

# Evaluation Of Whole Plant of *Cardiospermum Halicacabum* Linn for Anthelmintic Activity

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## Abstract

Medicinal plants have been used in healthcare since time immemorial. About 80% of those who live in rural areas rely on herbal medicine as their primary form of healthcare. *Cardiospermum halicacabum* Linn is a member of the Sapindaceae family. An herbaceous climber, it is known as Mudakkathan in Tamil. It can be an annual or perennial. This plant's seeds, roots, leaves, stem, and stem are all used to treat a variety of illnesses and ailments. *Cardiospermum halicacabum* Linn's entire plant is being examined for anthelmintic action as part of this study, and its ethanolic, hydroalcoholic, and aqueous extracts have all undergone preliminary phytochemical examination. Whole plant extract was prepared using alcohol, hydroalcohol (50:50) and water. Anthelmintic property of whole plant of *Cardiospermum halicacabum* Linn. ethanolic, hydroalcoholic and aqueous extract was examined at 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml concentrations. The standard concentration utilised was piperazine citrate. *Cardiospermum halicacabum* Linn's anthelmintic action was demonstrated by the worms' paralysis and death at 5 hours, which was followed by a loss of motility and the fading of their body colours. Ethanolic extract was found to be potential anthelmintic drug. The preliminary study revealed the presence of various components that is alkaloids, flavonoids, tannins, sterols and triterpenoids, proteins and amino acids, carbohydrates. Both aqueous and hydroalcoholic extract were found to be less significant. Thus, we can conclude that ethanolic extract of whole plant is a better crude drug of choice for anthelmintic activity.

**Keywords:** *Cardiospermum halicacabum* Linn, Anthelmintic activity.

## INTRODUCTION

Due to their lack of side effects, medicinal plants are transitioning from the margins of society to the mainstream. Worldwide, traditional medical systems have used plant-based medications to treat a variety of ailments. In places where access to modern medications is limited, almost 80% of the world's population still relies on medicinal plants for their basic healthcare needs. <sup>[1][2][3]</sup> About 75–80% of the world's population, primarily in developing nations, still relies primarily on herbal therapy. These plants include a variety of phytochemicals and bioactive

compounds that are essential in the treatment of serious illnesses. <sup>[1][4][5]</sup>

*C. halicacabum* Linn. is a member of the Sapindaceae family. Balloon vine has this common name. Name Mudakkathan in Tamil. Annual climber stems with tendrils that are faintly pubescent. Biternate, essentially trifoliate leaves with three leaflets on each section, each with coarse serrations. Flowers in the axillary heads are typically white with a yellowish centre and 3 flowered by abortion. Fruit is a membranous, inflated, over 2 cm long capsule that is green and turns brown as it dries. Black, round seeds with a large heart- or kidney-shaped mark. <sup>[5][6]</sup>

One of the most common diseases in both developed and developing nations is helminth infections. Intestinal nematodes are thought to infect 2 billion individuals worldwide. [7][8][9]

The parasitic helminths resemble worms. According to their general outward shape and the host organ they occupy, the clinically important groupings are divided. There are bisexual and hermaphrodite species. Worms are generally referred to as helminths. Invertebrates known as helminths have elongated, flat, or circular bodies. The internal and exterior morphology of the egg, larval, and adult stages serve as the basis for the final classification.

- Flukes (Trematodes)
- Tapeworms (Cestodes)
- Roundworms (Nematodes)

The absence of an alimentary canal makes tapeworms unusual. Because of this deficiency, nutrients must be taken via the tegument. Nematodes and blood flukes both have two sexes. The only other types of tapeworms and flukes that affect people are hermaphrodites. Anti-parasitic worm medications are referred to as anthelmintics. This comprises both round worms, such as nematodes, and flat worms, such as flukes and tapeworms. They are of utmost significance to both veterinary and human tropical medicine. The 20th century saw the discovery of the first potent anti-helminthic medications, commonly known as anthelmintics. [10][11][12]

The objective of the current study was to assess the anthelmintic potential of the widely viable *Cardiospermum*

*halicacabum* extract using a variety of solvents.

## MATERIALS AND METHODS

### Plant material collection

*Cardiospermum halicacabum* Linn were collected from in and out skirt of Tiruchengode and the same was authenticated by Dr. S.S. Hameed Scientist 'E' & office-in-charge, Botanical Survey of India, Coimbatore.

### Preparation of extract

The plant material was gathered, shade-dried, and then extracted using ethanol, hydroalcohol, and aqueous

### Ethanolic Extract

The whole plant of *Cardiospermum halicacabum* Linn was shade dried under normal conditions and pulverized into coarse powder. The powdered drug was extracted by hot continuous extraction process using Soxhlet apparatus with ethanol as solvent. The extract was concentrated and the dried residue was collected to obtain the crude ethanolic extract.

### Hydroalcoholic Extract

Shade dried whole plant of *Cardiospermum halicacabum* Linn was macerated with hydroalcohol ethanol: water (50: 50) for 7 days with occasional shaking. The contents are filtered on the 8<sup>th</sup> day and the filtrate is concentrated and dried in the desiccator to obtain crude hydroalcoholic extract.

### Aqueous Extract

Shade dried whole plant of *Cardiospermum halicacabum* Linn was

macerated with water for 7 days with occasional shaking. The contents are filtered on the 8<sup>th</sup> day and the filtrate is concentrated and dried in the desiccator to obtain crude aqueous extract.

### Phytochemical screening

The ethanolic, hydroalcoholic and aqueous extracts of *Cardiospermum halicacabum* whole plant were screened for their phytochemical composition in order to determine their qualitative chemical components. The components were screened using conventional protocol, procedure and reagents as described in Trease and Evans and Sofowora. <sup>[13][14]</sup>

### Anthelmintic studies of *Cardiospermum halicacabum* Linn

For the study, earthworms with consistent size and length between 3-5cm in length and 0.1-0.2cm in width were chosen. Earthworms were released into 10ml of the suitable solution in 21 groups of six each. Group I contain normal saline and serves as a negative control. *Cardiospermum*

*halicacabum* ethanolic extract was administered at doses of 10 mg/ml, 20 mg/ml, 30 mg/ml, 40 mg/ml, and 50 mg/ml to Groups II through VI, respectively. *Cardiospermum halicacabum* hydroalcoholic extract was administered to Groups VII through XI at doses of 10 mg/ml, 20 mg/ml, 30 mg/ml, 40 mg/ml, and 50 mg/ml, respectively. *Cardiospermum halicacabum* aqueous extract was administered at doses of 10 mg/ml, 20 mg/ml, 30 mg/ml, 40 mg/ml, and 50 mg/ml to Group XII to XVI, respectively. Piperazine citrate was administered at doses of 10 mg/ml, 20 mg/ml, 30 mg/ml, 40 mg/ml, and 50 mg/ml to Group XVII through Group XXI, respectively. The earthworms were monitored for the duration of their paralysis and until each one died, which could take up to 5 hours during the test period. The worms' paralysis was confirmed when they failed to recover in normal saline, and death was determined by the loss of their motility and the fading of their body colours. <sup>[15][16][17]</sup>

## RESULTS AND DISCUSSIONS

### Phytochemical Screening:

S.No	Phytoconstituents	Ethanolic Extract	Hydroalcoholic Extract	Aqueous Extract
1.	Alkaloids	+	+	+
2.	Glycosides	-	-	-
3.	Tannins	+	+	+
4.	Flavonoids	+	+	+
5.	Carbohydrates	+	+	+
6.	Proteins and amino acids	+	+	-
7.	Sterols and Triterpenoids	+	-	-
8.	Fats and fixed oils	-	-	-
9.	Vitamin – C	-	-	-

**Key:** + =Present - =Absent

Preliminary phytochemical analysis of ethanolic, hydroalcoholic and aqueous extracts of *Cardiospermum halicacabum* Linn. revealed the presence of alkaloids, flavonoids, carbohydrates, proteins and amino acids, sterols and triterpenoids in

the alcoholic extract. Whereas, the hydroalcoholic extract contains alkaloids, tannins, flavonoids, carbohydrates, proteins and amino acids. Alkaloids, tannins, flavonoids and carbohydrates were present in the aqueous extract.

**Anthelmintic study of *Cardiospermum halicacabum* Linn extract using various solvents:**

Group	Treatment	Dose	Time taken for paralysis (min)	Time taken for death (min)
I	Control	–	–	–
II	<i>Cardiospermum halicacabum</i> ethanolic extract	10 mg / ml	>300	>300
		20 mg / ml	>300	>300
		30 mg / ml	>300	>300
		40 mg / ml	280.7 ± 0.86	>300
		50 mg / ml	220.08 ± 0.88	237 ± 0.92
III	<i>Cardiospermum halicacabum</i> hydroalcoholic extract	10 mg / ml	>300	>300
		20 mg / ml	240.8 ± 1.06	256.72 ± 0.96
		30 mg / ml	207.02 ± 0.92	235.06 ± 0.88
		40 mg / ml	152.9 ± 0.84	180.3 ± 0.48
		50 mg / ml	132.60 ± 0.68	156.42 ± 0.68
IV	<i>Cardiospermum halicacabum</i> aqueous extract	10 mg / ml	>300	>300
		20 mg / ml	>300	>300
		30 mg / ml	>300	>300
		40 mg / ml	>300	>300
		50 mg / ml	180.2 ± 1.08	210.8 ± 0.68
V	Piperazine citrate	10 mg / ml	085.6 ± 0.84	104.80 ± 0.72
		20 mg / ml	032.4 ± 0.78	047.4 ± 0.64
		30 mg / ml	016.4 ± 0.76	026.6 ± 0.98
		40 mg / ml	010.1 ± 0.68	020.4 ± 0.92
		50 mg / ml	0.005.6 ± 1.02	008.2 ± 0.54

All the values are mean  $\pm$  SEM and compared to control group,  $n = 6$  \*\*\* $p < 0.001$

Due to worm infestation, helminthiasis is a widespread disorder that affects the majority of the world. The main causes of this condition's persistence are a lack of sufficient sanitary facilities and a pure water supply brought on by poverty and illiteracy. A third of the world's population is affected by helminthiasis, but it is particularly frequent in developing nations like India. [15] [16] India has a significant problem with helminthiasis, which predominantly affects rural areas but also, to a lesser extent, metropolitan areas.

Anthelmintic drugs are used to eradicate parasitic worms (helminths) from the body by killing or paralysing them. [17][18][19] In the present study, an attempt had been made to evaluate the anthelmintic potential of *Cardiospermum halicacabum* extract using various solvents. The study clearly depicts that *Cardiospermum halicacabum* Linn Ethanolic extract possess significant anthelmintic property. The results were comparable to that of the standard drug.

## CONCLUSIONS

Anthelmintic property of whole plant of *Cardiospermum halicacabum* Linn. ethanolic, hydroalcoholic and aqueous extracts was evaluated for the anthelmintic property at 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml. Piperazine citrate was used as the standard as the above concentrations. The presence of alkaloids, flavonoids, tannins, carbohydrates, proteins, and amino acids, as well as sterols and triterpenoids, was discovered using alcohol extract. The hydroalcoholic extract, on the other hand, has alkaloids,

tannins, flavonoids, carbohydrates, proteins, and amino acids. The aqueous extract contained alkaloids, tannins, flavanoids, and carbohydrates. Ethanolic extract was found to be a potential anthelmintic drug with paralysing time of 132.60min and death time of 156.42 min. Both hydroalcoholic and aqueous extracts were found to be less significant as compared to the standard drug piperazine citrate. Thus, we can conclude that, *Cardiospermum halicacabum* Linn. whole plant ethanolic extract is a better crude drug of choice for anthelmintic activity.

## REFERENCES

1. Manju Shree S, Azamthulla M. A review of *Cardiospermum halicacabum* (sapindaceae), 2019; 8(5):410-420.
2. Deepan T, Alekhya V, Saravanakumar P, Dhanaraju MD. Phytochemical and AntiMicrobial Studies on the Leaves Extracts of *Cardiospermum halicacabum* Linn. Adv. Biol. Res., 2012; 6(1): 14-18.
3. Shaikh SH, Farnaz M, Henry J, Hamid A, Trends in the use of complementary and alternative medicine in Pakistan: a population based survey. J. Altern. Compl, 2009;15(5): 545-550.
4. Swammy, SMK, Tan BKH. Cytotoxic and Immunopotentiating effects of ethanolic extracts of *Nigella sativa* L. seeds. J Ethnopharmacol, 2000; 70:1-7.
5. Savitha G, Vishnupriya V, Krishnamohan S, Geetha RV. Analysis of phytochemical constituents and antimicrobial properties of *Cardiospermum halicacabum* Linn. Drug Invention Today. 2018 Sep 2;10.

6. Senthilkumar S, Vijayakumari K. Phytochemical and GC-MS analysis of *Cardiospermum halicacabum* Linn. Leaf. Int J Inst Pharm Life Sci 2013;3 Suppl 5:95-8.
7. Deokate UA, Lahane SB, Sujeetkumar A. Review on Anthelmintic Drugs. International Journal of Pharmaceutical Research. 2014 Jul;6(3):1.
8. Krogstad DJ, Andengleberg CN, "Introduction Toparasitology, Mechanisms of Microbial Disease", Williams & Wilkins, Maryland, USA, 1998; 341-346.
9. Wen LY, Yan XL, Sun FH, Fang YY, Yang MJ, Lou LJ, Acta Tropica, 2008;106;190-194
10. <http://www.who.int/wormcontrol/statistics/>
11. Astalakshmi. N, Surendra Kumar. M, Mithra. T., Nikhil. BR., Rinshida P Zubair., Muhammed Ameer. VK and G. Babu.. Evaluation Of *Hyophila involuta* (Hook.) A. Jaeger aqueous extract for anthelmintic activity.
12. Surendra Kumar, M. and Kavimani. S., 2014a. Anthelmintic activity of *Millingtonia hortensis* Linn. F. stem bark on Indian adult earthworm. Der Pharmacia Lettre, 6(5):89-91.
13. G. E. Trease and W. C. Evans, Pharmacognosy, Bailliere Tindall, London, UK, 13th edition, 1989.
14. A. Sofowora, Medicinal Plants and Traditional Medicine in Africa, Spectrum Books Ltd, Ibadan, Nigeria, 1993.
15. Surendra kumar. M., Astalakshmi. N., Mithra. T., Nikhil. BR., Rinshida P Zubair., Muhammed Ameer. VK and G. Babu., 2014. Evaluation of *Cyathodium cavernarum* Kunze aqueous extract for anthelmintic activity. International journal of pharmacognosy and phytochemical research. 6(4) :778-779.
16. Singh S., Rai AK, Sharma P., Barshiliya Y. Comparative study of anthelmintic activity between aqueous extract of *Areva Lanata* and *Rotula aquatica* Lour. Asian Journal of Pharmacy and Life Science., 2011; 1(3): 211-215.
17. Dash GK, Suresh P, Sahu SK, Kar DM, Ganapathy S and Panda A. Evaluation of *Evolvulus alsinoides* Linn. for anthelmintic and antimicrobial activities. Journal Natural Remedies., 2002; 2: 182-85.
18. Walter PJ, Richard KK. Chemotherapy of parasitic infections, In; W.C. Campbell and L.S. Rew (eds), plenum, New York, 1985; 278-539.
19. Temjenmongla and Yadav A. Anticystodal efficacy of folklore plants of Naga tribes in North East India, Afr. J. Trad. Cam., 2005; 2(2): 129-133.