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ANTHELMINTIC ACTIVITY OF *SALVADORA PERSICA* ROOT EXTRACT AGAINST *PHERETIMA POSTHUMA*

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ABSTRACT

Helminthes infections are the most common health problems in India, in developing countries they pose a large treat to public. These infections can affect most population in endemic areas with major economic and social consequences. The miswak is a natural toothbrush made from the twigs of the *Salvadora persica* (Salvadoraceae). Miswak prevents tooth decay, eliminating toothaches and halt further increase in decay. The present study was undertaken to evaluate antihelmintic activity of aqueous and alcoholic root extract of *S. persica* against Indian earthworms *Pheretima posthuma*. Various concentrations (10, 20, 40 and 80 mg/ml) of aqueous and alcoholic root extract of *S. persica* were tested, which involved determination of time of paralysis and time of death of the worms. It was compared with Piperazine citrate (10, 20, 40 and 80 mg/ml) as standard reference and normal saline as control. The study indicated the potential usefulness of aqueous and alcoholic extract of *S. persica* against earthworm.

INTRODUCTION: Helminthiasis or worm infestation is one of the most prevalent disease and one of the most serious public health problems in the world. Hundreds of millions if not billions of human infections by helminthes exist worldwide and increased world travel and immigration from the developing countries¹. Chemical control of helminthes coupled with improved management has been the important worm control strategy throughout the world. However, increasing problems of development of resistance in helminthes^{2,3} against anthelmintics have led to the proposal of screening medicinal plants for their antihelmintic activity.

Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins,

flavonoids and phenolic compounds. Many of the indigenous medicinal plants are used as spices and food plants. They also sometimes added to foods meant for pregnant women and nursing mothers for medicinal purposes^{4,5,6}.

In addition, the use of herbal medicine for the treatment of diseases and infections is as old as mankind. The World Health Organization supports the use traditional medicine provided they are proven to be efficacious and safe⁷. In developing countries, a huge number of people lives in extreme poverty and some are suffering and dying for want of safe water and medicine, they have no alternative for primary health care⁷. Therefore, the need to use medicinal plants as alternatives to orthodox medicines in the provision of primary health care cannot be over-emphasized.

Moreover, such herbal medicines have received much attention as sources of lead compounds since they are considered as time tested and relatively safe for both human use and environment friendly⁸.

Miswak is a chewing stick prepared from the roots, twigs or stems of *Salvadora persica* and widely used in Middle Eastern and Eastern African cultures. It has been shown that extracts of miswak possess various biological properties including significant antibacterial⁹ and anti-fungal effects¹⁰. Extracts of *S. persica* and other related plants may be effective against the bacteria that are important for the development of dental plaque. Therefore, it has been claimed that miswak sticks may have antiplaque effects and may also affect the pathogenesis of periodontal diseases by reducing the virulence of periodontopathogenic bacteria¹¹.

There is therefore, the need to look inwards to search for herbal medicinal plants with the aim of validating the ethno-medicinal use and subsequently the isolation and characterization of compounds which will be added to the potential list of drugs. The aqueous extract of and stem root of *S. persica* L. has also been investigated for some antimicrobial anionic components by using capillary electrophoresis techniques. It was reported that the root and stem extracts contain sulfate chloride, thiocyanate, and nitrate¹².

This study investigates the anthelmintic activity of aqueous and alcoholic root extract of *S. persica* against *P. posthuma*.

MATERIALS AND METHODS:

Plant collection and Plant Extract Preparation:

Miswak chewing sticks were purchased from the local market and were identified in this laboratory as the roots of *S. persica*. Dirt was removed from the root by rinsing in clean water. The roots were cut into small pieces and powdered. Aqueous extract was prepared according to Kokate and Trease^{13, 14} by (Maceration method).

Powdered material of *S. persica* root (200 gm) was kept for maceration with 1000 ml of distilled water for 12 hrs. The extract was double filtered by using muslin cloth and Whatmann no. 1 filter paper and

concentrated by evaporation on water bath. The extract was dried and used as a powder. The percentage yield of extract was found to be 3.56 percent. Alcoholic extract was prepared by Continuous Soxhlet's extraction method. Powder was first defatted with pet. Ether and then extracted with ethanol which is further evaporated to dryness to obtain alcoholic extract.

Animals: Indian adult earthworms *Pheretima posthuma* collected from moist soil and washed with normal saline to remove all fecal matter were used for the antihelmintic study. The earthworms of 4- 6 cm in length and 0.3-0.4 cm in width were used for all experimental protocol¹⁵.

Antihelmintic Activity: Aqueous and alcoholic root extract of *S. persica* were investigated for their antihelmintic activity against *P. posthuma*. Various concentrations (10, 20, 40 and 80 mg/ml) of each extract were tested in the bioassay, which involved determination of time of paralysis and time of death of the worms. Piperazine citrate was included as standard reference and saline water as control. The antihelmintic assay was carried as per the method of Ajaiyeoba¹⁶ with minor modifications. The assay was performed on adult Indian earthworm, *Pheretima posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasite of human beings^{17, 18, 19}.

Because of easy availability, earthworms have been used widely for the initial evaluation of antihelmintic compounds *in vitro*^{20, 21, 22}. The earthworms were divided into different groups, each group containing six worms. Fifty ml formulations containing four different concentrations of aqueous and alcoholic root extract of *S. persica* (10, 20, 40 and 80 mg/ml in normal saline) were prepared. 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 could be observed except when the worms were shaken vigorously. Death was concluded when the worms lost their motility followed with fading away of their body colors. Piperazine citrate (10, 20, 40 and 80 mg/ml) was used as reference standard while normal saline served as a control.

RESULTS AND DISCUSSION: Data in the **Table 1** reveals that aqueous and alcoholic root extract of *S. persica* showed moderate antihelmintic activity at all the concentrations. The alcoholic extract showed more significant effect on paralyzing the worms, in terms of paralysis time, at every concentration to that of aqueous root extract when compare with standard Piperazine citrate at same concentration. Piperazine

citrate by increasing chloride ion conductance of worm muscle membrane produces hyper polarization and reduced excitability that leads to muscle relaxation and flaccid paralysis²³. Aqueous and alcoholic extract of *S. persica* not only demonstrated paralysis, but also caused death of worms even at low concentration of 10 mg/ml as compared to standard drug Piperazine citrate.

TABLE 1: SALVADORA PERSICA ROOT EXTRACT SHOWS ANTIHELMINTIC ACTIVITY AGAINST PHERETIMA POSTHUMA

Treatment	Concentration (mg/ml)	Time taken for paralysis (min)	Time taken for death (min)
Control (Normal Saline)	---	---	---
	10	37.8±0.52	75.3±0.41
Piperazine citrate (Standard)	20	24.4±0.42	48.5±0.86
	40	17.9±0.13	35.4±0.43
	80	10.4±0.23	26.8±0.35
	10	74.5±0.55	97.0±0.64
Aqueous root extract	20	61.5±0.16	82.3±0.41
	40	43.6±0.59	69.1±0.29
	80	31.1±0.37	56.6±0.59
	10	45.5±0.14	83.5±0.45
Alcoholic root extract	20	32.9±0.72	47.4±0.51
	40	21.4±0.46	32.7±0.37
	80	15.5±0.23	23.5±0.79

CONCLUSION: It could be concluded and confirmed that the aqueous and alcoholic root extracts *S. persica* have antihelmintic activity on dose dependent manner when comparable with standard drugs, which is effective against parasitic infections of humans. From the above result *S. persica* used by tribal traditionally to treat intestinal worm infections, showed significant antihelmintic activity. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as antihelmintic.

Miswak creates a fragrance in the mouth, eliminates bad odor, improves the sense of taste, and causes the teeth to glow and shine. The other parts of the tree have therapeutic values as corrective, deobstruent, liver tonic, diuretic, analgesic, antihelmintic, astringent, lithontriptic, carminative, diuretic, aphrodisiac, and stomachic. A paste of roots is applied as a substitute of mustard plaster and its decoction is used against gonorrhoea and vesical catarrh. The extract of root is said to relieve the pain due to spleen troubles. A decoction of bark is used as a tonic and stimulant in low fevers and as an emmenagogue. Stem bark is used as an ascarifuge and for gastric troubles²⁴.

Further, in future it is necessary to identify and isolate the possible active phytoconstituents responsible for the antihelmintic activity and study its pharmacological actions.

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