Short Communication

Comparative investigation on anthelmintic activities of *Azadirachta indica* and *Areca catechu* leaves

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Abstract

Objective: The aim of this study was to investigate anthelmintic efficacy of *Azadirachta indica* and *Areca catechu* leaves. **Material and methods:** Firstly plant leaves material was defatted with petroleum ether and prepared hydro-alcoholic extracts. Hydroalcoholic extract taken and was evaluated separately for anthelmintic activity on adult Indian earthworm *Pheretima posthuma*, using albendazole as reference standard, paralysis and death time was noted. **Results and conclusion:** The results represented that the hydroalcoholic extract of *Azadirachta indica* was more potent than *Areca catechu* extract. Conclude that *S. oleosa* leaves could be used for development of novel anthelmintic treatment.

Keywords: *Azadirachta indica*, *Areca catechu*, anthelmintic, *Pheretima posthuma*, earthworm, albendazole

Introduction

Only a few of anthelmintic compounds are now available in the market; these are classified as like benzimidazoles, macrocyclic lactones, imidazothiazoles, and cyclic Octadepsipeptides etc. These agents on various studies recently have been found the presence of gastrointestinal nematodes that are opposed to the main marketed available anthelmintic drugs on cattle farms. These modern drugs showed various side effects, consequently, we believe the research of medicinal plants species that could have antiparasitic activity, because the many of these medicinal plants have been used as traditional medicine in the olden days (Dubey et al., 2019).

Azadirachta indica (neem) is a medicinal plant. It is widely distributed in all over Country and easily found during all seasons. It's each part having some medicinal property such as Neem leave, bark, seed and extracts. It is mainly used for the treatment of wound, diabetes acne, dental diseases and various

other antimicrobial infections (Tewari et al., 1992; Kausik et al., 2002). It has been extensively used in ayurveda, unani and homoeopathic medicine. The chemical constituents are found in the leaves of neem as nimbin, nimbanene, 6-desacetylnimbinene, nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7-benzoylazadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione and nimbiol, etc (Biswas et al., 2002). Nimbidin is major bitter chemical constituents of seed kernels oil of *A. indica*.

Arecanut palm (*Areca catechu* L.) is belongs to the family Palmae. It is the seed or endosperm (nut) of *Areca catechu* Linn. It has been reported as a therapeutic agent for the treatment of leucoderma, leprosy, anemia obesity. It has been used as vermifuge. The nut is presented to guests, along with a betel leaf, as a mark of respect. It is chewing (betel leaf, arecanut and lime) in India is at least 2,000 years old. Arecanut seed biochemical compounds have been newly recognized as functionally active molecules, showing antioxidant, antidiabetic and antiallergic. It is used treat for cardiovascular and other diseases, and further studies are required to know the underlying mechanisms and type of chemical compounds involved in this beneficial effect (Amudhan et al., 2012). The medicinal plants were the potent source of numerous pharmacological activities.

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Therefore, the need for the investigation of the medicinal plants for the treatment has attained a great interest and in present investigation our purpose was to investigate anthelmintic efficacy of *Azadirachta indica* and *Areca catechu* leaves.

Materials and methods

Plant material

The plant leaves of *Azadirachta indica* and *Areca catechu* leaves were obtained from Botanical garden of Rani Durgavati University, Jabalpur MP, India, during the month of December. The standard drug, Albendazole was purchased from local market of Jabalpur, Madhya Pradesh, India and test sample. All the other reagents were purchased of analytical reagent grade and used.

Preparation of plant extracts

Dried and powdered leaves of *Azadirachta indica* and *Areca catechu* leaves were defatted firstly to remove all fatty material of plant, using petroleum ether solvent. The marc of plant material was extracted with ethanol. Then after filtered, evaporated and concentrated to dry residue by using rotator evaporator. The residue was dried and stored in desiccators. Last finally the marc was macerated with distilled water (3 days) to obtain aqueous extract.

Evaluation of anthelmintic activity

Earth-worm *Pheretima postuma* was taken from Jawaharlal Nehru Krishi Vishwavidyalaya (JNKVV), Jabalpur Madhya Pradesh India in the month of December 2019. All earthworms were having same size (4-8 cm approximately). The anthelmintic activity was evaluated in-vitro by using adult *Pheretima postuma* worms' species owing to their physiological and anatomical resemblance with the intestinal round worms.

The anthelmintic activity was assessment on adult Indian earthworm suitable to its anatomical and physiological similarity like the intestinal roundworm parasites of human beings. Nine groups, each having of six earthworms of about equal size were released in to 10 ml of suspension. Each group was treated with one of the following: vehicle standard albendazole (25 mg/ml, 50 mg/ml and 100 mg/ml), Etahnolic extract of *Azadirachta indica* and *Areca catechu* leaves. Observations were completed for the time taken to paralysis and death of individual worms. The death time was ended when the worms lost totally their motility followed with fading away of their body colour (Tiwari et al., 2016; Gupta et al., 2015).

Results and discussion

In vitro investigation results showed that the ethanolic extract of *Azadirachta indica* and *Areca catechu* leaves of plant extract at 100 mg/ml inhibited almost completely the mobility of isolated worms which is comparable with the reference standard drug albendazole. The present evaluation, therefore, revealed that the ethanolic extract *Azadirachta indica* was more potent than the *Areca catechu* at the doses of 25, 50 and 100 mg/ml respectively (Table 1 and figure 1). The results of anthelmintic activity revealed concentration dependent nature of extracts. Strength of the herbal extracts was found to be inversely relative to the time taken for paralysis and death of the worms, the active chemical constituents of these plants, such as phenolic and alkaloids of both of plant leaves to produce anthelmintic activities.

Plants chemical constituents such as flavonoids are

Table 1. Anthelmintic activity of plant extracts

Extract (min) standard drug (Albendazole 20 mg/ml)	Time taken for paralysis (min)	Time taken for death
25 mg/ml	55.8 ± 1.52	65.0 ± 1.20
50 mg/ml	40.6 ± 1.92	52.5 ± 1.25
100 mg/ml	33.2 ± 1.31	42.6 ± 1.98
<i>Azadirachta indica</i>		
25 mg/ml	73.8 ± 1.52	90.0 ± 1.90
50 mg/ml	68.6 ± 1.92	81.0 ± 1.56
100 mg/ml	53.2 ± 1.31	62.0 ± 1.31
<i>Areca catechu</i>		
25 mg/ml	145.1 ± 1.32	181.0 ± 1.16
50 mg/ml	104.3 ± 1.18	133 ± 1.35
100 mg/ml	61.2 ± 1.71	95 ± 1.80

All values are represent Mean ± SEM; N=6 in each group; ** P<0.001

Figure 1. Comparative data of death time analysis

polyphenolic compounds; they interfere with the energy production by uncoupling the oxidative phosphorylation which blocks with the glycoprotein of cell surface and leads to parasite death. Anthelmintic effects of plants have been also reported due to the presence of tannins. Another chemical constituent like saponins mainly act by parallel irritation of the mucus membrane consequently leads to parasite death (Kalmobé et al., 2017). Standard drug albendazole also has been shown to inhibit the enzyme fumarate reductase, which is helminthic specific. This action may be measured secondary to the effect on the microtubules due to the decrease reuptake of glucose.

Conclusion

In conclusion, the traditional use of stem of *Azadirachta indica* and *Areca catechu* leaves extracts as an anthelmintic drug has been confirmed in our study. Further, it would be interesting to isolate the possible phytochemical constituents who might be responsible for the anthelmintic activity possible mechanism of action can be elucidated. It might have some other antimicrobial activity.

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