975-7538
Research Article

In-virto anti-microbial activity of medicinally important plant *Cardiospermum helicacabum Linn* against pathogenic bacteria

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ABSTRACT

Methanol and acetone extracts from leaf and root of *Cardiospermum halicacabum Linn* were investigated for in-vitro anti-bacterial property by agar disc diffusion method. The crude extracts in acetone and methanol of *Cardiospermum halicacabum Linn* root exhibited good anti-microbial activity against the *Salmonella typhi* and *Proteusm irabilis*. Leaf extract in methanol exhibited good anti-microbial activity against the *Proteusm irabilis*. Leaf extract in acetone exhibited moderate inhibition activity against the *Staphylococcus aureus*.

Keywords: Anti-microbial activities, *Cardiospermum halicacabum Linn*, acetone, methanol.

INTRODUCTION

Cardiospermum halicacabum Linn is one of the members of soapberry family, Sapindaceaes. 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 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 snakebite (Joshi *et. al*., 1992; Gopal Krishnan *et. al*., 1976; Chopra *et. al*., 1980; Nadkarni, 1976; Abulla, 1973; Jafri, 1966). Variety of chemical constituents has been isolated from its *Viz.* β- arachidic acid, apigenin, apigenin-7-O-glucuronide, chrysoeriol-7-O-glucuronide and 80 luteolin-7-O-glucuronide (Khan *et. al*., 1990; Subramanyam *et. al*., 2007). Number of fatty acids were also isolated from seed oil (Chisholm & Hopkins, 1958). The plant was reported as anti-ulcer (Sheeba *et. al*., 2006), analgesic (Muthumani *et. al*., 2010), anti-parasitic (Boonmars *et. al*., 2005), anti-malarial (Wakko *et. al*., 2005), anti-filarial (Khunkitti *et. al*., 2000) and anti-pyretic action (Asha & Pushpangadan, 1999). Plants have been used as curative mediator from the most primitive day of human's survival (Shellard, 1987) and made it obligatory to study them in details in order to classify the kinds, working for different purposes (Ghani, 1986). Therefore, in present study we were screen the whole plant for its microbial analysis.

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Received on: 02-06-2017
Revised on: 12-09-2017
Accepted on: 03-10-2017

MATERIALS & METHODS

Plant Extracts

The roots of the plant Cardiospermum helicacabum was shade dried and powdered. A weighed quantity of 250 g 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 72 hours. 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 same procedure is followed for the acetone extracts also. The left over fraction was considered as aqueous fraction. The extract and fractions were concentrated in a rotary evaporator at reduced pressure.

Test organisms used for the study

Above extracts were tested against four bacterial strains i.e., three gram (-ve) bacterium *Salmonella typhi*, *Proteusm irabilis, Escherichia coli* and one gram (+ve) bacterium *Staphylococcus aureus*. Muller Hint on agar medium was prepared by using clean sterile conical flask and kept it for sterilization. After sterilization them medium was poured into the sterile Petri-plate sand allowed to solidify. The bacterial culture was inoculated in the peptone water and kept in the shaker for 7-8 h. Then the culture was swabbed on the surface

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

S. No	*Zone of Inhibition (mm)*	Micro organisms			
		Escherichia coli	*Salmonella typhi*	*Proteusm irabilis*	*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

Table 2: Effect of Methanol and Acetone root extract of *Cardiospermum halicacabum Linn* against pathogenic micro-organisms.

S. No	Zone of Inhibition (mm)	Micro organisms			
		Escherichia coli	Salmonella typhi	Proteusm irabilis	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

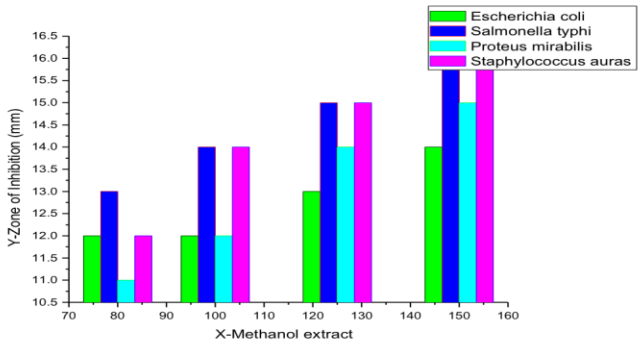

Figure 1: Effect of Methanol root extract of *Cardiospermum halicacabum Linn* against pathogenic micro-organisms.

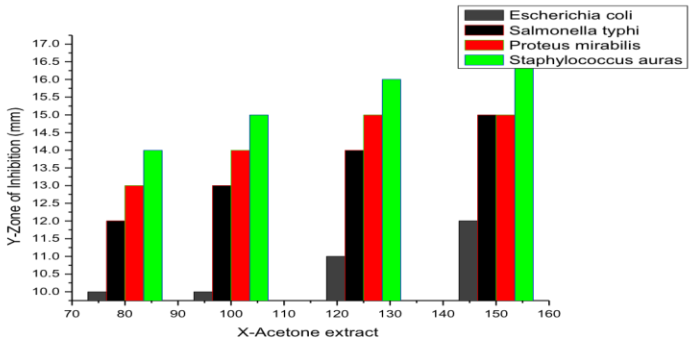

Figure 2: Effect of Acetone root extract of *Cardiospermum halicacabum* Linn against pathogenic micro-organisms.

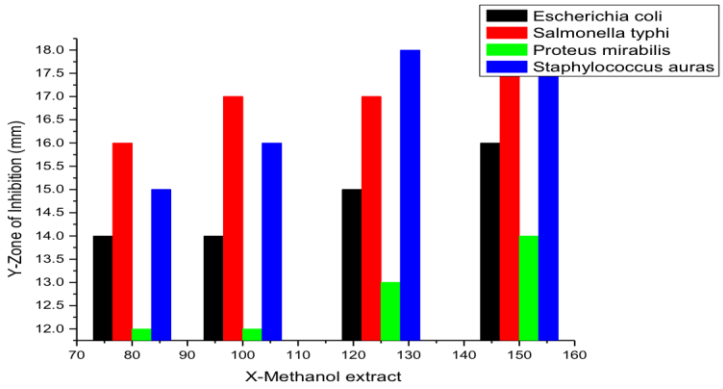

Figure 3: Effect of Methanol leaf extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms.

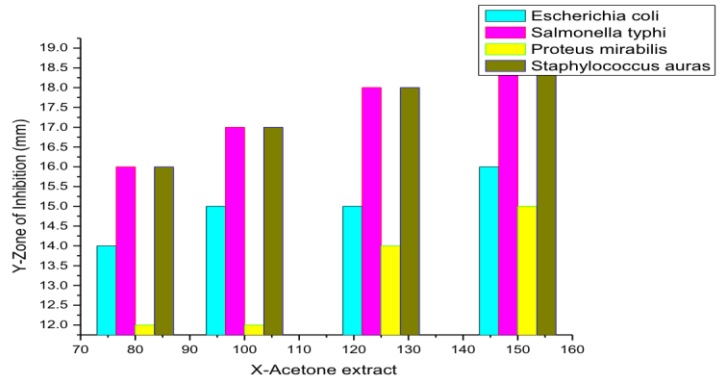

Figure 4: Effect of Acetone leaf extract of *Cardiospermum halicacabum Linn* against pathogenic microorganisms.

of the Muller Hinton Agar medium by using sterile cotton swabs. The sample was added into the sterile disc at different concentrations (75 µL, 100 µL, 125 µL and 150 µL) by using sterile tips, and kept on hot plate. Then the plates were incubated into the incubator for 24 h at 37 ºC. The zones of inhibition of the tested micro-organism by the extracts were measured using a Fisher-chilly anti-biotic zone reader model 290 (U.S.A).

RESULTS AND DISCUSSION

The methanol and acetone extracts were selected for anti-microbial activity and tested against gram (+ve) and gram (-ve) micro-organisms *Staphylococcus aureus*, *Salmonella typhi*, *Proteusm irabilis* and *Escherichia coli*. The results revealed that the extracts exhibited moderate to high anti-microbial activity against all the tested microbial strains. The anti-microbial activity was evaluated from the zone of inhibition (Table-1 and Table-2). Among the crude extracts of *Cardiospermum halicacabum Linn*, methanol and acetone root extract exhibited good anti-microbial activity against the *Salmonella typhi* and *Proteusm irabilis* (Figure-1 and Figure-2). Leaf extract in methanol exhibited good anti-microbial activity against the *Proteusm irabilis* (Figure-3). Leaf extract in acetone exhibited moderate inhibition activity against the *Staphylococcus aureus* (Figure-4). The root extraction from *Cardiospermum halicacabum Linn,* have a good antimicrobial activity when compare to the other roots and leafs of this type. The newly prepared extracts were found to possess high antibacterial activity against *Staphylococcus aureus* NCCS 2079, *Bacillus cereus* NCCS 2106, *Escherichia coli* NCCS 2065, *Pseudomonas aeruginosa* NCCS 2200 at the concentration of 75, 100, 125 and 150 µg/mL (Minimum inhibitor concentration).

CONCLUSION

The results of this study have reveals that the root extracts of *Cardiospermum helicacabum Linn* (Sapindaceae) have great potential as anti-microbial agents in the treatment of infectious organisms. Further detailed investigation of the active component soft replant for the exact mechanism of action will contribute greatly to the development new pharmaceuticals.

ACKNOWLEDGEMENT

Author expresses his sincere thanks to R.G.M authorities for providing good environment for above research.

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