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Research Article

COMPARATIVE STUDIES ON ANTHELMINTIC ACTIVITY OF MANGIFERA INDICA L. VAR. THOTAPURI AND MANGIFERA INDICA L. VAR. NEELAM ROOT CRUDE EXTRACTS

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Abstract

Pet ether, ethyl acetate and ethanolic extracts of *Mangifera indica* L. Var. *Thotapuri* and *Mangifera indica* L. Var. *Neelam* were taken for anthelmintic activity against Indian earthworm *Pheritima posthuma*. Various concentrations of both extracts were tested and results were expressed in terms of time for evoked response, paralysis and time for death of worms. Piperazine citrate was used as a reference standard and distilled water as a control group. Dose dependent activity was observed in both plant extracts but *Mangifera indica* L. Var. *Thotapuri* shows more activity as compared to *Mangifera indica* L. Var. *Neelam.*

Keywords: *Mangifera indica,* Anthelmintic Activity, Piperazine citrate and *Pheritima posthuma*.

1. Introduction

Since the time immemorial, our traditional system of medicine and folklore claiming that medicinal plants as a whole or their parts are being used in all types of diseases successfully including antibacterial and anthelmintic, anti-inflammatory etc[1]. As we know very well, now a days the medicinal preparation available in the market from which most of them either not effective up to the mark or has to develop resistance resulting in reoccurrence again. Plant derived drug serve as a prototype to develop more effective and less toxic medicines[2-3].

Helminth infections are among the most widespread infections in humans, distressing a huge population of the world. Although the majority of infections due to helminths are generally restricted to tropical regions and cause enormous hazard to health and contribute to the prevalence of undernourishment, anaemia, eosinophilia and pneumonia. Parasitic diseases cause ruthless morbidity affecting principally population in endemic areas[4-5]. The gastro-intestinal helminthes becomes resistant to currently available anthelmintic drugs therefore there is a foremost problem in treatment of helminthes diseases[6]. Hence there is an increasing demand towards natural anthelmintics.

The *Mangifera indica* (mango) is one of the choicest fruit crops of tropical and subtropical regions of the world, especially in Asia. Its popularity and importance can easily be realized by the fact that it is often referred as 'King of fruits' in the tropical world. The characteristic of *Mangifera indica* is the trees are deep rooted, symmetrical evergreens that the height is about 90 feet and widths of 80 feet.[7-9] The mango has a long taproot that often branches just below ground level, forming between two and four major anchoring taproots that can reach 6 m (20 ft) down to the water table. The more fibrous finer roots (feeder roots) are *Mangifera indica* (mango) found from the surface down to approximately 1 m (3.3 ft) and usually extend just beyond the canopy diameter. Distribution of the finer roots changes seasonally with the moisture distribution in the soil.[10-11]

2. Materials and Methods

2.1 Preparation of plant extracts: The coarse powdered material was subjected to successive extraction with ethyl acetate and ethanol by increasing polarity. The physical parameters of the root extracts of *Mangifera indica* L. Var. Thotapuri and *Mangifera indica* L. Var.Neelam mentioned in Table.1.

2.2 Preliminary phytochemical screening: Ethyl acetate and ethanol extracts of *Mangifera indica L.* verities were subjected to phytochemical investigation to study the presence of alkaloids, steroids, carbohydrates, flavonoids, saponins, glycosides,amino acids, phenolics compounds and tannins. Results are tabulated in table.2.

2.3 Anthelmentic activity: The Earthworms (*Pheritima posthuma*) were procured from local supplier at Shimoga at the time of carrying out the experiment. The worms were washed with water to remove adhering materials and were sorted out for uniform size and length. The worms were kept in 6% dextrose solution for acclimatization. The worms with normal motility were selected for the experiment. Emulsion of the crude extract in Tween-80 (0.1%) which containing 5, 10, 50mg/ml of extract were prepared by 6% dextrose solution and used as reference. Each of physiological solution 25ml was poured into Petri dishes. The anthelmintic activity was determined in duplicate. Three worms of about the same size per Petri dish were used. They were observed for their spontaneous motility and evoked responses. The paralytic score was recorded at different time intervals. Immediate after inhibition of response to external stimuli, the worms were placed in fresh water and observed for recovery. Duration required for final recovery or death was noted. Mean paralytic score was plotted against time and by keeping the view of reported method and we have chosen piperazine citrate 3% solution as reference standard. The death and/or total paralysis time were recorded at room temperature. The death of the worm was ascertained by transferring it into a beaker containing hot water (50^0C), which stimulated and induced movements if the worm was live. Two independent experiments were carried out for each observation to confirm the result. Worms were observed at regular intervals for evoked response, paralysis and death and the time of paralysis and death in each concentration was recorded in the table 3.

3. Results and Conclusion

Preliminary phytochemical screening has shown the presences of alkaloids were present in ethanol extract of *Thotapuri and* pet ether and ethanol extracts of *Neelam.* Steroids were present in all the crude extracts of both the plants. Carbohydrates were present in ethyl acetate extract of the plant *Thotapuri* and also present in ethyl acetate extract and ethanol extracts of *Neelam.* Flavoids were present only in ethyl acetate and ethanol extracts of *Thotapuri*. In both the plant pet ether extract shows the presence of saponins. Amino acids and proteins were absent in all the extracts except in ethyl acetate extract of *Thotapuri.* Phenolic compounds and tannins were present in ethyl acetate and ethanol extracts of *Mangifera indica* L. Var. *Thotapuri* and *Mangifera indica* L. Var. *Neelam* plants.

From the results it is observed that both *Thotapuri* and *Neelam* varieties of *Mangifera indica* plant shows potent anthelmintic activity. While *Neelam* variety has taken long time for death of worms. Pet ether extract of *thotapuri* shows paralysis within 115 min while death was comparable with that of piperazine citrate as death of worms was observed at 68 to 100 min. *Thotapuri* was taken 115-130 min to bring paralysis at 30 mg/ml concentration and 2- 3 hrs. to bring death of worms at 30 mg/ml. Future scope involves need of isolation of phytoconstituents responsible for activity.

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Table 1. The physical parameter of the root extracts of *Mangifera indica* L. Var. *Thotapuri* and *Mangifera indica* L. Var. *Neelam*

Varieties	Extracts	Weight (g/kg)	Colorour	Physical state
Mangifera indica* L. Var. *Thotapuri	Ethyl acetate extract	10.5	Greenish brown	Gummy
	Ethanolic extract	28.0	Brown	Powder Dry
Mangifera indica* L. Var.*Neelam	Ethyl acetate extract	13.0	Greenish brown	Gummy
	Ethanolic extract	32.0	Dark yellow	Dry powder

Table 2. Preliminary phytochemical constituents

Varieties	Mangifera indica *L. Var. Thotapuri*			*Mangifera indica* L. Var. *Neelam*		
Tests	**Pet ether extract**	**Ethyl acetate extract**	**Ethanol extract**	**Pet ether extract**	**Ethyl acetate extract**	**Ethanol extract**
Alkaloids						
a) Mayer's Test	- ve	- ve	+ ve	+ ve	- ve	+ ve
b) Dragendroff's Test	- ve	- ve	+ ve	+ ve	- ve	+ ve
Steroids						
a) Salkowski's Test	+ ve	+ ve	+ ve	+ ve	+ve	+ ve
b) Libermann teroid Test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
Carbohydrates						
a) Molisch's Test	- ve	+ ve	- ve	- ve	+ ve	+ ve
b) Benidict's Test	- ve	+ ve	- ve	- ve	+ ve	+ ve
Flavonoids	- ve	+ ve	+ ve	- ve	- ve	- ve
Saponins						
a) Foam Test	+ ve	- ve	- ve	+ ve	- ve	- ve
Amino Acids and Proteins						
a) Ninhydrin Test	- ve	+ ve	- ve	- ve	- ve	- ve
Phenolic Compounds and Tannins						
a) Neutral $FeCl_3$ Test	- ve	+ ve	+ ve	- ve	- ve	- ve
b) Dilute iodine test	- ve	+ ve	+ ve	- ve	+ ve	- ve
c) Dil HNO_3 test	- ve	+ ve	+ ve	- ve	+ ve	+ ve
d) Dil NH_4OH test	- ve	+ ve	+ ve	- ve	+ ve	+ ve
e) Acetic acid test	- ve	+ ve	+ ve	- ve	+ ve	+ ve

Table 3. Time taken for evoked response, paralysis and death in each concentration

reatment groups		No. of earth worms testes	Conc. (mg/ml)	Mean evoked response in min. ± SEM	Mean paralysis time in min. ± SEM	Mean death time in min. ± SEM
1. Control		3	-	-	NP	ND
2. Standard drug		3	5	40.33±1.80	90.00±1.18	99.23±1.78
		3	10	33.33±1.18	81.66±2.85	83.33±1.18
		3	30	20.66±0.32	61.33±1.43	68.66±1.83
3. *Thotapuri*	Pet ether extract	3	5	76.33±1.74	180.00±1.71	235.66±1.08
		3	10	68.33±0.32	131.00±0.98	200.66±1.18
		3	30	59.66±0.32	115.66±1.74	136.36±1.43
	Ethyl acetate Extract	3	5	57.66±2.37	172.33±0.32	210.33±2.96
		3	10	42.38±0.98	155.00±1.14	199.38±0.98
		3	30	33.00±0.57	132.00±0.65	182.33±2.37
	Ethanol extract	3	5	86.33±3.14	196.33±1.74	278.00±2.80
		3	10	72.33±1.74	158.00±1.51	203.33±2.80
		3	30	55.66±0.65	133.00±2.87	175.66±1.43
4. *Neelam*	Pet ether extract	3	5	80.00±0.57	165.33±2.70	229.33±0.32
		3	10	63.66±2.70	144.00±2.61	201.33±0.87
		3	30	51.33±0.87	124.33±0.87	178.66±2.00
	Ethyl acetate Extract	3	5	76.00±1.51	161.33±2.16	243.33±1.83
		3	10	60.33±2.03	140.66±1.64	195.33±1.64
		3	30	49.33±1.18	120.33±2.28	166.66±2.63
	Ethanol extract	3	5	78.0±1.51	166.33±2.63	243.00±2.28
		3	10	66.66±1.51	155.00±2.28	219.66±2.87
		3	30	57.66±1.51	128.33±1.74	188.66±0.32

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