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Phytochemical screening of *Cardiospermum halicacabum* L. seeds

Laby Singh[1], Awadh Raj Singh[2]
[1] Research Scholar, Department of Botany, S.G.S. Govt. P.G. College, Sidhi, Madhya Pradesh, India
[2] Principal, S.G.S. Govt. P.G. College, Sidhi, Madhya Pradesh, India

Abstract
Cardiospermum halicacabum L. is a climber plant of Sapindaceae family with certain medicinal properties that have made it to be used traditionally in different systems of medicine such as Ayurveda, Homeopathy and Unani medicine. The phytochemical screening gave a positive test for presence of various phytoconstituents like alkaloids, flavonoids, and tannins. The amount of total phenols was found to be between 28.637±0.227 to 187.303±0.606 mg pyrogallol equivalent/g and the content of flavonoids between 26.812±0.424 to 137.201±0.304 mg quercetin equivalent/g in various extracts.

Keywords: balloon vine, *Cardiospermum halicacabum*, phytochemical, seeds

1. Introduction
Cardiospermum halicacabum L. of Sapindaceae family is an annual or sometimes perennial climber plant. It extensively grows in tropical and subtropical areas of the world and is commonly found as a weed throughout India. It is known as *love in a puff* or *balloon vine* in English and Kanphuti in Hindi. The whole plant of *C. halicacabum* is used in folk remedies for its nutritional values and is known as a medicinal plant which possesses medicinal properties for treatment of various ailments; it has been used in various traditional systems of medicine such as Ayurveda, the Indian system of medicine, Unani and Chinese medicine (AYUSH, 2007 & 2008, Kirtikar and Basu, 2005) [1-3]. In Indian system of medicine *C. halicacabum* L. has been used for treatments of chronic bronchitis, stiffness of limbs and snakebites.

2. Material and Methods
Cardiospermum halicacabum plant with its leafy flowering branches and mature seeds were collected from Sidhi district, Madhya Pradesh. Powder of the seeds was prepared finally by grinding the seeds in a mechanical pulverizer and passing through a 40- mesh sieve. The powder was stored in an airtight jar, protected from the light.
Two-hundred g of powder was used for preparation of the various extracts by solvents with different polarities like *n*-hexane, chloroform, ethyl acetate, methanol and aqueous methanol (methanol 60%). The extracts were tested for the presence of various constituents, some of which were further subjected for quantitative estimation (Khandelwal, 2007; Olajire and Azeez, 2011 and Kim, *et al.* 2003) [4-6].

3. Results and Discussion
The present work described the preliminary phytochemical analysis of the seeds.
Various physical parameters of seeds and powder such as moisture content, total ash, acid insoluble ash, water-soluble ash, pH values and extractive value, were determined. The results of this study were shown in tables 1 and 2. Results of preliminary phytochemical screening are compiled in table 3.

Table 1: Physicochemical parameters of *C. halicacabum* seeds

S. No.	Parameters	w/w %
1.	Loss on drying	6
2.	Total ash	4
3.	Acid insoluble ash	3
4.	Water soluble ash	1.6
5.	pH (1%)	7.24
6.	pH (10%)	5.84%

Table 2: Fluorescence analysis and yield of extracts in different solvent of *C. halicacabum* seeds

S. No.	Solvents	Day light	UV light 366 nm	Extractive yield in % w/w	Consistency
1.	n-hexane	Greenish yellow	Orange	24.17	Oily
2.	Chloroform	Golden brown	Amber orange	0.95	Semi oily
3.	Ethyl acetate	Nordic olive	Sulphuric yellow	0.72	Semi oily
4.	Methanol	Red brown	Beige	2.73	Semi solid
5.	Aqueous methanol	Dark brown	Brown	1.14	Solid

Table 3: Preliminary phytochemical screening of *C. halicacabum* seeds

S. No.	Phytochemicals	n-hexane	Chloroform	Ethyl acetate	Methanol	Aqueous methanol
1.	Alkaloid	-	-	+	+	+
2.	Saponin	-	-	-	+	+
3.	Steroid	-	-	-	-	-
4.	Flavonoid	+	+	+	+	+
5.	Tannins and Phenolics	+	+	+	+	+

The results of the quantitative *phytochemical* estimations indicated the amount of phenols and flavonoids in different extracts; it indicated the levels of phenol expressed as milligrams of pyrogallol equivalents 28.637±0.227 in chloroform to 187.303±0.606 in the aqueous methanol extracts. The content of flavonoids was expressed as quercetin equivalents varied from 26.812±0.424 in ethyl acetate to 137.201±0.304 in the aqueous methanol extract. Table 4 summarizes the amounts of total phenolic and total flavonoid compounds in different extracts.

Table 4: Total phenolics and flavonoid content of *C. halicacabum* seeds extracts

S. No.	Seeds extracts	Total phenolics (mg pyrogallol equivalent/g)	Total flavonoid (mg quercetin equivalent/g)
1.	n-hexane	53.161±0.484	32.173±0.423
2.	Chloroform	28.637±0.227	56.116±0.426
3.	Ethyl acetate	97.902±0.244	26.812±0.424
4.	Methanol	135.292±0.121	63.311±0.431
5.	Aqueous methanol	187.303±0.606	137.201±0.304

Each value in the table is represented as mean±SD

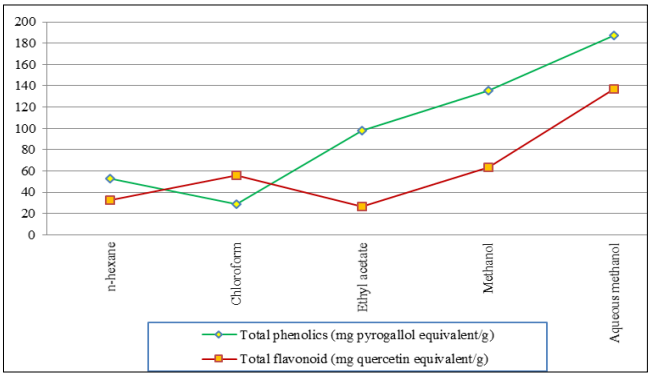

Fig 1: Graphics analysis of Total phenolics and flavonoid content of *C. halicacabum* seeds extracts.

The results here indicated that the seeds have high extractive yield in *n*-hexane extract in the form of oil, which is an important product from seeds and is considered as a good source of nutrition and essential oils. The results indicated that the seeds have high extractive yield for the *n*-hexane extract in the form of oil, which is an important product from seeds and considered as a good source of nutrition and essential oils (Burr, *et al.* 2007) [7]. In addition, the amount of the total phenols and flavonoids present in the seeds showed a potential for medicinal values. The presented data from this study would be beneficial for quantitative and qualitative standardization of herbal preparations from *C. halicacabum* seeds.

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