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Research Article

EVALUATION OF ANTHELMINTIC ACTIVITY OF *PRUNUS PERSICA* (L.)

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ABSTRACT

Objective: *Prunus persica* leaves are used as anthelmintic, insecticidal, sedative, diuretic, demulcent, expectorant and vermicidal ethnopharmacologically. The objective of the present study was an evaluation of anthelmintic activity of different extracts of *P. persica* leaves.

Methods: *Pheretima posthuma* (annelids) and *Ascaridia galli* (nematods) were used to perform experiments for anthelmintic activity. Piperazine citrate was used as a standard. The time required for paralysis and death (lethal time) of worms were noted for each sample of *P. persica* extracts and standard.

Results: The results demonstrated that the treatment with P. persica significantly ($p<0.05$-$p<0.01$) with dose-dependently paralyzed and killed the both *A. galli* and earthworms. Ethanol and ethyl acetate extracts have showed the comparable anthelmintic activity at the highest concentration (60 mg/ml) to the well-known anthelmintic agent piperazine citrate against *A. galli*.

Conclusion: The ethanolic and ethyl acetate extracts exhibited the maximum potency, i.e. shortest paralysis and lethal times. The potency was not more than the reference drug, piperazine citrate but comparable to it at 60 mg/ml concentrations in both test worms.

Keywords: Prunus Persica, Anthelmintic activity, Pheretima posthuma, and Ascaridia galli.

INTRODUCTION

Helminthes infections are the most common infections in man which affects the large proportions of the world's population. In the treatment of parasitic diseases, the anthelmintics drugs are used indiscriminately. Recently, the use of anthelmintics produces toxicity in human beings. Hence, the development and discovery of new substances acting as anthelmintics are being derived from plants which are considered to be the best source of bioactive substances. *Prunus persica* L. (Peach) named as *Amygdalus persica* is a perennial and deciduous tree of the subfamily Prunoideae of the family Rosaceae. The leaves are insecticidal, sedative, diuretic, demulcent, expectorant, vermicidal and are used in leucoderma, and in piles [1]. Leaf paste is used to kill worms in wounds, and fungal infections. The treatment of gastritis, whooping cough, and chronic bronchitis is carried out internally with leaves [2]. The bark is used in leprosy, and jaundice. Leaves of *P. persica* have been investigated for their antioxidant [3], and anti-inflammatory activities in the past [4]. *P. persica* screened for the treatment of Alzheimer's disease [5]. Fruits of *P. persica* reported for the hypoglycemic effect for the prevention of Type-2 diabetes [6]. *P. persica* seeds showed the good results in the treatment of the degenerative disorders, such as hypermenorrhea, and dysmenorrheal [7]. Hence, various activities have been reported from various parts of *P. persica*. The leaves of *P. persica* was used in the treatment of helminthes ethnopharmacologically (Charaka Samhita, and Ayurveda), but no scientific data is available yet. Therefore, it was thought to investigate the anthelmintic potential of leaves of *P. persica.*

METHODS

Plant material

The leaves of *P. persica* were collected in the month of August from a village and were authenticated by Department of Botany, Meerut College, Meerut, Uttar Pradesh, (India).

Experimental worms

Indian earthworms (*Pheretima posthuma)* were obtained from the waterlogged areas. Adult Indian earthworms (*P. posthuma*) have anatomical and physiological resemblance with the intestinal round worm parasite of human being [8-11].

Ascaridia galli Schrank (Nematoda) were collected from the Department of Veterinary Science, Pantnagar. *A. galli* infections affect the poultry productivity through retarded growth, diarrhoea weight loss, and poor absorption of nutrients [12].

Preparation of extracts

The leaves of *P. persica* were dried under shade and crushed in an electric blender to form coarse powder (200 g), and subjected to soxhlet extraction (continuous hot extraction) by using petroleum ether, ethyl acetate, and ethanol as solvent. The extracts were concentrated by rotary evaporator and used for testing the anthelmintic activity.

Test samples

Test samples were prepared freshly. Varying concentrations of three tests extracts such as petroleum ether, ethyl acetate, and ethanol *viz.* 10, 20, 40, 60 mg/ml for each were prepared by dissolving or suspending in distilled water for annelids. Similar dilutions were made in phosphate buffered saline (PBS) (pH 7.2, 0.15 M), supplemented with 2% dimethyl sulfoxide (DMSO) for nematodes.

Experimental design

The fresh worms of nearly equal size were selected for the study. Each type of worms was divided into 14 groups of six worms each.

The first group was served as positive control and kept in 9 cm petri dishes containing 20 ml of piperazine citrate (10 mg/ml) in distilled water (for annelids) and in 2% DMSO (dimethyl sulfoxide) in (PBS, pH 7.2, 0.15 M) (for nematodes). Piperazine citrate (10 mg/ml) was served as reference vermicide drug in the positive control group.

The second group was served as negative control, and kept in distilled water for annelids and 2% DMSO in PBS (pH 7.2, 0.15 M) for nematodes.

12 groups were kept in petri dishes containing 20 ml of each three extracts at four different concentrations (10, 20, 40, and 60 mg/ml). Time for the paralysis has been noted when no movement of any sort was observed except when the worms were shaken vigorously. The time for death (lethal time) of worms has been recorded after ascertaining that the worms were neither moved when shaken vigorously nor when dipped in warm water (50°C). Death has been concluded when the worms were lost their body color [13,14].

Statistical analysis

The result was expressed as mean±standard error of the mean. Statistical analysis was carried out using one-way ANOVA followed by Dunnett's multiple comparison tests. [a](p<0.01), [b](p<0.05) were considered as statistically significant.

RESULTS

The results of *in vitro* evaluation of different test extracts from *P. persica* in *P. posthuma,* and *A. galli* are summarized in Tables 1 and 2 respectively. Against *P. posthuma* all the test extracts (60 mg/ml and 40 mg/ml) exhibited significant[a](p<0.01), [b](p<0.05) paralytic and lethal actions in a concentration dependent manner (Table 1). The ethanolic extracts was showed the shortest paralysis and lethal time, followed by ethyl acetate and only petroleum ether extracts which was least active, at higher concentrations, exhibited most prolonged paralytic and lethal time. The lower concentrations, i.e. 10 mg/ml and 20 mg/ml of petroleum ether extracts were not detected for paralysis and lethal time till 24 h of observation. Only against *P. posthuma,* 10 mg/ml concentration of ethyl acetate extracts was not detected for lethal time till 24 hrs of observation (Fig. 1). In case of *A. galli*, here also all the test extracts demonstrated the concentration dependent paralysis, and lethal effects (Table 2). Ethanol extracts of *P. persica* have shown the significant anthelmintic activity, and it was found that the ethanol extract activity is higher than other both extracts at all the concentrations against *A. galli*. At the highest concentration (60 mg/ml), ethanol and ethyl acetate extracts activity were comparable to the well-known anthelmintic agent piperazine citrate against *A. galli* (Fig. 2).

DISCUSSION

In the present investigation, the *in vitro* effects of the defatted ethanolic and ethyl acetate extracts of *P. persica* leaves were evidenced by their

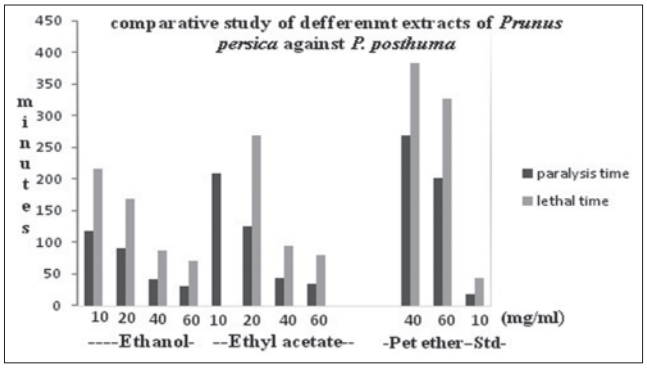

Fig. 1: Effect of *Prunus persica* leaves against *Pheretima posthuma*

Table 1: Effects of *P. persica* leaves against *P. posthuma*

Treatment	Concentration (mg/ml)	Mean paralysis time (minutes)±SEM	Mean lethal time (minutes)±SEM
Positive control (piperazine citrate)	10	17.33±0.21	44.00±0.36
Negative control (vehicle only)	Nil	Nil	Nil
Ethanol extract	10	118.16±0.30	215.16±0.30
	20	91.16±0.30	168.17±0.31
	40	42.16±0.54*	87.33±0.21*
	60	30.83±0.30**	71.16±0.31**
Ethyl acetate extract	10	208.17±0.31	Nil
	20	125.16±0.30	269.00±0.36
	40	43.50±0.22*	94.66±0.21*
	60	35.16±0.31**	79.50±0.42**
Petroleum ether extract	10	Nil	Nil
	20	Nil	Nil
	40	268.17±0.30	383.16±0.30
	60	202.16±0.31	325.83±0.47

Number of worms per group n=6, SEM: Standard error of mean, *p<0.05, **p<0.01, Vehicle: Distilled water. *P. persica: Prunus persica, P. posthuma: Pheretima posthuma*

Table 2: Effects of *P. persica* leaves against *A. galli*

Treatment	Concentration (mg/ml)	Mean paralysis time (minutes)±SEM	Mean lethal time (minutes)±SEM
Positive control (piperazine citrate)	10	11.16±0.30	19.00±0.36
Negative control (vehicle only)	Nil	Nil	Nil
Ethanol extract	10	57.16±0.40	72.33±0.33
	20	28.16±0.54*	30.16±0.65*
	40	15.83±1.19*	28.00±0.93*
	60	14.00±0.25**	23.00±0.57**
Ethyl acetate extract	10	58.16±0.30	74.16±0.30
	20	29.00±0.57	31.16±0.40
	40	17.16±0.47*	29.00±0.57*
	60	14.16±0.54**	25.00±0.36**
Petroleum ether extract	10	265.83±1.55	383.83±0.70
	20	203.00±0.93	322.16±0.30
	40	121.50±0.99	253.16±0.54
	60	41.66±0.55	86.16±0.30

Number of worms per group n=6, SEM: Standard error of mean, *p<0.05, **p<0.01, Vehicle: 2% DMSO in PBS (pH 7.2, 0.15 M), *P. persica: Prunus persica, A. galli: Ascaridia galli*, DMSO: Dimethyl sulfoxide, PBS: Phosphate buffered saline

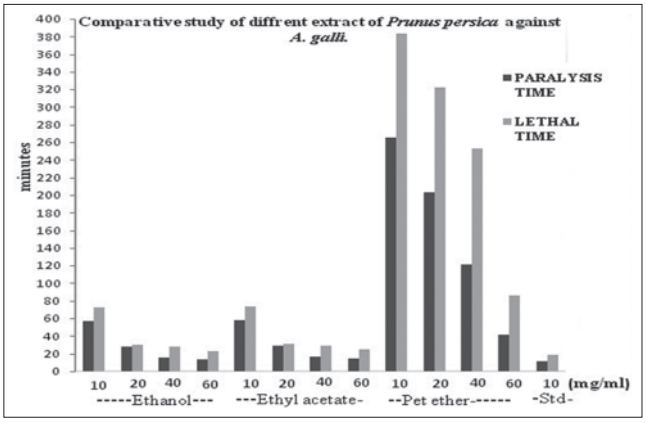

Fig. 2: Effect of *Prunus persica* leaves against *Ascaridia galli*

paralytic and lethal actions on *P. posthuma* and *A. galli*. At lower concentrations, pet ether extracts showed their paralytic and lethal actions on *A. galli* only. The adult Indian earthworms, although not helminthes but have extensively been used for initial *in vitro* anthelmintic evaluation due to their easy availability and their anatomical and physiological resemblance with the intestinal roundworm parasites in human beings.

A. galli infections continue to be the most debilitating factor impeding poultry productivity resulting in poor growth, weight loss, poor absorption of nutrients, and death. *A. galli* is also an easily available, and suitable for *in vitro* anthelmintic evaluation [15-17].

In the present study, *P. posthuma* was found to be paralyzed and eventually killed by all test extracts except 10 and 20 mg/ml pet ether extracts in a clear-cut concentration dependent manner.

In case of *A. galli*, there were all worms found to be paralyzed and eventually killed by all test extracts in concentration dependent manner.

The ethanolic and ethyl acetate extracts exhibited the maximum potency, i.e. shortest paralysis and lethal times. The potency was not more than the reference drug piperazine citrate but comparable to it at 60 mg/ml concentrations in both test worms.

Against *A. galli* lethal times for all test extracts were found to be comparatively shorter than those in the case against *P. posthuma,* thereby indicating the relative sensitivity of *A. galli* to the extracts and thus confirming their marked nematocidal potential.

CONCLUSION

Ethanopharmacological use of *P. persica* as an anthelmintic has been confirmed. All the extracts showed the anthelmintic activity. The ethanol extracts showed more potent activity as compared to ethyl acetate and petroleum ether extracts and its activity at 60 mg/ml was comparable to the reference drug, piperazine citrate at 10 mg/ml. Further studies are needed to be carried out to recognize the specific active constituent responsible for anthelmintic activity and mechanism of action.

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REFERENCES

1. Nadkarni AK. Indian Materia Medica. 3rd ed. Mumbai: Popular Prakashan; 1996. p. 1236.
2. Kirtikar KR, Basu BD. Indian Medicinal Plant. 2nd *ed*. Dehradun: Oriental enterprises; *2001*. p. *1533*.
3. Deb L, Gupta R, Dutta AS, Yadav A, Bhowmik D, Kumar KP. Evaluation of antioxidant activity of *Prunus persica* L. aqueous extract. Pharm Sin 2010;1(3):157-64.
4. Shin TY, Park SB, Yoo JS, Kim IK, Lee HS, Kwon TK, *et al*. Anti-allergic inflammatory activity of the fruit of *Prunus persica*: Role of calcium and NF-kappaB. Food Chem Toxicol 2010;48(10):2797-802.
5. Suh SJ, Koo BS, Jin UH, Hwang MJ, Lee IS, Kim CH. Pharmacological characterization of orally active cholinesterase inhibitory activity of *Prunus persica* L. Batsch in rats. J Mol Neurosci. 2006;29(2):101-7.
6. Park SW, Survay NS, Ko EY, Upadhyay CP, Mi1 J. Hypoglycemic effects of fruits and vegetables in hyperglycemic rats for prevention of Type-2 Diabetes. Korean J Hortic Sci Technol 2010;28(5):1-7.
7. Kim YK, Koo BS, Gong DJ, Lee YC, Ko JH, Kim CH. Comparative effect of *Prunus persica* L. BATSCH-water extract and tacrine (9-amino-1,2,3,4-tetrahydroacridine hydrochloride) on concentration of extracellular acetylcholine in the rat hippocampus. J Ethnopharmacol 2003;87(2-3):149-54.
8. Thorn GW, Adams RD, Brundwald E, Isselbacher KJ, Petersdorf RG. Harrison's Principles of Internal Medicine. New York: McGraw Hill Co.; 1977. p. 1088.
9. Vigar Z. Atlas of Medical Parasitology. 2nd ed. Singapore: P. G. Publishing House; 1984. p. 216.
10. Vidyarthi RD. A Text Book of Zoology. New Delhi: S. Chand & Co.; 1967. p. 329-70.
11. Chatterjee KD. Parasitology, Protozoology and Helminthology. Calcutta: Guha Ray Sree Saraswati Press Ltd.; 1967. p. 168-9.
12. Permin A, Bisgaard M, Frandsen F, Pearman M, Kold J, Nansen P. Prevalence of gastrointestinal helminths in different poultry production systems. Br Poult Sci 1999;40(4):439-43.
13. Ghosh T, Maity TK, Bose A, Dash GK. Anthelmintic activity of *Bracopa monnieri*. Indian J Nat Prod 2005;21(2):16-9.
14. Lalchhandama K. Nematocidal effects of piperazine and the extract of *Acacia oxyphylla* stem bark on the poultry nematode, *Ascaridia galli*. Pharmacology 2008;3:864-9.
15. Singh K, Nagaich S. Anthelmintic efficacy of the alcoholic extract of *Ocimum sanctum* against common poultry worms *Ascaridia galli* and *Heterakis gallinae.* J Parasit Dis 2002;26:42-5.
16. Singh K, Nagaich S. Efficacy of aqueous seed extract of *Carica papaya* against common poultry worms *Ascaridia galli* and *Heterakis gallinae*. J Parasit Dis 1999;23:113-6.
17. Kaushik RK, Katiyar JC, Sen AB. Studies on the mode of action of anthelmintics with *Ascaridia galli* as the test parasite. Indian J Med Res 1974;62(9):1367-75.