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Anthelmintic activity of seed extracts of *Artocarpusheterophyllus*

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Abstract: *Helminthic infections are now being recognized as cause of many acute as well as chronic ill healthamong the various human beings as well as cattle's. Helminthiasis, the condition resulting from worm infestation, is one of the major prevalent diseases in the world, particularly in the tropical countries. Lack of adequate sanitary facilities and supply of pure water coupled with poverty and illiteracy are some of the factors responsible for wide spread nature of this disease in the developing countries. The present study aimed at the in-vitro evaluation of anthelmintic activity of ethanol, ethyl acetate and aqueous extracts of seeds of the plant "Artocarpusheterophyllus" in earthworms (Pheretimaposthuma). The test samples were given in the dose of 25mg/ml, 50mg/ml, and 100mg/ml. The ethyl acetate extract showed more significant activity when compared to ethanol and aqueous extracts of seed. Whereas ethanol and aqueous extracts has showed moderate anthelmintic activity at prefixed time. Since detailed investigation of anthelmintic activity has not been carried out so far, present study was under taken.*

Keywords: *Albendazole,Anthelmintic activity, Artocarpusheterophyllus,Pheretimaposthuma, earthworms.*

I. Introduction

More than half of the population of the world suffers from infection of one or the other and majority of cattle's suffers from worm infections. Anthelmintic drugs can be classified according to their chemical structure as well as to their action against the specific type of helminthic [1]. As per WHO, only few drugs are frequently used in the treatment of these parasite infections[2]. Helminthiasis is prevalent globally (1/3 of world's population harbours them), but is more common in developing countries with poorpersonal and environmental hygiene [3]. Anthelmintics are drugs that expel parasitic worms (helminths) from the body, by either stunning or killing those [4]. The gastro-intestinal helminthes becomes resistant to currently available anthelmintic drugs; therefore, there is a foremost problem in treatment of helminthes diseases [5]. Moreover, these drugs are unaffordable because of their high cost. These factors paved the way for herbal remedies as alternative anthelmintics. An ideal anthelmintic must have a wide margin between its toxicity to the worm and its toxic effect on the host. The drug must be effective in one dose.

Plants are used medicinally in different countries and are a source of many potent and powerful drugs [6]. *Artocarpusheterophyllus*is a species of tree in the *Artocarpus* genus of the mulberry family (*Moraceae)*[7]. It is a native to parts of South and South East Asia, and is believed to have originated in the south western rain forest of India, Kerala, Tamilnadu, Coastal Karnataka and Maharashtra [8]. It is reported that the seeds of *Artocarpusheterophyllus* is a good remedy for diuretic and constipating [9]. In view of its medicinal properties, in the present study the various solvent extracts of seeds of *Artocarpusheterophyllus* were screened for anthelmintic activity. The Chinese consider jackfruit pulp and seeds tonic, cooling and nutritious, and to be "useful in overcoming the influence of alcohol on the system." The seed starch is given to relieve biliousness and the roasted seeds are regarded as aphrodisiac. The ash of jackfruit leaves, burned with corn and coconut shells, is used alone or mixed with coconut oil to heal ulcers. The dried latex yields artostenone, convertible to artosterone, a compound with marked androgenic action. Mixed with vinegar, the latex promotes healing of abscesses, snakebite and glandular swellings. The root is a remedy for skin diseases and asthma. An extract of the root is taken in cases of fever and diarrhoea. The bark is made into poultices. Heated leaves are placed on wounds. The wood has a sedative property; its pith is said to produce abortion. It is reported that the medicinal value is due to the presence of some chemical substance that produces a physiological action on the Human body and therefore researchers always try to isolate these chemical substances from plants.

II. Materials And Methods

2.1Collection and authentication of plant

The seeds of *Artocarpusheterophyllus*were collected from the local areas of Shimoga district. The materials were shade dried, powdered and stored in air tight containers. The plant was identified and authenticated by Taxonomist Dr.Rudrapa, Dean and Department of Botany S.R.N.M College, Shimoga. The herbarium of the identified plant was prepared and submitted to the Department of Pharmacognosy, National College of Pharmacy, Shimoga, karnataka, India.

2.2 Preparation of plant extract

2.2.1 Hot extraction of seeds

The dried seed powder was subjected to hot solvent extraction in a soxhlet extractor. The extraction carried by ethyl acetate and ethanol by successive method. All the three extracts were stored in refrigerator at 4°C [10, 11].

2.3 Phytochemical screening

The extracts of seed were screened for the presence of Carbohydrates, Proteins, Amino acids, Alkaloids, Steroids, Triterpenoids, Tannins, Glycosides, Flavonoids and Saponins (As per the standard procedure)[12-23].

2.4Worms

Indian adult earthworms (*Pheretimaposthuma*) were collected from moist soil of Thunga dam. The earthworms were washed with normal saline to remove all the faecal matter and were used for the anthelmintic study. The earthworms of 3-5 cm in length and 0.1-0.2 cm in width were used for the experiment due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings.

2.5Acute toxicity Studies

Acute toxicity was evaluated on Swiss albino mice weighing between 25-30g. The fixed dose method was adopted as per OECD (Organization for Economic Co-operation and Development) Guideline No.423 of CPCSEA [24, 25]. The therapeutic dose fixed was 500mg/kg body weight i.e., $^{1}/_{10th}$ of the lethal dose.

2.6 Anthelminthic activity of seeds of Artocarpusheterophyllus by in vitro method:

The test samples prepared from seed extract of an ethanol, ethyl acetate and aqueous were tested for their anthelmintic activity by *in vitro* method. The adult Indian earthworms *(Pheretimaposthuma)* were used to evaluate anthelmintic activity.The animals were divided into 5 groups of 5 worms each. The worms of group I were released into a plate containing a solution of 50 sterile distilled water which served as control. The worms of group IIwere released into a plate containing Albendazole (25 mg/ml, 50 mg/ml, and 100 mg/ml) which served as standard. The worms of group III, IV and Vwere released into the separate plates containing solution of test samples of seed extract (Ethanol, aqueous and ethyl acetate) at a dose of 25 mg/ml, 50 mg/ml and at 100 mg/ml to group respectively. All the test samples were prepared in sterile water. In the study observations were made for the time taken to paralysis and death of individual worms. Time for paralysis was noted when no movement of any sort even after transfer to normal saline. Death was concluded when the worms lost their motility completely and failed to respond even after a touch with the needle followed by fading of their body colors[26].

Due to the anatomical and physiological resemblances to the human intestinal round worm parasite, the assay was performed on adult earth worm, *Pheretimaposthuma*[27, 28]. The individual earth worms were placed in petridishes containing distilled water, three different concentrations of extracts and standard Albendazole. The time for the paralysis and death was noted. The earthworms in control group (group I) were alive up to 24hrs of the experiment [29, 30]. Mean values of paralysis time and death time of *Pheretimaposthuma*earthworms and were calculated separately and tabulated.

2.7Statistical analysis

The statistical analysis was carried out by one way analysis of variance (ANOVA). All the data were presented as Mean ± SEM.

III. Results

3.1 Phytochemical study of test samples

The qualitative analysis of test samples of seed showed the presence of different secondary metabolites. The results of phytochemical screening of seeds are shown in the table No-1.

Table No-1: Phytochemical study of test samples for phytochemical constituents

SI NO	EXTRACT	YIELD	CONSTITUENTS
1.	Ethanol		Carbohydrates, Alkaloids, Steroids, Triterpenoids, Tannins, Glycosides, Flavonoides, Saponins.
2.	Ethyl acetate		Steroids, Triterpenoids, Flavonoides, Saponins.
3.	Aqueous		Carbohydrates, Alkaloids, Steroides, Triterpenoides, Glycosides, Flavonoides, Saponins.

3.2 Anthelmintic Activity of various extract of Artocarpusheterophyllus

Artocarpusheterophyllus seed extract has shown good anthelmintic activity. The results are displaced in table-2.

Table-2 showing anthelmintic activity of various extracts of *Artocarpusheterophyllus*

GROUP	TREATMENT	CONCENTRATION (mg/ml)	TIME TAKEN FOR PARALYSIS	TIME TAKEN FOR DEATH
GP-1	Control	5% Normal saline	_	_
GP-2	Albendazole (standard)	25 mg 50 mg 100 mg	19.83±0.95 15.50±0.89 09.17±0.70	26.83±0.93 20.83±0.95 14.17±0.95
GP-3	Ethanol extract (test sample)	25 mg 50 mg 100 mg	95.33±0.88 64.50±0.92 46.67±0.67	117.50±0.99 86.67±0.84 66.17±0.87
GP-4	Aqueous (test sample)	25 mg 50 mg 100 mg	120.33±0.80 78.50±0.99 64.67±0.88	147.17±0.93 106.50±0.99 117.50±0.90
GP-5	Ethyl acetate (test sample)	25 mg 50 mg 100 mg	82.67±0.88 57.17±0.95 46.67±0.67	109.50±0.99 92.50±0.85 66.17±0.87

Histogramshowing the effect of seed extracts of *Artocarpusheterophyllus* on the worms at different concentration.

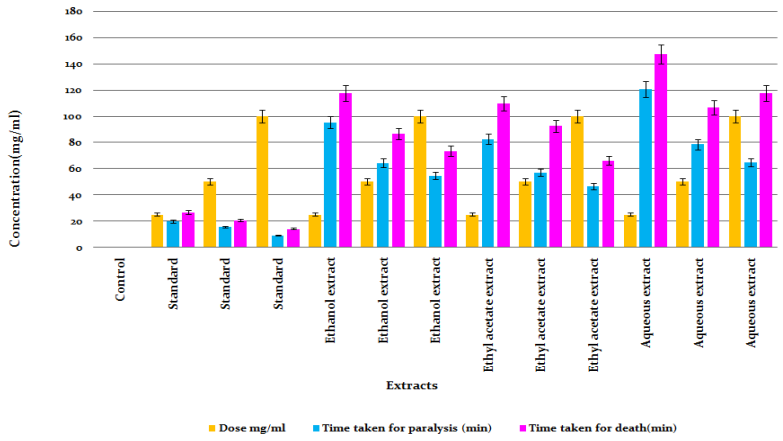

Fig 1-showing the effect of seed extracts of *Artocarpusheterophyllus* on the worms at different concentration.

IV. Discussion

In the present study the test samples of seed extracts of plant *Artocarpusheterophyllus*belongs to the family *Moraceae* were tested for anthelmintic activity. The anthelmintic activity has also been reported for extracts of many plants like, *Artocarpusaltillis[31], Artocarpuslakoocha[32],Streblusasper[33], Morusalba[34, 35], Ficusracemosa[36], FicusCarica[37], Morusaustralis[38], Ficusriligiosa[39], Ficusbengalensis ,Ficusglomerata, Morusindica, Moruslaevigata[40],Ficuselastic[41], Ficushispida[42]*have the same familyof *Moraceae* have been reported with significant anthelmintic activity. However, anthelmintic activity has not been reported for the metabolites of the plant seeds of *Artocarpusheterophyllus*. Hence, in the present study anthelmintic activity for the seed extract of *Artocarpusheterophyllus*has been evaluated.

In the present study anthelmintic activity was evaluated by Ajaiyeoba*et.al* method. The ethyl acetate ethanol and aqueous extracts of seed exhibited significant anthelminthic activity in comparison with control.

Amongst all the extracts, Ethyl acetate extract showed better activity. It indicates that certain non-polar constituents are responsible for the activity. This anthelmintic activity is mainly due to the presence of secondary metabolites- Alkaloids, flavonoids and Triterpenoides. There are several reports on Alkaloids and flavonoids exhibiting anthelmintic activity [43, 44].

V. Conclusion

The ethyl acetate, ethanol and aqueous extracts exhibited significant anthelmintic activity. The test samples can be evaluated further for other pharmacological properties which may be useful in designing of new drugs of anthelminthic activity.

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