In vitro Anthelmintic activity of stem extract of *Muntingia calabura* Linn

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Abstract

Background and Objectives: Muntingia calabura Linn is an Indian medicinal plant belongs to the family Muntingiacea. The goal of the current study is to evaluate the anthelmintic activity of stem part of *Muntingia calabura* Linn.

Methodology: To investigate the anthelmintic property we have selected adult Indian earthworms (*Pheretima posthuma*). The dried extract was suspended in 1% w/v carboxymethyl cellulose and prepared three different concentrations (25, 50, and 100 mg/ml) in normal saline water. Normal saline water with 1% CMC was used as the control, while an albendazole suspension at the same concentrations were used as the standard. Worms were introduced in petri-dishes containing 15 ml of the standard and test solution and were observed for the Vermicidal and vermifuge action.

Results: When compared to standard drug, ethanolic extract of Muntingia calabura Linn exhibited significant anthelmintic activity at all tested doses, with extremely significant activity exhibited at the higher concentration (100 mg/ml).

Conclusion: According to the data of the present investigation, Muntingia calabura Linn exhibits significant anthelmintic activity when compared to the albendazole and this effect is attributed to the phytochemicals like glycosides, tannins, flavonoids, saponins and triterpenes.

Index Terms - Anthelmintic activity, Albendazole, Vermifuge, Vermicidal.

I. INTRODUCTION

There is a widespread belief that every ailment has a natural treatment somewhere. Today, plants such as trees, shrubs, or herbs are used to make about 25% of all prescription medications [1]. In tropical areas, especially Asian nations, helminthiasis is a severe and pressing issue. Helminthiasis is a critical issue for both humans and other animals worldwide [2]. Because they typically live in the small intestine, which contains a lot of food, worms are often referred to as "stomach worms," however they can also live in the large intestine. In most cases, worms infect people when they consume food or liquids that have been infected with worm eggs and make their way into the human digestive system [3]. Two billion individuals worldwide have worm infections, according to statistics from the World Health Organization from 2012 [4]. Humans and animals are infected by a variety of helminths, the most prevalent of which are intestinal round worms (species of *Ascardia*). The severe morbidity caused by these parasites affects about 300 million people, half of whom are school children who have been infected severely. This infection causes a number of clinical symptoms, such as dysentery, diarrhoea, nausea, and vomiting, as well as loss of appetite and weight, acidity, and occasionally anaemia also [5]. *Muntingia calabura*, belongs to the family Muntingiaceae, is commonly called as Jamaican cherry and “kerukup siam” in Malaysia [6]. The Central America, tropical South America, Southern Mexico, Trinidad, and St. Vincent are its native habitats. In warm regions of India and Southeast Asia, including Malaysia, Indonesia, and the Philippines, it is frequently grown. In fact *M. calabura* is frequently planted as shelter trees in these countries. *Muntingia calabura* Linn. grows lushly in a variety of places, including public lawns, orchards, woodlands, cities, industrial facilities, playgrounds, roadside ditches, and residential lots [7]. To make these herbal medicines more effective, proper scientific screening of these plants potential bioactive followed by chemical research is required.

Helminths are a significant problem for humans and other animals worldwide, but particularly in the developing world. Different types of helminths, some of which are prevalent, infect both humans and animals. These parasites cause serious morbidity in about 300 million people, half of whom are school-age children who have widespread infections. Every organ and organ system is susceptible to infection by helminths, which are most commonly found in the intestines. They can also infect the blood, liver, lungs, brain, and other organ [8]. This infection causes a number of clinical symptoms, such as dysentery, diarrhoea, nausea-vomiting infections, respiratory symptoms, dermatological complications, and epilepsy. In addition to impairing immune responses to pathogens causes other illnesses like HIV, malaria, HIV/AIDS, and tuberculosis, helminthic infections can cause weight loss, acidity, and occasionally anaemia [9].

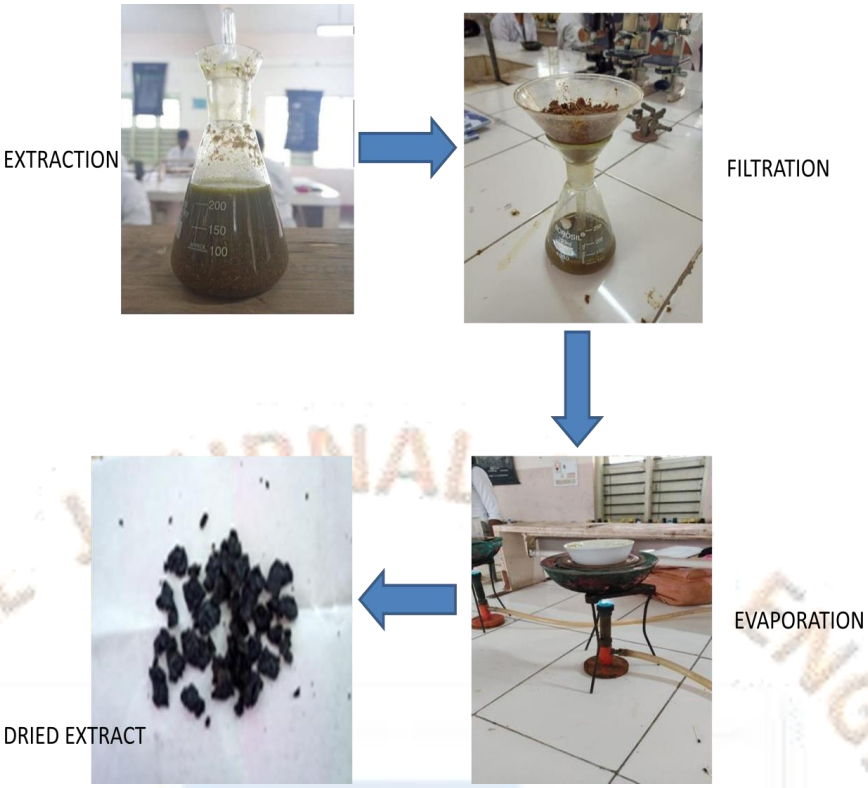


Fig.1: *Muntingia calabura* stem extraction process

II. MATERIALS AND METHODOLOGY

Collection and authentication

The stem part of *Muntingia calabura* Linn was collected from the vicinity of Bharathi College of Pharmacy. The plant was authenticated by Dr. Mahesh H M., Assistant Professor and Head, Department of Botany, Bharathi College, Bharathinagara, Maddur Tq, Mandya Dist. Karnataka.

Drying and grinding

The stems were collected and dried for two weeks at room temperature in the shade. The dried stems were processed into a coarse powder using an appropriate grinder and sieve no. 40. The powder was then kept in an airtight container until the analysis commence.

Preparation of stem extract of *Muntingia calabura Linn* using ethanol as solvent

The maceration extraction procedure was applied to the powder samples using an ethanol solvent solution. In a flask that was tightly shut with a cotton plug and contained 40g of freshly made powder and 400ml of ethanol solution, 48 hours of room temperature storage were performed. The iodine flask was occasionally shaken to aid in the extraction process. Whatman's filter paper was used to filter the flask's contents. A small amount of ethanol was used to rinse and filter the residue still in the flask. The filtrate was preserved for the solvent's steam evaporation after being transferred to a beaker that had already been weighed. The extract was weighed and used to assess the extract's anthelmintic activity after the solvent had completely evaporated. To determine whether there were any phytoconstituents in the extract, a preliminary phytochemical screening was conducted.

Phytochemical screening

Ethanolic stem extract *Muntingia calabura* Linn was subjected to preliminary phytochemical analysis using standard procedure to identify the presence of alkaloids

Selection of experimental animal

Indian adult earthworms were employed in this experiment (*Pheretima posthuma*). The earthworms were gathered from the soggy soil of an agricultural field, and all faeces were removed by washing the worms in regular saline solution. For every step of the experiment, earthworms measuring 8–10 cm in length and 0.3–0.4 cm in width were employed. It should first be employed for in vitro testing of anthelmintic activity due to its ready availability.

Evaluation of anthelmintic activity

Since there is a morphological and physiological resemblance to the human intestinal round-worm parasite, the adult earthworm (*Pheretima posthuma*) was selected in the experiment for anthelmintic activity. Six worms in each group were taken for the experiment. Dried extract was prepared in three different concentrations (25, 50, and 100 mg/ml) with 1% w/v carboxymethyl cellulose and prepared in normal saline water. Normal saline water with 1% CMC served as the control and albendazole suspension at the same concentrations served as the standard. The petridishes were added with 15 ml of control, sample and drug separately and to them worms were introduced.

Group-1- Control (1% CMC in normal saline)

Group- 2 - Albendazole (25, 50, 100 mg/ml)

Group-3 - Ethanol extract (25, 50, 100 mg/ml)

III. RESULTS

Phytochemical analysis

To identify the active components, the plant extracts were subjected through a series of qualitative chemical tests to check whether these phytoconstituents might be responsible for the anthelminthic activity. The data provided in the table 1 shows that the *M. calabura* stem contain many phytochemicals like glycosides, tannins, flavonoids, saponins and triterpenes.

Table 1: Qualitative chemical investigations of extracts of *Muntingia calabura Linn.*

Sl. no.	Phytochemical tests	Ethanolic extract of stem
1.	Alkaloids	-
2.	Glycosides	+
3.	Tannins	+
4.	Phenols	-
5.	Flavonoids	+
6.	Saponins	+
7.	Sterols	-
8.	Triterpenes	+

"+" = present and "–" = absent.

Death time of worms at 25, 50, & 100 mg of ethanolic extract

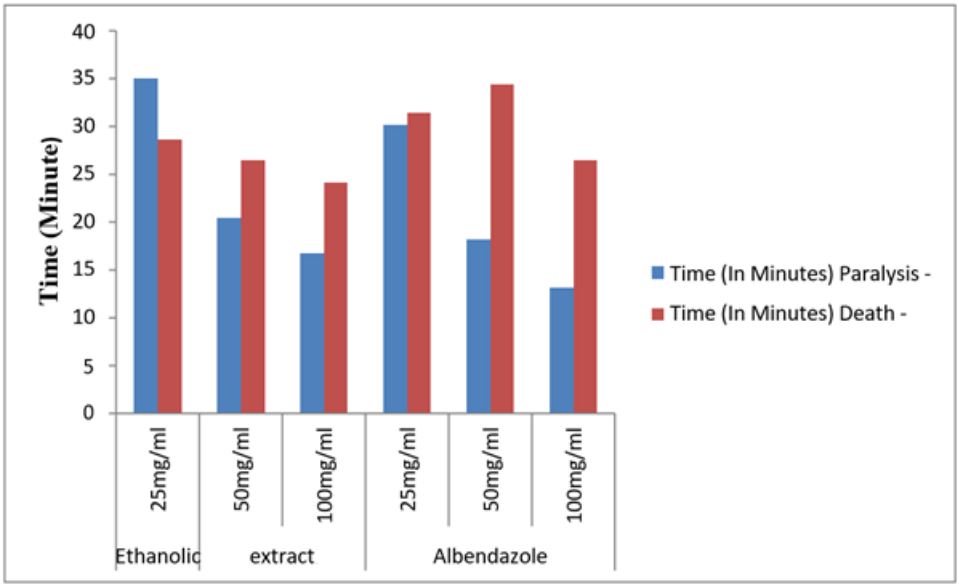
In both the treatment and control groups, time taken for paralysis of the worm were recorded at various concentrations. When compared to worms treated with the standard drug albendazole, the ethanolic extract of *Muntingia calabura* Linn, 25 mg, was found to be somewhat significant (p 0.05). When compared to worms treated with the usual treatment albendazole, the ethanolic extract of *Muntingia calabura* Linn, 50 mg, was found to be extremely significant (p 0.01). When compared to worms treated with the usual treatment with albendazole, the ethanolic extract of *Muntingia calabura* Linn, 100mg, was found to be extremely significant (p 0.01).

Table 2: Anthelmintic activity of ethanolic extract of *Muntingia calabura Linn*.

Group/treatment	Concentration	Time (In Minutes)	
		Paralysis	Death
Control (1% CMC)	-	-	-
Ethanolicextract	25mg/ml	35.01±0.164 *	28.63±0.05 *
	50mg/ml	20.42±0.093 **	26.43±1.04 **
	100mg/ml	16.69±0.048 **	24.093±0.326**
Albendazole (Standard drug)	25mg/ml	30.17±0.971	31.43±0.25
	50mg/ml	18.14±0.410	34.38±0.59
	100mg/ml	13.106±0.562	26.483±0.128

All values are expressed as mean ± standard deviation (SD)

Significant level P<0.05 *, P<0.01 ** Moderately significant [*]Highly significant [**]



IV. DISCUSSION

Medicinal plants contains many phytochemicals which are essential to human health. Medicinal herbs can treat a variety of illnesses when handled properly. One such medicinal plant being used traditionally to cure a variety of ailments is *Muntingia calabura* Linn.

Crude extract of the stem of *Muntingia calabura* Linn was subjected to preliminary phytochemical analysis and the presence of flavonoids, alkaloids, triterpenes, saponins, glycosides, and tannins was observed. According to the results, the ethanolic stem extract of *Muntingia calabura* produces dose-dependent in-vitro anti anthelmintic activity. The 25mg dose causes paralysis in worms in 38.15 minutes, 50 mg/ml causes paralysis in worms in 25.08 minutes, and 100 mg/ml causes paralysis in worms in 19 minutes. In this experiment, albendazole was employed as the standard in doses of 25, 50, and 100 mg/ml, respectively, and it took 12 minutes and 32 minutes, 9 minutes and 28 minutes, and 5.30 minutes and 15 minutes to paralyse the worms and cause their death from the dose of 25, 50, and 100 mg/ml, respectively.

V. CONCLUSION

From the findings of current study it is evident that the ethanolic extract of *Muntingia calabura* Linn has a strong anthelmintic activity when compared to commonly prescribed medication and is nearly as effective as standard anthelmintic medication. Additional research utilizing *in vitro* models is necessary to carry out and establish the efficacy and other pharmacological parameters for using *Muntingia calabura* Linn as an anthelmintic medication. To find the active ingredient responsible for the anthelmintic effect, the drug's phytochemical profile may be further examined.

VI. REFERENCES

[1] Petrovska BB. Historical review of medicinal plants' usage. Pharmacognosy reviews. 2012 Jan;6(11):1.

[2] Hossain E, Chandra G, Nandy AP, Mandal SC & Gupta JK: Anthelmintic effect of a methanol extract of leaves of *Dregea volubilis* on Paramphistomum explanatum. Parasitol Res, 110, 2012, 809–814.)

[3] Rowardho D, Ismail TS. Keberadaan telur cacing usus pada kuku dan tinja siswa sekolah alam dan non alam. Jurnal Kesehatan Masyarakat Indonesia. 2018 Feb 6;10(2):18-25.

[4] World Health Organization. Soil-transmitted helminthiases: Eliminating soil-transmitted helminthiases as a public health problem in children, in Progress report 2001-2010 and strategic plan 2011- 2020. France: WHO Press; 2012

[5] Nagaraju *Y. Kranthi, M.Soma,Srujana,K.Prasad* In-vitro anthelmintic activity of methanolic extract of *Muntingia calabura* leaves (2019) International journal of pharmaceutical science Review & Research [2019] : 56(2) 91-93.)

[6] Kaneda N, Pezzuto JM, Soejarto DD, et al. Plant anticancer agents, XLVIII. New cytotoxic flavanoids from *Muntingia calabura* roots. J Nat Prod. 1991; 54:196–206

[7] Battu Gango Rao, Jeevitha konda, Battu Heera, Review of literature phytochemical & pharmacological studies of *Muntingia Calabura. [Global trendspharmacy]* (2018): 5020-5025.

[8] Sangh Partap, Saurabh Kumar, Amit Kumar In-vitro anthelmintic activity of *Luffa Cylindrica* leaves in Indian adult earthworm [2012] Journal of Pharmaconsy and Phytochemistry.

[9] Jitendra Patel, G.J Kumar, Md Shamim Quershi (2010) in-vitro anthelmintic ativity of ethanolic extract of whole plant of *Eupatorium odoratum*. L. (2010) International Journal of phytomedicine.