



Received on 12 February 2026; received in revised form, 17 March 2026; accepted, 20 March 2026; published 31 March 2026

EVALUATION OF ANTHELMINTIC ACTIVITY OF AQUEOUS EXTRACT OF THREE MEDICINAL PLANTS OF BANGLADESH

Mohammad Sarwar¹, Md. Al Amin Topu¹, Deepanwita Nath², Tasmina Rahman³, Md. Sohel Rana^{3,4}, Dipongkar Roy⁵ and Pritesh Ranjan Dash^{3,*4}

Department of Pharmacy¹, Primeasia University, Banani, Dhaka, Bangladesh

Faculty of Medicine², Institute of Applied Health Sciences, University of Sciences and Technology Chittagong (USTC), Chittagong, Bangladesh

Department of Pharmacy³, Jahangirnagar University, Savar, Dhaka, Bangladesh

Department of Pharmacy⁴, ASA University Bangladesh, Shyamoli, Dhaka, Bangladesh.

Department of Neuromedicine⁵, Sylhet MAG Osmani Medical College, Sylhet Bangladesh.

Keywords:

P. posthuma, Zingiberaceae, Cucurbitaceae, Moringaceae, Earthworm

Correspondence to Author:

Pritesh Ranjan Dash

Assistant Professor,
Department of Pharmacy,
ASA University Bangladesh,
Shyamoli, Dhaka, Bangladesh.

E-mail: pritesh.ju@gmail.com

ABSTRACT: The development of anthelmintic resistance and the higher expense of traditional anthelmintic medications caused the *Zingiber stigation* of medicinal plants as a potential substitute of anthelmintics, utilizing the *P. posthuma* adult earthworm. The present investigation focuses on the anthelmintic potential of three traditionally used plants of Bangladesh: *Zingiber officinale* (family: Zingiberaceae), *Momordica charantia* (family: Cucurbitaceae), and *Moringa oleifera* (family: Moringaceae) at all tested concentrations (25 mg/ml, 50 mg/ml, and 100 mg/ml), the extracts showed anthelmintic activity. The greatest effect was seen at 100 mg/ml. At higher concentrations, *Momordica charantia* (Korola) showed the strongest anthelmintic effect among the plants, followed by *Zingiber officinale* (Ada) and *Moringa oleifera* (Sajna pata). The traditional use of these plants as natural anthelmintic agents is supported by these results.

INTRODUCTION: Helminth infections are one of the most prevalent diseases in developing and developed countries. Globally, 2 billion people are infected by intestinal nematodes. Most diseases caused by helminthes are chronic and debilitating in nature, they probably cause more morbidity and greater economic and social deprivation among humans and animals than any other single group of parasites.

Parasitic gastroenteritis is caused by mixed infection with several species of stomach and intestinal worms, which results in weakness, loss of appetite, decreased feed efficiency, reduced weight and decreased productivity¹. Anthelmintics are drugs which may kill infesting helminthes. Chemotherapy is the only treatment and effective tool to cure and control helminthes infection, as effective vaccines have not been developed so far.

Indiscriminate use of synthetic anthelmintics can lead to resistance of parasites². Helminthic infection is one of the health issues that affect human he and livestock in the world. The helminths which infect the gastrointestinal system are cestodes, nematodes, and trematodes. The synthetic drugs available have been shown to have

	<p>QUICK RESPONSE CODE</p>
	<p>DOI: 10.13040/IJPSR.0975-8232.IJP.13(3).216-20</p>
<p>Article can be accessed online on: www.ijpjournal.com</p>	
<p>DOI link: https://doi.org/10.13040/IJPSR.0975-8232.IJP.13(3).216-20</p>	

side effects; moreover, resistance of the parasites to existing drugs is increasing³. Gastrointestinal parasite becomes a serious threat to the livestock production in the developing nations. In spite of the development of anthelmintic resistance in the parasites of higher economic significance, chemotherapy is still used widely for the purpose of controlling the helminthes⁴. Helminthiasis which is caused by the helminthes infection is proved to be a major constraint in the livestock production all around the globe. As mentioned above, chemotherapeutics remains the corner stone for treating the helminthiasis by overcoming certain factors such as chemical residues and toxicity, increased cost, non-adaptability of drugs and non-availability in the remote areas⁵.

A part of the Cucurbitaceae family, *Momordica charantia* (Korola) is a popular vegetable in Bangladesh and is prized in traditional medicine. Alkaloids, saponins, tannins, and flavonoids found in its fruit and leaves have been linked to antimicrobial, antidiabetic, and anthelmintic properties⁶. The Zingiberaceae family includes the widely used spice and medicinal *Zingiber officinale* (Ada). Gingerols and shogaols are examples of phytochemicals that have been found to be active substances with vermifugal, antioxidant, and anti-inflammatory properties. According to studies, ginger extracts have a strong *in-vitro* anthelmintic effect on gastrointestinal nematodes and *Pheretima posthuma*⁷. The Moringaceae family includes *Moringa oleifera* (Sajna pata). In addition to being high in proteins, vitamins, and phenolic compounds, it exhibits pharmacological properties such as anthelmintic, antimicrobial, and anticancer effects. Effective paralysis of *P. posthuma* have been shown by aqueous extracts of *M. oleifera* leaves⁸.

M. charantia, *Z. officinale* and *M. oleifera* are promising candidates for the creation of natural anthelmintic agents due to their historical use and documented effectiveness. The purpose of this study is to examine the *in-vitro* anthelmintic.

MATERIALS AND METHODS: The experiment was conducted using regular saline water and albendazole. Different dosages of an aqueous extract of the leaves of *Momordica charantia* (family: Cucurbitaceae), *Moringa oleifera* (family:

Moringaceae), and *Zingiber officinale* (family: Zingiberaceae) were evaluated in each group. Saline water was used as the standard control. In a comparative analysis of *in-vitro* anthelmintic activity, albendazole obtained from Albion Laboratories Ltd. served as the standard medication. The investigation documented the anthelmintic properties of the aqueous extract.

Earthworms: To study the anthelmintic activity, adult earthworms (*P. posthuma*) used *in-vitro*. The earthworms were identified at Primeasia University in Bangladesh after being taken from Brahmanbaria district. The worms were between 2 and 4 cm long and 0.2 and 0.3 cm wide.

Collection and Identification of Plants:

There are Three Plants: *Momordica charantia*, *Zingiber officinale* and *Moringa oleifera* plant samples were collected from the Brahmanbaria district of Bangladesh. The sample of three plants was verified at the Bangladesh National Herbarium in Mirpur, Dhaka. The identification numbers of three plants were *Momordica charantia* DAC137454, *Zingiber officinale* DAC135491, and *Moringa oleifera* DAC135493. To keep the phytoconstituents, the plant parts were chopped into small pieces, cleaned with distilled water, and then left to dry at room temperature in the shade.

Anthelmintic Activity: For the preliminary evaluation of anthelmintic activity, the assay was carried out *in-vitro* using adult Bangladeshi earthworms (*Pheretima posthuma*). These worms were chosen because of their close morphological and physiological resemblance to human intestinal nematodes. Extract solutions were freshly prepared in normal saline at concentrations of 25, 50, and 100 mg/ml.

For each concentration, six worms of nearly equal size were placed in a beaker containing 50 ml of the respective solution. The positive control was albendazole, a well-known benzimidazole derivative that has been demonstrated to be efficient in paralyzing and killing helminths by blocking microtubule polymerization⁹. Normal saline was utilised as the negative control to ensure that any action was due to the extract or standard medication and not osmotic effects. The worms were observed carefully throughout the experiment.

Paralysis was recorded at the point when the worms ceased movement, except for occasional responses upon vigorous shaking¹⁰. Death was confirmed when the worms failed to respond even after being exposed to gentle agitation or immersion in warm water (50°C).

Phytochemical Screening: Alkaloids, flavonoids, tannins/phenols, steroids, terpenoids, glycosides, and saponins were among the secondary metabolites found in the crude extracts of *M. charantia*¹¹, *Z. officinale*¹², and *M. oleifera*¹³ according to qualitative phytochemical screening.

TABLE 1: RESULT OF PHYTOCHEMICAL SCREENING OF *M. CHARANTIA*, *Z. OFFICINALE*, *M. OLEIFERA*

Extract	Alkaloids	Flavonoids	Glycosides	Steroids	Saponins	Phenols /Tannin	Terpenoids /Quinones
<i>M. charantia</i>	-	-	+	+	+	+	+
<i>Z. officinale</i>	-	+	+	+	-	+	+
<i>M. oleifera</i>	+	+	-	+	+	-	+

Present (+), Absent (-)

TABLE 2: RESULT OF *IN-VITRO* EVOLUTIONS OF THE ANTHELMINTIC ACTIVITY OF *M. CHARANTIA*

Animal group	No. of worms	Concentration	Time taken for Paralysis (min)	Time taken for death (min)
Control Group	6	---	-	-
Standard Group	6	10 mg/ml	180±2	203±5
	6	100 mg/ml	40± 1	65± 2
<i>M. charantia</i>	6	50 mg/ml	57± 2	58± 1
	6	25 mg/ml	60± 1	67± 3

TABLE 3: RESULT OF *IN-VITRO* EVOLUTIONS OF THE ANTHELMINTIC ACTIVITY OF *Z. OFFICINALE*

Animal group	No. of worms	Concentration	Time taken for Paralysis (min)	Time taken for death (min)
Control Group	6	---	-	-
Standard Group	6	10 mg/ml	180±2	203±5
	6	100 mg/ml	44± 1	63± 2
<i>Z. officinale</i>	6	50 mg/ml	50± 1	265± 3
	6	25 mg/ml	89± 1	295± 4

TABLE 4: RESULT OF *IN-VITRO* EVOLUTIONS OF THE ANTHELMINTIC ACTIVITY OF *M. OLEIFERA*

Animal group	No. of worms	Concentration	Time taken for Paralysis (min)	Time taken for death (min)
Control Group	6	---	-	-
Standard Group	6	10 mg/ml	180±2	203±5
	6	100 mg/ml	41± 1	180± 2
<i>M. oleifera</i>	6	50 mg/ml	53± 1	190± 3
	6	25 mg/ml	77± 1	201± 1

RESULT: In these three plants *M. charantia*, *Z. officinale*, *M. oleifera* by using phytochemical screening, alkaloids, tannins, reducing sugar, flavonoids, steroids, terpenoids, and saponins were found in the aqueous extracts.

Anthelmintic Activity: At 25, 50, and 100 mg/mL, the extracts of *Momordica charantia*, *Zingiber officinale*, and *Moringa oleifera* were tested against adult earthworms (*Pheretima posthuma*). Maximum effects were typically seen at the highest concentration. Although all three plants exhibited dose-dependent activity. The worms were paralyzed by *M. charantia* at 100 mg/mL in about 40 minutes, and they died in about 65 minutes. In a same way, the *Z. officinale* extract caused paralysis at approximately 44 minutes and death at 63

minutes. Then, *M. oleifera* took almost the same amount of time and get 41 minutes to cause paralysis, but the worms lived much longer, death at 180 minutes later. During the tests, all three plant extracts showed better anthelmintic efficacy than the conventional reference medicine, albendazole (10 mg/ml), which resulted in paralysis at around 180 minutes and death at around 203 minutes.

Overall, *Z. officinale* and *M. charantia* both faster and stronger anthelmintic effects than *M. oleifera*, which produced paralysis in a similar amount of time but had a much slower lethal action. This indicates that while all three of them possess significant anthelmintic activity, *M. charantia* and *Z. officinale* may have a more potent combination

of active phytochemicals contributing to their efficacy.

DISCUSSION: The extracts of *Momordica charantia*, *Zingiber officinale*, and *Moringa oleifera* were tested against adult earthworms (*Pheretima posthuma*) at concentrations of 25, 50, and 100 mg/mL. The results showed a clear dose-dependent anthelmintic activity, with 100 mg/mL showing the highest efficacy. *M. charantia* demonstrated robust and quick anthelmintic action at this concentration, causing paralysis at about 40 minutes and death at about 65 minutes. Likewise, *Z. officinale* produced paralysis at roughly 44 minutes and death at 63 minutes, which is extremely similar to *M. charantia*'s effectiveness. Though its deadly effect was much slower, with death happening at around 180 minutes, *M. oleifera* also produced paralysis at about 41 minutes. Albendazole (10 mg/mL), the reference medication, on the other hand, took significantly longer roughly 180 minutes to cause paralysis and 203 minutes to cause death. As a result, the three plant extracts performed better in terms of speed of action than albendazole, with *M. charantia* and *Z. officinale* being especially quick and effective. These results are consistent with previous studies showing that *M. charantia* extracts have strong *in-vitro* anthelmintic activity against *P. posthuma*¹⁴ and that *Z. officinale* extracts have similarly strong effects against *Haemonchus contortus*, achieving complete mortality after a few hours¹⁵. Furthermore, in similar *in vitro* investigations, *M. oleifera* extracts have demonstrated significant dose-dependent anthelmintic effects¹⁶. Together, these findings provide credence to the notion that *Z. officinale* and *M. charantia* are more effective anthelmintic agents than *M. oleifera* because they include phytochemical ingredients that operate more quickly in the neuromuscular and fatal domains. This study thus highlights the potential of these medicinal plants, particularly *M. charantia* and *Z. officinale*, as quick and efficient natural substitutes for traditional anthelmintic medications like as albendazole. Isolating phytochemicals and validating these compounds *in-vivo* should be the main goals of future studies.

CONCLUSION: This study showed that aqueous extracts of *Momordica charantia*, *Zingiber officinale*, and *Moringa oleifera* are capable of

producing considerable anthelmintic effects when tested against *Pheretima posthuma*. The activity can be linked to the presence of bioactive compounds such as flavonoids, tannins, saponins, and terpenoids, which are commonly associated with antiparasitic properties. Between the three plants, *M. charantia* and *Z. officinale* produced faster and stronger effects, while *M. oleifera* demonstrated a comparatively slower action. These findings lend support to the traditional use of these plants in the management of worm infections and suggest that further studies, particularly *in vivo* experiments, are needed to confirm their safety and practical value as natural alternatives to synthetic anthelmintic agents.

ACKNOWLEDGEMENT: Nil

CONFLICT OF INTEREST: Nil

REFERENCES:

1. Jain P, Singh S and Singh SK: Anthelmintic potential of herbal drugs. International Journal of Research and Development in Pharmacy and Life Sciences 2013; 2(3): 412–427.
2. Singh D, Swarnkar CP and Khan FA: Anthelmintic resistance in gastrointestinal nematodes in livestock. Indian Journal of Veterinary Parasitology 2002; 16: 115–130.
3. Kappagoda S, Singh U and Blackburn BG: Antiparasitic therapy. Mayo Clinic Proceedings 2011; 86: 561–583.
4. Jabbar A, Zaman MA, Iqbal Z, Yaseen M and Shamim A: Anthelmintic activity of *Chenopodium album* (L) and *Caesalpinia crista* (L) against trichostrongylid nematodes of sheep. Journal of Ethnopharmacology 2007; 114: 86–91.
5. Hussain A, Khan MN, Iqbal Z, Sajid MS, Khan MK. Anthelmintic activity of *Trianthema portulacastrum* L. and *Musa paradisiaca* L. against gastrointestinal nematodes of sheep. Veterinary Parasitology 2011; 179: 92–99.
6. Poolperm S and Jiraungkoorskul W: An update review on the anthelmintic activity of bitter melon (*Momordica charantia*). Pharmacognosy Reviews 2017; 11(21): 31–34.
7. Roy B, Tandon V and Reddy KS: Anthelmintic efficacy of *Zingiber officinale* (ginger) against gastrointestinal nematodes in laboratory animals. Journal of Parasitic Diseases 2010; 34(2): 98–101.
8. Portugaliza HP: Anthelmintic activity of *Moringa oleifera* seed aqueous and ethanolic extracts against *Haemonchus contortus* eggs and third-stage larvae 2017.
9. Horton J: Albendazole: A review of anthelmintic efficacy and safety in humans. Parasitology Today 2000; 16(9): 418–422.
10. Kumanan R, Anand R, Deepak T and Kumaravel S: Evaluation of anthelmintic activity of medicinal plants: A review. International Journal of Pharma and Bio Sciences 2010; 1(3): 1–7.
11. Shirin APR and Jamuna P: Chemical composition and antioxidant properties of ginger root (*Zingiber officinale*).

- Journal of Medicinal Plants Research 2010; 4(24): 2674–2679.
12. Ali BH, Blunden G, Tanira MO and Nemmar A: Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinale* Roscoe): A review of recent research. Food and Chemical Toxicology 2008; 46(2): 409–420.
 13. Olayinka AA, Akinmoladun FO, Komolafe TR and Komolafe EO: Phytochemical screening, proximate analysis and antimicrobial activities of *Zingiber officinale* Roscoe. J of Pharma and Phytotherapy 2015; 7(1): 9–14.
 14. Landage RR and Rasika A: Anthelmintic activity of bitter gourd leaves extract on Indian earthworms. Phytotherapy Journal 2025; 14(4): 106–112.
 15. Chagas AC, Bizzo HR, Ferreira JF and Amarante AF: *In-vitro* anthelmintic activity of rhizome extracts of *Zingiber officinale*, *Zingiber zerumbet* and *Curcuma longa*: A comparative study. Journal of Pharmacy Research 2022; 5(7): 3813–3814.
 16. Pore AV and Mali HS: Assessment of *in-vitro* anthelmintic activity of *Moringa oleifera* leaves. International Journal of Pharmacy and Drug Research 2019; 1(1): 81–84.

How to cite this article:

Sarwar M, Topu AA, Nath D, Rahman T, Rana S, Roy D and Dash PR: Evaluation of anthelmintic activity of aqueous extract of three medicinal plants of Bangladesh. Int J Pharmacognosy 2026; 13(3): 216-20. doi link: [http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.13\(3\).216-20](http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.13(3).216-20).

This Journal licensed under a Creative Commons Attribution-Non-commercial-Share Alike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)