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ORIGINAL ARTICLE

Comparative Study on the Anthelmintic Effects of *Moringa oleifera, Raphanus sativus*, and Their Combinations

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ABSTRACT

In this work, crude hydroalcoholic herbal extract mixtures (HEM) made from the roots of *Raphanus sativus* and leaves of *Moringa oleifera* were evaluated for their anthelmintic activity. Investigations were conducted on eight treatment groups: Groups IV–VI were treated with mixed HEM (HEMA-C) blends in varying ratios of Moringa oleifera and Raphanus sativus (HEMA: 50%:50%, HEMB: 70%:30%, HEMC: 30%:70%); Group VII and Group VIII were treated with individual hydroalcoholic extracts of *Moringa oleifera* (HEMO) and *Raphanus sativus* (HERS) at 10 mg/ml. Group I was treated with normal saline as a negative control; Group II was treated with a solvent control with a (30:70) water and ethanol solution; Group III was treated with albendazole (10 mg/ml) as a standard. Mature *Pheretima posthuma* worms approximately 5 cm size placed in glass Petri dishes were utilized for adult motility testing into it; about 24 adult worms per study and 3 worms per group were used. When exposed to water at 50°C, the inhibition of worm motility acted as a reliable predictor of anthelmintic activity, corresponding with either death or paralysis. Worms that showed signs of renewed movement were deemed alive, while those that did not move were deemed dead. The results of the study provide important new information about the possible anthelmintic qualities of these hydroalcoholic herbal extracts, indicating that they may be useful in treating parasitic diseases by focusing on particular physiological processes of the parasites.

Keywords: Anthelmintics, Herbal extract mixtures, Albendazole, *Pheretima posthuma*, Mortality, Paralysis

INTRODUCTION

The parasitic worm disease helminthiasis is quite common, especially in tropical areas where there is inadequate sanitation, dirty water, low income, and little access to education. Parasites such as roundworms, hookworms, threadworms, tapeworms, guinea worms, and filarial worms are common in India and can cause blood loss, malnourishment, and urticaria, or hives. Transmission happens when a person consumes tainted food or water, comes into contact with an infected animal, or is spread by mosquitoes carrying filarial worm eggs or larvae. The main danger posed by worm infections is the harm that the parasites' burrowing activities due to tissues and organs.

Despite synthetic medications are an effective treatment for helminthiasis, abuse of them can result in adverse effects and widespread drug resistance in parasites[1]. While synthetic medications are often more effective against parasite diseases, plant-derived medications typically have fewer negative effects[2]. There is a growing interest in creating plant-based remedies for parasitic illnesses because many underdeveloped nations have a long history of using medicinal herbs to treat helminthiasis. The purpose of this

study was to assess the hydroalcoholic extracts of *Raphanus sativus* roots and *Moringa oleifera* leaves for their *in vitro* anthelmintic activity.

Moringa oleifera Lam., a member of the Moringaceae family that is abundantly grown in India, is used as a nutritional herb with a variety of pharmacological activities, such as anti-inflammatory, anti-cancer, hepatoprotective, anti-diabetic, and antioxidant qualities. Referred to as the "Drumstick tree" or "Horse-radish tree," *Moringa* is valued for its therapeutic properties in all parts. It is high in vitamins A and C, proteins, and a variety of phytoconstituents, including tannins, alkaloids, saponins, and flavonoids[3].

Radish, or *Raphanus sativus* Linn. (Brassicaceae), has long been used to treat respiratory conditions including asthma and intestinal parasites. It has laxative, diuretic, antibacterial, and antifungal qualities, especially in its older roots, leaves, and seeds. Preparations made from radish are especially helpful for gastrodynia, urinary symptoms, piles, and liver and gall bladder problems[4].

Assessing the anthelmintic efficiency of hydroalcoholic extracts from *Raphanus sativus, Moringa oleifera,* and their combinations against adult Indian earthworms (*Pheretima posthuma*) at different doses was the aim of this study.

MATERIALS AND METHODS

Plant Material

Raphanus sativus roots and *Moringa oleifera* leaves were gathered in February at the Government Nursery in Moinabad, Hyderabad. Scientist G from the Botanical Survey of India (BSI) in Hyderabad, P.V. Prasanna, verified the validity of these obtained plant components. The leaves and roots were then dried for a week at the ideal temperature. The leaves and roots were dried, then ground into a coarse powder with an electric mixer.

The process of making hydroalcoholic extracts from the roots of *Raphanus sativus* and leaves of *Moringa oleifera*

200 grams of powdered *Moringa oleifera* leaves and *Raphanus sativus* roots were first defatted independently with petroleum ether after the solvent was completely evaporated. Following a thorough drying process, the residues were extracted using a 30–70% hydro-alcohol solvent mixture in a Soxhlet extractor. Whatman filter paper was used to filter the final extracts, and they were then allowed to dry at room temperature[5]. The hydroalcoholic extracts were then concentrated using rota evaporators after undergoing another round of filtering. After that, the powdered crude extract was kept in a cold storage area for additional examination. The extracts were then subjected to three distinct mixture preparation processes (A, B, and C): mixture A contained 50% *Moringa oleifera* and 50% *Raphanus sativus*, mixture B contained 70% *Moringa oleifera* and 30% *Raphanus sativus,* and mixture C contained 30% *Moringa oleifera* and 70% *Raphanus sativus* in combination[6, 7].

Screening for phytochemicals

Phytochemical screening was performed on hydroalcoholic extracts of *Raphanus sativus* roots and *Moringa oleifera* leaves to determine the presence of tannins, alkaloids, flavonoids, glycosides, saponins, and terpenoids/steroids[8].

Investigating the Anthelmintic Potential of Different Hydroalcoholic Extracts

For this investigation, adult *Pheretima posthuma* earthworms of similar size were used. After being removed from the damp soil, the earthworms were cleaned with distilled water. Prior to the experiment, each earthworm was allowed to acclimate for sixty minutes in a saline solution. There were eight groups of animals, each with three earthworms in them. Each earthworm was put into a Petri plate with 20 milliliters of the test solution in it. As the negative control, Group I received normal saline treatment. Group II was treated with a 30:70 water and ethanol mixture and acted as the solvent control. Group III received standard albendazole (10 mg/ml) treatment. Combinations (HEMA-C) with varying proportions of *Moringa oleifera* and *Raphanus sativus* (HEMA: 50%:50%, HEMB: 70%:30%, HEMC: 30%:70%) were administered to Groups IV-VI. Individual extracts of *Moringa oleifera* (HEMO) and *Raphanus sativus* (HERS) at a concentration of 10 mg/ml were given to Group VII and Group VIII, respectively. Over five hours, the earthworms' paralysis and mortality were seen. The term "paralysis" described the worms' inability to move other than when they were severely shaken. The worms' loss of motility and consequent fading of their body color served as indicators of death, this was further supported by immersion in water at 50°C[9].

Evaluation of Statistics

Analysis of variance (ANOVA) was used for statistical analysis. At a significance level of, Duncan's multiple range tests were used to identify significant differences between the experimental groups.

RESULTS AND DISCUSSION

Phytochemical Test

The results of the preliminary phytochemical screening Table. 1 revealed distinct variations in the chemical profiles of the extracts of *Raphanus sativus* and *Moringa oleifera*. The extract of *Moringa oleifera* was found to contain a wide range of bioactive constituents, including flavonoids, glycosides, terpenoids, tannins, and saponins. Flavonoids are well known for their antioxidant properties, while glycosides

contribute to cardiovascular health and terpenoids are associated with antimicrobial activity. Tannins possess astringent properties and may facilitate wound healing, whereas saponins are recognized for their anti-inflammatory and antimicrobial effects.

In contrast, the extract of *Raphanus sativus* tested positive for alkaloids and flavonoids but was devoid of glycosides and saponins. Alkaloids are commonly associated with analgesic and pharmacologically active properties, and the presence of flavonoids suggests antioxidant potential. The absence of glycosides and saponins in *Raphanus sativus* may influence its therapeutic applications differently when compared to *Moringa oleifera*.

Overall, the phytochemical variations presented in Table. 1 highlight the distinct chemical compositions of *Raphanus sativus* and *Moringa oleifera*, underscoring their potential as valuable sources of bioactive compounds for pharmaceutical and nutraceutical development.

Table 1: Phytochemical Analysis of *Moringa oleifera* and *Raphanus sativus* hydroalcoholic extracts

S. no	Phytochemical screening	*Moringa oleifera*	*Raphanus sativus*
1	Alkaloids	-	+
2	Flavonoids	+	+
3	Glycosides	+	-
4	Terpenoids	+	+
5	Tannins	+	+
6	Saponins	+	-

(+/Present, -/Absent)

In vitro Anthelmintic activity

The data obtained from the anthelmintic activity study on *Pheretima posthuma*, including the standard drug, solvent control, and negative control groups, are presented in Table. 2. Albendazole (10 mg/mL), used as the reference standard, produced paralysis at 146.66 minutes and death at 256.6 minutes, confirming its established efficacy against parasitic helminths.

Among the test samples, the hydroalcoholic extract combination of *Moringa oleifera* and *Raphanus sativus* (HEMB) exhibited pronounced anthelmintic activity, inducing paralysis at 130 ± 5.77 minutes and death at 183.33 ± 8.8 minutes. In comparison, HERS demonstrated slower activity, with paralysis occurring at 233.33 ± 8.8 minutes and death at 250 ± 5.77 minutes. The extracts HEMA, HEMC, and HEMO showed comparatively mild anthelmintic effects, with variable onset times for both paralysis and death.

The comparatively faster onset of paralysis and mortality observed with HEMB suggests a possible synergistic interaction between the bioactive constituents of *Moringa oleifera* and *Raphanus sativus*. These findings indicate that HEMB warrants further investigation to elucidate its mechanism of action, safety profile, and potential applicability in the development of novel anthelmintic agents for clinical or agricultural use.

Table 2: Anthelmintic Activity of Herbal Extracts on *Pheretima posthuma* Earthworms

S. No	Test sample	Concentration mg/ml	Time taken for paralysis (min)	Time taken for death (min)
1	Negative Control	-----	-----	----
2	solvent control	-----	-----	----
3	Standard (Albendazole)	10	146.66±4.40	256.6±8.8
4	HEMA	10	200±5.77	230.6±6.03
5	HEMB	10	130±5.77	183.33±8.8
6	HEMC	10	210±5.77	222.66±8.19
7	HEMO	10	216.66±8.8	230.66±9.0
8	HERS	10	233.33±8.8	250±5.77

Data are shown as mean ± SEM (n=3)

CONCLUSION

Phytochemical examination sets *Moringa oleifera* apart with its flavonoids, glycosides, terpenoids, tannins, and saponins; *Raphanus sativus*, on the other hand, lacks saponins and glycosides but has alkaloids and flavonoids. Applications for *Moringa oleifera* include antibacterial, cardiovascular, and antioxidant properties that show promise. In comparison to albendazole and individual extracts, the anthelmintic study demonstrates the synergistic effectiveness of combining *Moringa oleifera* and *Raphanus sativus* extracts (HEMB), resulting in improved action against *Pheretima posthuma* earthworms. By utilizing the complementing qualities of these plant extracts, more research into the safety and mechanisms of HEMB may result in novel anthelmintic treatments for use in agriculture and medicine.

DISCLOSURE

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Conflict of Interest: None.

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