World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 7.409

PARASITE CONTROL POTENTIAL OF THE AQUEOUS EXTRACT OF *JATROPHA MULTIFIDA*

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Article Received on 23/03/2024 **Article Revised on 12/04/2024** **Article Accepted on 02/05/2024**

ABSTRACT
Helminthic infections are often attributed to poor management practices and inadequate control strategies. Medicinal plants, rich in diverse phytoconstituents, possess anthelmintic properties that contribute to their effectiveness against these parasites. Aqueous extract of leaves of the plant *Jatropha multifida* (L.) belonging to the family *Euphorbiaceae* were selected for screening it's anthelminthic activity by means of *in-vitro* method on *Eisenia fetida* belongs to *Lumbricidae* family. During the process of evaluation, it is found out that the aqueous extract possesses a significant dose dependent anthelminthic activity which was comparable with the standard drug albendazole on different concentrations (100,150,200,250 mg/ml). The maximum anthelminthic activity observed with 250 mg/ml of the plant extract.

KEYWORDS: *Jatropha multifida* (L.), Anthelminthic, *in-vitro*, *Eisenia fetida*, Albendazole.

INTRODUCTION
Herbal medicine has a long history of use for treating and preventing diseases, promoting health, and improving quality of life. It focuses on restoring the body's natural balance to facilitate self-healing. Herbal plants and medicines have been utilized across different medical systems globally for various ailments. Researchers are increasingly interested in plant-derived medicinal agents due to concerns about the side effects and high costs associated with current drugs.[1] Plant-based medicines have played a vital role in healthcare practices for millennia, especially in regions like India, Africa, China, and Egypt. These diverse cultures have long recognized the therapeutic potential of plants and incorporated them into their traditional medicinal systems. In India, for example, Ayurveda, one of the world's oldest holistic healing systems, relies heavily on plant-based remedies. Herbs like turmeric, neem, and ashwagandha are just a few examples of plants that have been used for centuries in Ayurvedic medicine to treat various ailments.[2]

Anthelmintics, also known as antihelminthics, are medications designed to eliminate parasitic worms (helminths) from the body by either paralyzing or killing them. This is a crucial aspect of healthcare as the World Health Organization (WHO) estimates that approximately two billion people worldwide are infected with parasitic worms. These infections not only affect human health but also impact livestock and crops, leading to reduced food production and significant economic consequences. The development and effective use of anthelmintic drugs are thus essential for combating parasitic worm infections and addressing their wide-ranging effects on public health and agricultural sustainability. Helminth infections affect a significant portion of the global population, particularly in developing countries. Statistics show that approximately 819 million people are affected by Ascaris, 438 million by hookworm, and 464 million by Trichuris. These infections are more prevalent in warm, humid equatorial regions with inadequate hygiene and sanitation facilities. Helminths encompass various categories such as tapeworms, roundworms, and flukes, impacting both humans and animals and causing physiological damage. The management of helminth-borne diseases is often hindered by poor practices and insufficient control strategies.

Medicinal plants play a crucial role in managing parasitic infections due to their anthelmintic properties. They offer several advantages over synthetic medicines, containing diverse secondary metabolites that exhibit anthelmintic activity.[3]

MATERIALS AND METHODS

Source of the plant

The leaves of *Jatropha multifida* (L) were collected locally from Karunagappally region of Kerala during the month of February and the study has been carried out after confirming its botanical identity by Dr.Sreeja P, Assistant Professor from the Department of Botany, Sir Syed College, Thaliparamba in Kannur district of Kerala. A voucher specimen bearing voucher specimen number 9954 has also been deposited in the Department of PG Studies and Research in Botany, Sir Syed College, Taliparamba, Kannur, Kerala. The collected leaves were dried in shade, powdered and closely packed in air tight container.

Preparation of the Extract

The dried leaves of *Jatropha multifida* was powdered and was extracted using distilled water through a maceration technique. Approximately 50 grams of the powdered plant material was macerated with 400 ml of water. The container holding the mixture was sealed and left undisturbed for seven days at normal room temperature, with occasional shaking and stirring during this period.[4]

Source of Organism

Eisenia fetida, also known as manure worm,[2] redworm, brandling worm, panfish worm, trout worm, tiger worm, red wiggler worm, etc., is a species of earthworm adapted to decaying organic material. These worms thrive in rotting vegetation, compost, and manure. They are epigean, rarely found in soil. Role of *Eisenia fetida* in determining invitro anthelminthic activity is well documented through various studies.[3]

The organism was procured from Kumar Jaivik Kisan Krishi Kendra and delivered by Kakran organics, Mohsanpur, Uttar Pradesh and its authentication has been done by Dr.Swaran, P.R, Associate Professor and Head, Department of Zoology, Payyanur College, Payyanur, Kannur district of Kerala state. Services of veterinary practitioners were also utilized to confirm the identity of the parasite. The worms with length of 4-5cm and 0.1 - 0.2 mm in width were used for the evaluation and were washed with water to remove the adhering sand and the unwanted materials. Pretreatment with saline has been done for the parasite before the evaluation.

Preliminary phytochemical screening

The preliminary phytochemical screening of aqueous extract of the leaves of *Jatropha multifida* were carried out as per the standard procedure.[5,6]

Anthelminthic activity (invitro)

The anatomical and physiological features of the earthworm bear a striking resemblance to the intestinal roundworm parasite found in humans. Consequently, *Eisenia fetida* was selected for this study to evaluate the anthelmintic properties of *Jatropha multifida*. The anthelmintic activity was assessed on adult earthworm *Eisenia fetida* following established protocols, with the experiment conducted in triplicate. Each group of worms was exposed to varying concentrations (100, 150, 200, 250 mg/ml) of aqueous extracts of *Jatropha multifida*, with three worms per Petri dish. The worms were closely monitored for signs of paralysis or death, recording the time it took for paralysis to occur, indicated by the absence of movement and confirmed by external stimuli. Death was confirmed by the loss of motility and a fading in coloration. Albendazole (100, 150, 200, 250 mg/ml) served as the standard drug, while saline acted as the control.[5]

Statistical Analysis

The statistical analysis was done by using Dunnett's test.

RESULT AND DISCUSSION

Phytochemical screening

Phytochemical screening of the crude extracts reveals the presence of carbohydrates, alkaloids, glycosides, tannins, saponins and flavonoids.

Anthelmintic evaluation

An effective anthelmintic drug must be able to penetrate the cuticle of the worm or gain access to its alimentary tract.[7] An anthelmintic drug can act by causing paralysis of the worm or by damaging its cuticle, leading to partial digestion or rejection by immune mechanism.[8] The aqueous extract of the leaves displays a significant anthelmintic activity in dose dependent manner. The anthelmintic activities of the extract were comparable with that of albendazole which is used as standard drug. The aqueous extract of leaves was found to be effective upon comparison with the standard drug albendazole in causing paralysis and death of earthworms. It can be concluded that the concentration of active constituents responsible for anthelmintic activity might be present in the leaf extract. The time taken for paralysis and death of the earth worms are tabulated in table 1.

Table 1: Anthelmintic activity of the aqueous extract of *Jatropha multifida*.

Drug Treatment	Concentration in(mg/ml)	*Eisenia fetida*	
		Paralysis time in Minutes	Death time in Minutes
Aqueous extract of *Jatropha multifida*	100	88±0.011	193±0.022
	150	74±0.079	87±0.027
	200	41±0.099	57±0.043
	250	29±0.047	26±0.082

Albendazole (Reference Standard)	100	187±0.052	222±0.058
	150	111±0.057	178±0.118
	200	89±0.227	112±0.587
	250	45±0.647	58±0.257

*Values are mean ± S.E.M, N=3*P<0.01with the standard*

It seems that glycosides, alkaloids and flavonoids were responsible for demonstrating anthelmintic activity of the aqueous extract. Plants exhibit anthelmintic activity mainly because of the phytoconstituents which is distributed throughout the plant. The plants are not explored scientifically to study the mechanism of action of these phytoconstituents as anthelmintic. A single plant may contain a single constituent or group of constituents. Sometimes the anthelmintic action may be due to single compound or sometimes these compounds jointly act by the inhibition of tubulin polymerisation and blocking glucose uptake.[9,11] Any damage to the mucoploysacharide membrane of worms will expose the outer layer restricting their movement which finally results in paralysis and there after the death of the parasites.[9,10]

The phytochemical screening of the aqueous extract of the leaves of *Jatropha multifida* reveals the presence of flavonoids, tannins, alkaloids and glycosides. The anthelmintic action of tannins could be due to its capacity to bind with free protein available for larval nutrition and thus reducing the nutrient availability resulting in larval starvation or decrease in gastro intestinal metabolism directly through inhibition of oxidative phosphorilation causing larval death.[12] The alkaloids present in the flower extract may act on the central nervous system and causes paralysis of the earth worms.[13] The alkaloids may suppress the transfer of sucrose from the stomach to the small intestine together with their antioxidant effect which is capable of reducing the nitrate generation which can interfere in local homeostasis and is essential for the development of helminths.[14]

CONCLUSION

The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as an anthelmintic. The plant may be further explored for its phytochemical profile to recognize and to isolate the different active constituents accountable for anthelmintic activity.

Conflict of interest: Nil.

ACKNOWLEDGEMENTS

The authors are thankful to Dr.Swaran PR Department of Zoology, Payyanur College, Payyanur, Kannur District of Kerala and Dr.Sreeja P, Department of Botany, Sir Syed College, Thaliparamba, Kannur district of Kerala for providing necessary information and facilities for the research work.

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