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Research Article

In-Vitro Anthelmintic Activity of the Roots and Leaves Extracts of *Neolamarckia Cadamba* and *Nyctanthes Arbor-Tristis* Plants on Earthworm - A Comparative Study

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ABSTRACT

Natural products are valuable sources of medicines. In the present study, *Neolamarckia cadamba* and *Nyctanthes arbor-tristis* plants have been selected for testing the anthelmintic activity against the Indian adult earthworm *(Pheretima posthuma*). The methanolic and ethanolic extracts of roots and leaves of both of these plants have been prepared separately by using the maceration method. The anthelmintic activity of both of these alcoholic extracts were being compared with the standard drug Albendazole. It has been found that both of the alcoholic extracts of the plants showed a better anthelmintic effect than the standard drug on earthworms. Additionally in the study, a comparative analysis has also been carried out among the two alcoholic extracts of roots and leaves of both of the plants to determine which of these extracts has a better anthelmintic effect.

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INTRODUCTION:

In today's scenario, various types of harmful diseases progression are seen. Helminthiasis is such a kind of disease mostly affecting children and adults. The helminthiasis infection is mainly caused by the helminths which are normally worm-like parasites. These are eukaryotic invertebrates which are multicellular and can have tube-shaped or flattened-shaped bodies with bilateral symmetry.

Medicinal plants have a great supply of organic compounds. *Neolamarckia cadamba* (commonly known as kadamba), is one of the sacred trees of India and its flowers are being offered to Lord Krishna. This plant has numerous health benefits such as hepatoprotective, nematicidal, and astringent properties. The stems of these plants act as a toothbrush in gum infection and dental caries. Its dried bark is used to relieve fever, burning sensations, and the leaves extracts are being used as a mouth gargle. Similarly, another plant *Nyctanthes arbor-tristis* (commonly known as seulli sephali) also possesses many medicinal values such as its roots are being used in toothache, its leaves are being used in the treatment of malaria, arthritis, eczema, and ringworm infections[1]. These two medicinal plants are being abundantly found in most parts of Western Odisha.

Earlier studies revealed that some extracts of different parts of both the plants *Neolamarckia cadamba* and *Nyctanthes arbor-tristis* possessed anthelmintic activity[2,3]. So, keeping it in consideration a research study was carried out using the leaves and roots alcoholic extracts of both the plants, and not only the anthelmintic activity was being checked but also a comparative analysis was made to reveal that which of these extracts should be chosen for further future studies to get better results.

MATERIALS AND METHODS:

Plant Material Collection:

The roots and leaves of the plants *Neolamarckia cadamba* and *Nyctanthes arbor-tristis* were being collected from a nearby locality of Chhend Colony, Rourkela. The roots and leaves of both the plants were thoroughly washed under tap water to remove the dirt and soil and then they were kept for sun drying for 3 days. After 3 days period, the dried roots and leaves of both the plants were grinded, powdered, and stored.

Chemical Material and Apparatus Collection:

Laboratory graded chemicals like methanol and ethanol were being purchased from Jai

Durga Chemicals. The standard drug Albendazole tablets (Alkem Laboratories LTD.) was purchased from a local pharmacy store.

Preparation of Plant extract:

The plant extract of roots and leaves was prepared by the Maceration method. The process of maceration method was followed as per the process of Darshan Dharajiya et al[4]. with minor modifications. In the maceration method, the powdered leaves and roots were kept in their respective beaker with methanol and ethanol separately in a ratio of 1:5 for 3 days at room temperature. After 3 days period, the extracts were collected by filtering them using laboratory graded filter paper, and then the filtered extracts were stored.

ANTHELMINTIC ACTIVITY:

The in-vitro anthelmintic assay was carried out on Indian adult earthworm (*Pheretima posthuma*) due to its anatomical and physiological resemblance with roundworm[5,6]. Firstly, the earthworms of size around 1.5-5cm were collected from the moist soil of nearby locality, and then they were washed with water to remove dirt and soil. Secondly, gradual increasing concentration of 1 gm/ml, 2.5 gm/ml, and 5 gm/ml each of methanolic and ethanolic extracts of roots and leaves was taken and the anthelmintic assay was carried out as per the method of Sarojini Nayak et al[7]. and Niranjan Sutar et al[8]. with minor modifications. Lastly, the time taken for showing paralysis (restricted movement) and death (no movement) by the earthworm was determined and compared with similar concentrations of the standard drug (albendazole) and vehicle (distilled water).

RESULTS:

The time for paralysis and death of earthworms using roots and leaves extracts of *Neolamarckia cadamba* are shown in Table 1. and of *Nyctanthes arbor-tristis* are shown in Table 2. The antihelmintic effect of the standard drug (albendazole) is shown separately in Table 3.

Table 1: Anthelmintic assay of roots and leaves extracts of *Neolamarckia cadamba*

Treatment	Concentration (gm/ml)	Roots		Leaves	
		Time taken for Paralysis (sec)	Time taken for Death (sec)	Time taken for Paralysis (sec)	Time taken for Death (sec)
Vehicle	------	------	-----	-----	------
Methanol	1 2.5 5	15 13 12	52 46 43	18 15 13	85 79 41
Ethanol	1 2.5 5	17 15 14	40 37 33	20 15 12	110 72 58

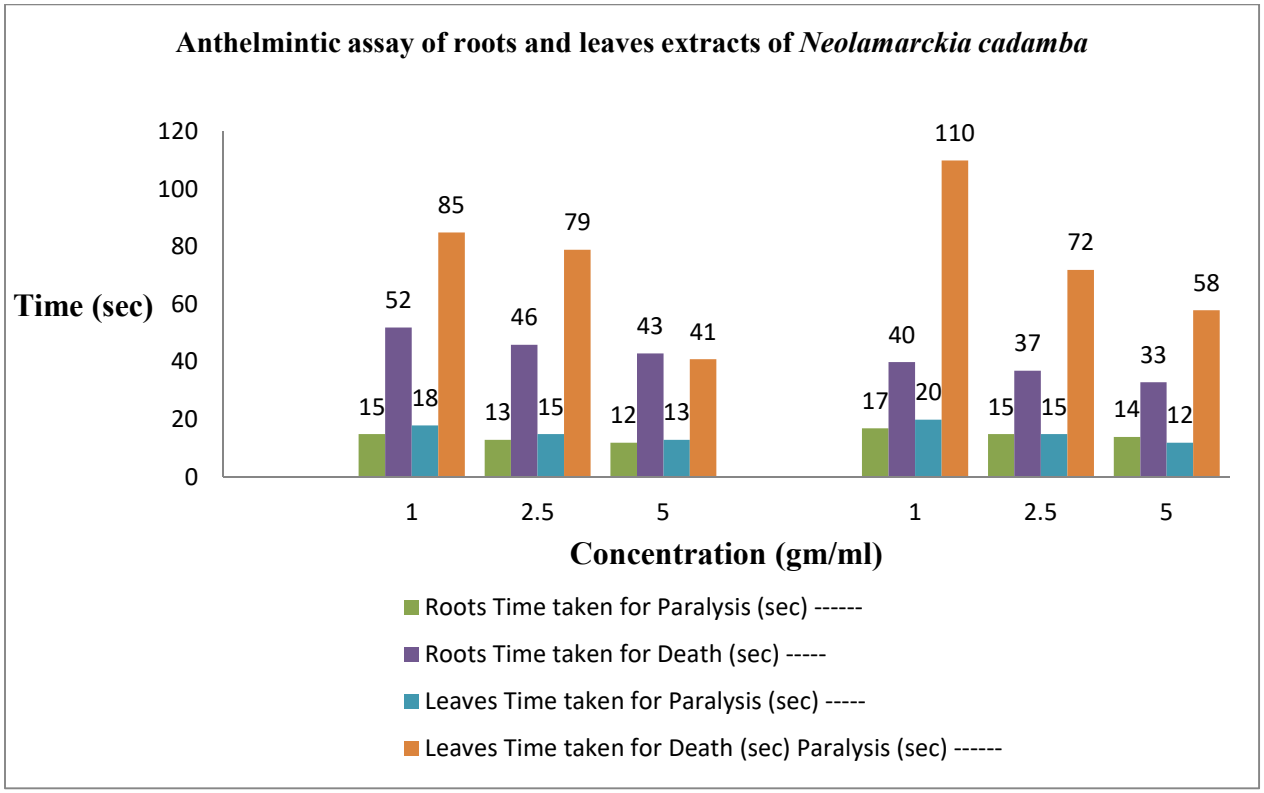

Figure 1: Anthelmintic assay of roots and leaves extracts of *Neolamarckia cadamba*

Table 2: Anthelmintic assay of roots and leaves extracts of *Nyctanthes arbor-tristis*

Treatment	Concentration (gm/ml)	Roots		Leaves	
		Time taken for Paralysis (sec)	Time taken for Death (sec)	Time taken for Paralysis (sec)	Time taken for Death (sec)
Vehicle	------	------	-----	-----	------
Methanol	1 2.5 5	14 13 11	55 48 45	24 21 18	114 76 52
Ethanol	1 2.5 5	17 13 11	112 83 78	18 16 15	55 41 37

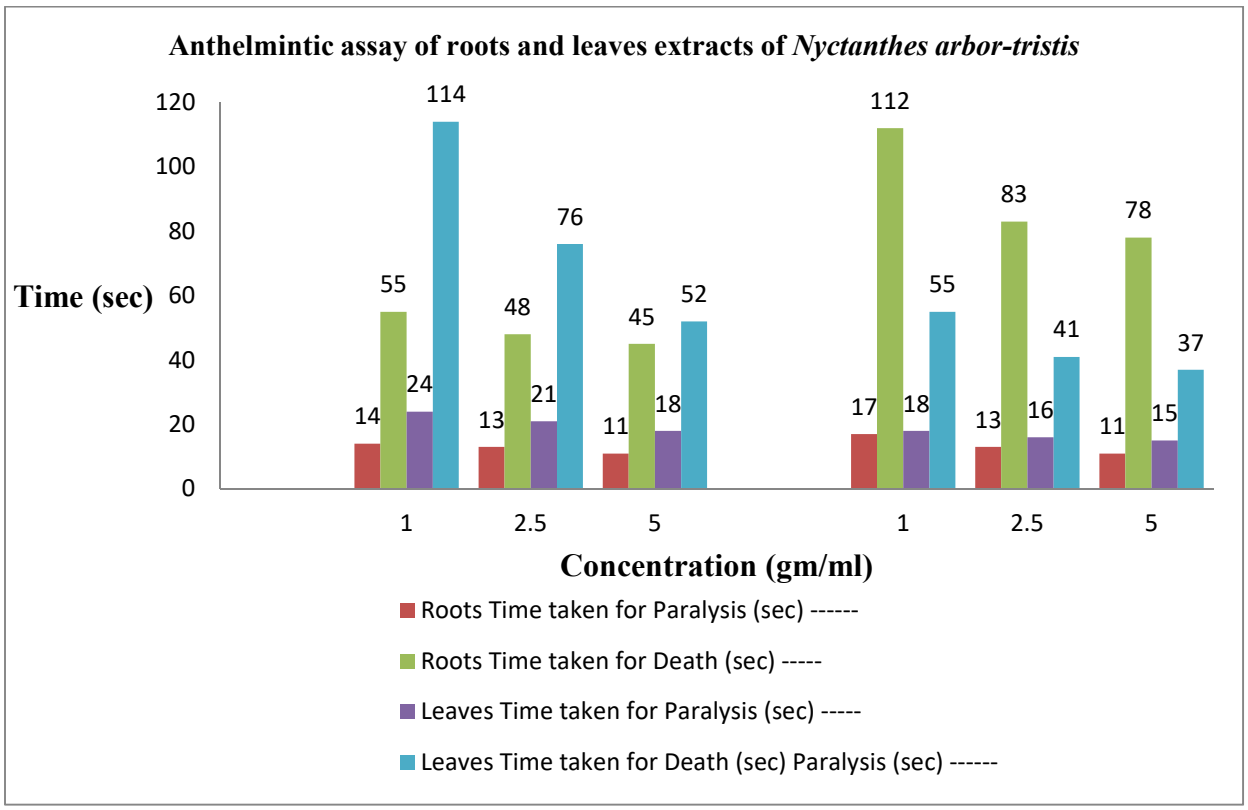

Figure 2: Anthelmintic assay of roots and leaves extracts of *Nyctanthes arbor-tristis*

Table 3: Anthelmintic assay of Standard drug

Treatment	Concentration (gm/ml)	Time taken for Paralysis (sec)	Time Taken for Death (sec)
Vehicle	------	-------	-------
Albendazole	1 2.5 5	32 28 16	145 110 85

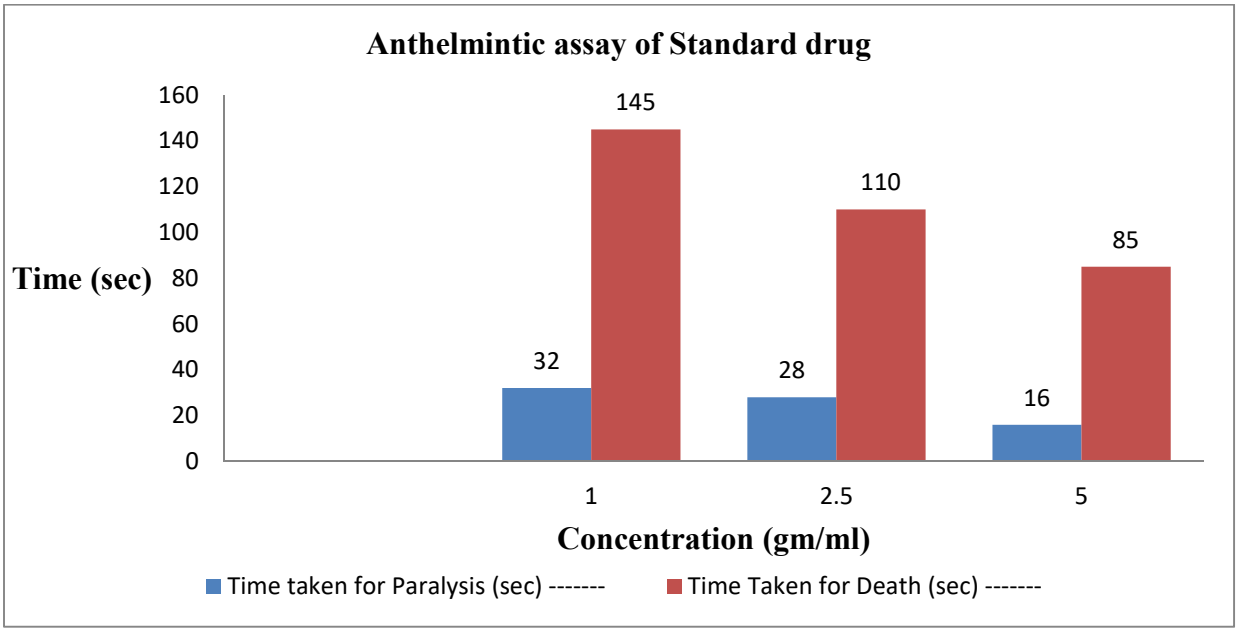

Figure 3: Anthelmintic assay of Standard drug

CONCLUSIONS:

From the data available from Table 1,2 and 3, it was found that anthelmintic activity of both the plants *Neolamarckia cadamba* and *Nyctanthes arbor-tristis* is more as compared to the standard drug as the time taken for the paralysis and death of earthworms is very less and among all the leaves extract, the ethanolic leaf extract of *Nyctanthes arbor-tristis* takes about 39% less time to kill the earthworms as well as among all the roots extract, the ethanolic extract of *Neolamarckia cadamba* takes about 32% less time to kill the earthworms. Similarly, upon comparing each alcoholic extracts of both the plants from Table 1 and 2, it was found that the ethanolic leaves extract of Nyctanthes *arbor-tristis* plant has shown about 55-65% more anthelmintic activity among all the leaves extract and

among all the roots extract the ethanolic root extract of *Neolamarckia cadamba* has shown about 40-78% more anthelmintic activity among all the roots extract.

CONFLICT OF INTEREST:

There is no such conflict of interest related to this investigation.

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