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Research Article

IN-VITRO ANTHELMINTIC EVALUATION OF SELECTED BRASSICACEAE SEEDS: A PHYTOCHEMICAL CORRELATION STUDY

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Abstract:

Helminth infections are now being recognized as a cause of many acute as well as chronic illnesses in human beings. The development of anthelmintic resistance and the high cost of conventional anthelmintic drugs have led to the evaluation of herbal remedies as alternative anthelmintic agents for the control of these parasites. In the current study, in-vitro experiments were conducted to determine the possible anthelmintic effects of crude aqueous seed extracts of Brassica nigra, Brassica juncea, and Sinapis alba against Pheretima posthuma, using Mebendazole as the reference standard. From the results, the paralysis time and death time of worms in all extracts were found to be dose-dependent. Potent anthelmintic activity was observed with the aqueous extracts when compared to the standard drug. Among the three plant extracts, Brassica nigra showed the most potent anthelmintic activity, with the least paralysis and death time, whereas Brassica juncea exhibited intermediate activity, and Sinapis alba required a longer time for worm death.

All values were found to be statistically significant, with a P value of 0.0001 using one-way ANOVA. Based on these findings, it may be concluded that Brassica nigra, Brassica juncea, and Sinapis alba possess varying degrees of anthelmintic activity and justify their traditional use for potential anthelmintic properties.

Key Words: Brassica nigra, Brassica juncea, Sinapis alba, Mebendazole, Anthelmintic.

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INTRODUCTION:^(1,2,3,4)

Helminth is a general term meaning worm. The helminths are invertebrates characterized by elongated, flat or round bodies. In medically oriented schemes the flatworms or platyhelminths (platy from the Greek root meaning “flat”) include flukes and tapeworms. Roundworms are nematodes (nematode from the Greek root meaning “thread”). These groups are subdivided for convenience according to the host organ in which they reside, e.g., lung flukes, extraintestinal tapeworms, and intestinal roundworms.

Brassica juncea commonly known as Indian mustard is a plant that belongs to the mustard family i.e., Cruciferae (Brassicaceae). In India, it is being used as oilseed, edible oil, and spices.

Brassica nigra, or what we often call black mustard, is one of those Ayurvedic gems.

Sinapis alba L. (white or yellow mustard, also known as *Brassica hirta*) is an annual plant of the family Brassicaceae that originates from the Mediterranean region.

MATERIALS AND METHODS:**COLLECTION:**

The *Brassica juncea*, *Brassica nigra* and *Sinapis alba* seeds were identified and purchased from local market of Nuzvid.

PREPARATION OF EXTRACT:⁽⁵⁾

The *Brassica juncea*, *Brassica nigra* and *Sinapis alba* seeds were collected, then dried and were powdered to get a coarse powder. The dried powder of 500 gm was taken in beaker and add 1000 ml of distilled water. Then it was kept for maceration for 7 days. The extract was double filtered by using muslin cloth and Whatman no.1 filter paper and concentrated by evaporation on water bath. The extract was dried and used.

PRELIMINARY PHYTOCHEMICAL SCREENING:^(7,8,9)

The preliminary phytochemical investigation was carried out with *Brassica juncea*, *Brassica nigra* and *Sinapis alba* seeds for identification of phytochemical constituents. Phytochemical tests were carried out by standard methods.

TEST ORGANISM:⁽⁶⁾

Indian adult earthworms (*Pheretima posthuma*) were used during the experiment. The earthworms were collected from a local supplier. Worms were washed with normal saline to remove all fecal matter. The earthworms of 8-10 centimeter (cm) in length and 0.2 -0.5 cm width were used for all the experiment protocol. Ready availability, anatomical and physiological resemblance of (*Pheretima posthuma*) made it to be used initially for *in-vitro* evaluation of antihelmintic activity. Time for paralysis was noted either when any movement could not be Observed except when the worms were shaken vigorously. Death was included when the worms lost their motility followed by white secretion sand fading away of their body color.

Evaluation of Antihelmintic activity:

The antihelmintic activity was evaluated on adult Indian earthworm. The earth worms were randomly chosen and divided into five groups having five earthworms in each as follows:

Group I: Control Group

Group II: Standard Group– **Mebendazole**⁽¹⁰⁾ -50, 100,150, 200, 250mg/ml

Group III: **Test-I-** Aqueous *Brassica juncea* seeds extract -50,100, 150, 200, 250mg/ml

Group IV: **Test-II-** Aqueous *Brassica nigra* seeds extract -50,100, 150, 200, 250mg/ml

Group V: **Test-III-** Aqueous *Sinapis alba* seeds extract -50,100, 150, 200, 250mg/ml

Observations were made for the time taken by worms to paralyze and death was observed. Time for paralysis was noted when no movement could be observed with a slight pin prick method. Death was ascertained by applying external stimuli which stimulate and induce movements in worms as well as fade of the bodycolor was noted.

STATISTICAL ANALYSIS:

The values are expressed as mean± SEM. The statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Dennett's multiple comparison test. Comparisons were made between haloperidol group and test/standard groups. P-values <0.05 was considered statistically significant. The statistical analysis was done by using Graph pad prism version no:7.0.

RESULTS AND DISCUSSIONS:

In this study, we found that aqueous extract possess the following chemical constituents (Table 1,2,3).

Table-1: Phytochemical screening of AEBJ

Phytochemical Constituents	Aqueous Extract of Brassica juncea [AEBJ]
Alkaloids	+
Carbohydrates	+
Flavonoids	+
Phenols	+
Saponins	—
Terpenoids	+
Steroids	+
Tannins	+
Amino acids	+
Glycosides	+
Fixed oils and fatty acids	+

+ indicate the compulsory present and – indicate the absent.

**Figure-1: Phytochemical tests of AEBJ****Table-2: Phytochemical screening of AEBN**

Phytochemical Constituents	Aqueous Extract of Brassica nigra [AEBN]
Alkaloids	+
Carbohydrates	+
Flavonoids	+
Phenols	+
Saponins	+
Terpenoids	+
Steroids	+
Tannins	+
Amino acids	+
Glycosides	+
Fixed oils and fattyacids	+

+ indicate the compulsory present and – indicate the absent.



Figure-2: Phytochemical tests of AEBN

Table-3: Phytochemical screening of AESA

Phytochemical Constituents	Aqueous Extract of Sinapis alba [AESA]
Alkaloids	+
Carbohydrates	+
Flavonoids	+
Phenols	+
Saponins	+
Terpenoids	+
Steroids	+
Tannins	+
Amino acids	+
Glycosides	+
Fixed oils and fattyacids	+

+ indicate the compulsory present and – indicate the absent.



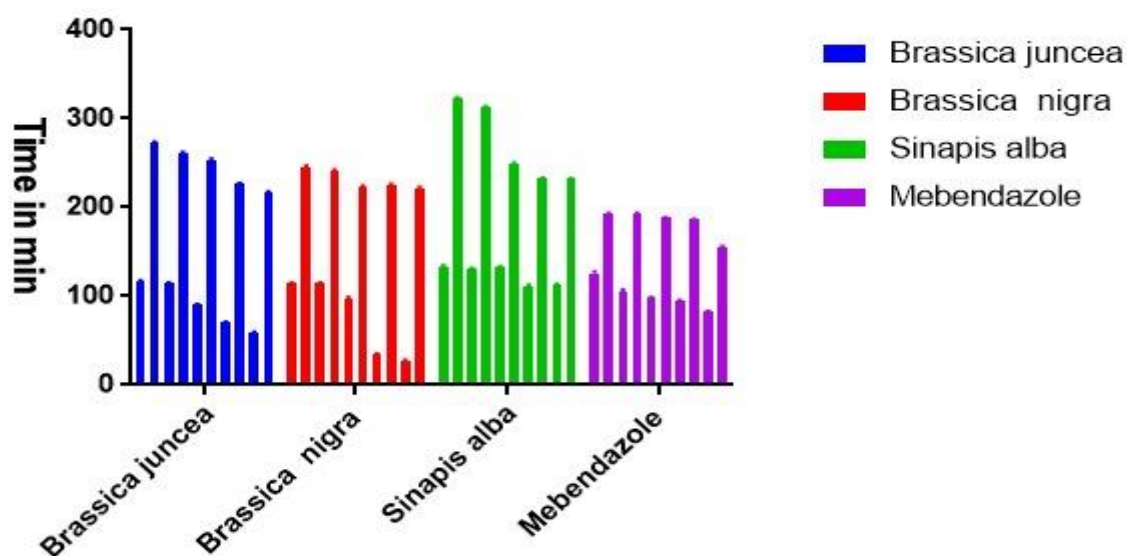
Figure-3: Phytochemical tests of AESA

Antihelmintic activity:

The aqueous extract produced a significant antihelmintic activity in dosedependent manner as shown in below table.

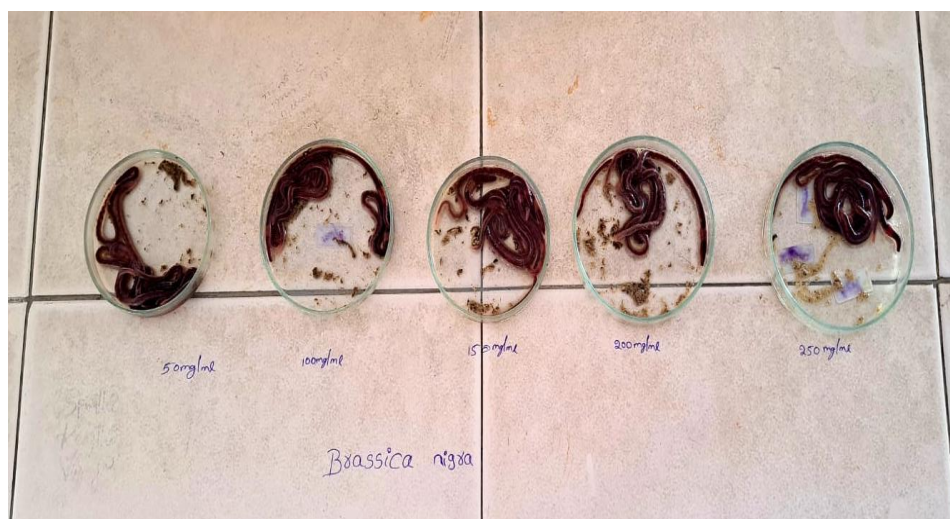
Table-4: Antihelmintic activity of aqueous extract & Standard drug on Indian earth worm

Groups	Concentration	Time Taken in minutes	
		Paralysis (P)	Death (D)
Control		-	-
Standard (Mebendazole)	50mg/ml	126±1.59	192±1.15
	100mg/ml	106 ±1.43	193±0.86
	150 mg/ml	98±0.71	188±0.58
	200 mg/ml	95±0.51	186±0.58
	250 mg/ml	82±0.86	155±1.24
Test-I (AEBJ)	50 mg/ml	116±0.59	273±0.81
	100 mg/ml	114±0.92	261±0.67
	150 mg/ml	90±0.74	253±1.02
	200 mg/ml	71±0.67	227±0.51
	250 mg/ml	59±0.37	217±0.59
Test-II (AEBN)	50 mg/ml	115±0.51	245±1.39
	100 mg/ml	114±1.04	241±0.81
	150 mg/ml	97±1.02	233±1.07
	200 mg/ml	34±1.11	224±1.69
	250 mg/ml	28±0.51	221±1.12
Test-III (AESA)	50 mg/ml	133±1.07	323±0.73
	100 mg/ml	131±0.58	313±0.83
	150 mg/ml	132±1.39	250±0.38
	200 mg/ml	112±1.07	232±1.09
	250 mg/ml	113±0.94	232±0.83

**Figure-4: Anthelmintic activities of standard, AEBJ, AEBN, and AESA Values are expressed as Mean**

$\pm$ SEM, $P < 0.0001$ 

**Figure-5: Test-I (AEBJ)-
50,100,150,200,250mg/ml- Paralysis and Death**



**Figure-6: Test-II (AEBN)-
50,100,150,200,250mg/ml- Paralysis and Death**



**Figure-7: Test-III (AESa)-
50,100,150,200,250mg/ml- Paralysis and Death**



**Figure-8: Standard (Mebendazole) –
50,100,150,200,250mg/ml- Paralysis and Death**

SUMMARY AND CONCLUSION:

- ❖ The present investigation was undertaken to evaluate the in vitro anthelmintic activity of crude aqueous seed extracts of *Brassica nigra*, *Brassica juncea*, and *Sinapis alba* against the Indian earthworm, *Pheretima posthuma*, which is commonly used as a model organism for preliminary anthelmintic screening due to its anatomical and physiological similarity to intestinal helminths.
- ❖ The results of the study clearly demonstrated that all three plant extracts possess significant anthelmintic activity, as evidenced by the induction of paralysis followed by death of the worms. The activity was found to be statistically highly significant ($P < 0.0001$), confirming the effectiveness of the extracts when compared with the standard drug, Mebendazole.
- ❖ Preliminary phytochemical screening of the crude aqueous extracts revealed the presence of tannins among other phytoconstituents. Tannins are polyphenolic compounds widely reported for their antimicrobial and antiparasitic properties. The possible mechanism underlying their anthelmintic activity may be attributed to their ability to bind with free proteins in the gastrointestinal tract of the host animal or with glycoproteins present on the cuticle of the parasite. This interaction may disrupt the structural integrity and physiological functions of the worms, ultimately leading to paralysis and death.
- ❖ Additionally, synthetic phenolic anthelmintics such as niclosamide, oxyclozanide, and bithionol are known to interfere with energy metabolism in helminths by uncoupling oxidative phosphorylation. Since tannins are polyphenolic in nature, they may exert a similar mechanism of action by disrupting energy generation within the parasite. Therefore, the presence of tannins in the extracts may be one of the major contributing factors responsible for the observed anthelmintic activity.
- ❖ Mebendazole, a benzimidazole derivative used as the reference standard in this study, acts by inhibiting microtubule polymerization and interfering with carbohydrate metabolism in helminths. This results in energy depletion, paralysis, and eventual expulsion of the worms from the host body. When compared with Mebendazole, the plant extracts demonstrated comparable effects in terms of paralysis and death time, though with varying degrees of potency.
- ❖ Among the three extracts tested, *Brassica nigra* exhibited the most potent anthelmintic activity, showing the least time required for both paralysis and death of the worms. *Brassica juncea* demonstrated moderate activity, whereas *Sinapis alba* showed comparatively lower potency, requiring a longer duration to produce similar effects. These differences in activity may be attributed to variations in the concentration and composition of bioactive phytochemicals present in each plant species.
- ❖ The findings of the present study strongly indicate that these three plants contain promising bioactive constituents that may be useful in the management and control of helminth infections. Considering the increasing problem of anthelmintic resistance and the high cost of conventional synthetic drugs, plant-based alternatives may offer a safer, cost-effective, and sustainable therapeutic option.
- ❖ Furthermore, the significant anthelmintic activity observed suggests that these plants may serve as valuable sources for the isolation and characterization of novel anti-helminthic compounds. Such compounds could act as lead molecules for the development of new anthelmintic drugs.

- ❖ In conclusion, the study provides scientific validation for the traditional use of *Brassica nigra*, *Brassica juncea*, and *Sinapis alba* as potential anthelmintic agents. However, further studies are required to isolate and identify the active principles, elucidate their precise mechanisms of action, and evaluate their safety and toxicity profiles through in vivo experiments. These investigations will help determine the feasibility of developing effective and safe herbal anthelmintic formulations for clinical use.

REFERENCES:

1. <https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.ncbi.nlm.nih.gov/books/NBK8282/&ved=2ahUKEwjn5dfGubCSAxX3zTgGHf3YGPgQFnoECB0QAQ&usg=AOvVaw2TcYtsU9FZZzrfpvGujSL0>
2. Vanktesh Kumar* et al., A Review Over the effect of Heavy Metal in Metabolism of *Brassica juncea* (L.) and *Myristica fragrans*, Asian Journal of Pharmaceutical Research, 11(2):97-103, 2021
3. <https://ask-ayurveda.com/wiki/article/3865-brassica-nigra>
4. <https://pmc.ncbi.nlm.nih.gov/articles/PMC7142246/>
5. Manohar et.al, Phytochemical Analysis of Ethanolic Extract of Fruits of *Terminalia chebula* (EEFTC), Drug Invention Today, Volume- 4, Issue-10, 2012, Page no: 491,492.
6. Aishwarya, K. Apte., Khot, V. S., Biradar, N.S., and Patil, S. B. (2014). Anthelmintic activity of *Trachyspermum Ammi* (1) extract. International Journal of Pharmacy and Pharmaceutical Sciences, 6(1), 464-466.
7. <https://www.biologydiscussion.com/angiosperm/dicotyledons/sapotaceae/characters-distribution-and-economic-importance/48215>
8. Sharada L. Deore, Pharmacognosy and phytochemistry: A Companion Handbook, PharmaMed Press, 2018, Page no: 69-77.
9. Beena. p.et, al/Preliminary phytochemical screening of *Cicer arietinum* in folklore medicine for hepatoprotection, Journal of Innovations in Pharmaceuticals and Biological Sciences, Volume-3, Issue-3, 2016, pg no: 155-157.
10. Saleem N Basha1*etal., Evaluation of Invitro anthelmintic activities of *Brassica nigra*, *Ocimum basilicum* and *Rumex abyssinicus*, Pharmacognosy Journal, Issue 20, February 2011.