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Research

Phytochemical Evaluation and Screening of Anthelmintic Activity of *Samanea saman* Root

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Abstract

Since plants possess diverse medicinal properties because of having some specific active ingredients, different organs of the same plant species may be effective against different diseases, or in some cases, if one organ has a healing effect, the other may be toxic, due to the presence of different active ingredients. The genus *Samanea saman* is the largest and more diverse of the family, comprising more than 560 species of vines, lianas, trees, and shrubs, commonly used for their fruits and derivatives, and as ornamental and medicinal plants. *Samanea saman* is a prominent medicinal plant with major phytoconstituents such as flavonoids, glycosides, alkaloids, phenolic and steroids constituents those are potent for potential therapeutic practice. The present aim of the research work is to assess the anthelmintic activity of ethyl acetate extract of *Samanea saman* root against Indian earth worms. Albendazole was used as standard reference and saline water as control. The anthelmintic activity of ethyl acetate extract was comparable with that of standard drug albendazole. At the concentration of 100 mg/ml extract of showed similar significant activity as compared to the standard drug albendazole (100 mg/ml), the time of paralysis and death being 15 min and 25 min respectively. Further work will emphasize the isolation and characterization of active principles responsible for anthelmintic activity of *Samanea saman*.

Keywords: *Samanea saman*, Indian earth worms, phytoconstituents, anthelmintic activity, albendazole.

INTRODUCTION

Medicinal plants have been used from ancient times to combat against different diseases from the daw, of human civilization. Medicinal plants are rich in secondary metabolites. In the middle of the 19th century different bioactive compounds were isolated and characterized from plants. According to the World Health

Organization (WHO) in 2008, 80% population of the developing countries and facing difficulties to afford synthetic drugs, and are relying on traditional medicines mainly of plant origin to maintain their health care needs. The World Health Organization (WHO 1985) supports the traditional medicine due to the inspiration of novel drug compounds from the natural source of plants. Such plants have derived medicines which made large contributions to human health and in both developing and developed countries have been great achievements in the field of herbal drugs because of their natural source and fewer side effects. The medicinal plant had shown an extensive interest in this field and it recognized that these natural products are true remedies for the human health benefits [1,2].

Approximately 8000 plant species are used as medicinal plants, constituting about 50% of the total number of higher flowering plant species in India. They include a number of spices and edible plants which are now regarded as an important source of drugs. India is sufficiently strong on herbal medicine because two of its traditional systems of medicine (Ayurveda and Unani) are almost solely dependent, while the third one (Siddha) is partially dependent, on herbal materials. Herbal formulations have evolved in India through a long process of trial and error, empirical reasoning and also experimentation. However, rationalization of traditional systems of medicine is now indispensable in order to meet international standards for specification of crude drugs as well as the processed products [3,4].

Helminth infections are among the commonest infections in man, affecting a large proportion of the world's population. In developing countries, they pose a major threat to public health and contribute to the prevalence of malnutrition, anemia, eosinophilia, and pneumonia. Anthelmintics are drugs that either kill or expel infesting helminths and the gastrointestinal tract is the abode of many helminths, although some also live in tissues, or their larvae migrate into tissues. They harm the host by depriving him of food, causing blood loss, injury to organs, intestinal or lymphatic obstruction and by secreting toxins. Helminthiasis is rarely fatal, but is a major cause of morbidity [5-7].

Samanea saman L. (stinking passion flower) is an exotic medicinal vine. It is native to Southwestern united states. It has been introduced to tropical regions around the world. It is a creeping vine like other members of the genus, and yields an edible fruit. It has been used in treatment of variety of diseases such as paralysis, epilepsy, swelling etc. To best of our knowledge there are no reports available on *Samanea saman* L [8-11].

Fig 1: *Samanea saman* plant

Fig 2: *Samanea saman* root

The present aim of the study is to carryout phytochemical screening and assess the anthelmintic activity of ethyl acetate extract of *Samanea saman* root.

MATERIALS AND METHODS

Collection of plant part

The whole plant of *Samanea saman* were collected from Kodad region of Suryapet, Telangana, India.

Drying and extraction

The whole plant was cleaned and dried under standard shade conditions. Then it was grinded to obtain coarse powder of standard size suitable for extraction. The powder was subjected to extraction. After that the extract was defatted with petroleum ether to remove the fats. Finally, the extract was air dried and stored in refrigerator for further use [12,13].

Preliminary phytochemical screening

The extract obtained was subjected to qualitative chemical test for the identification of various chemical constituents by using standard procedure [6,14].

Evaluation of in vitro anthelmintic activity

Ethyl acetate extract of *Samanea saman* was investigated for anthelmintic activity against *Pheretima posthuma*. Various concentrations (25, 50, 100 mg/ml) of extract were tested by bioassay, which involved in determination of time of paralysis and time of death of the worms. Albendazole was used as standard reference and saline water as control. The assay was performed on adult Indian earthworms.

The earthworms were collected from moist soil and washed with normal saline to remove all faecal matter and were used for anthelmintic study. The earthworms were used for experimental protocol. The earthworms were divided into four groups consisting of six earthworms in each group. Different extracts were poured in minimum amount of DMSO and then volume was adjusted to 10 ml with saline water. Extracts and standard drug solutions were poured in different petri plates. Observations 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 when dipped in warm water followed with fading away of their body colours [15-17].

RESULTS AND DISCUSSION

Preliminary phytochemical screening

The preliminary phytochemical studies were explored as per the standard procedure. The extracts were tested for different phytoconstituents like alkaloids, glycosides, saponins, tannins and phenolic compounds, flavonoids etc. The results are as shown in the Table 1.

Table 1: Phytochemical screening of *Samanea saman* root

S. No.	Chemical constituents	Ethyl acetate extract
1	Carbohydrates	+
2	Proteins	+
3	Amino acids	-
4	Tannins	+
5	Glycosides	+
6	Alkaloids	+
7	Flavonoids	+
8	Steroids	+
9	Saponins	+
10	Anthraquinones	+

'+' indicates present, '-' indicates absent

Table 2: *In vitro* anthelmintic activity of *Samanea saman* root extract

Groups	Conc. (mg/ml)	Response time taken for paralysis (min)	Time taken for death (min)
Normal saline	-	-	-
Ethyl acetate extract of *Samanea saman*	25	100	140
	50	75	120
	100	30	65
Albendazole	25	90	110
	50	35	80
	100	15	25

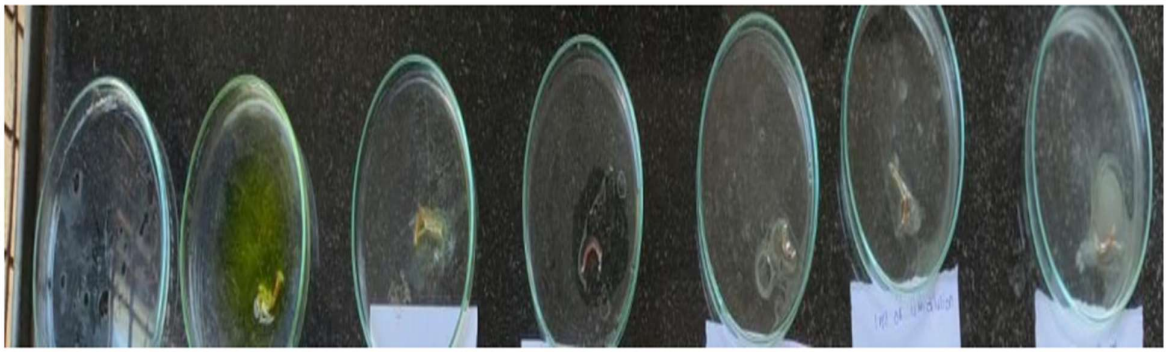

Fig 3: Earthworms placed in different concentrations of root extract of *Samanea saman*

Fig 4: Earthworms in standard drug

Fig 5: Earthworm in ethyl acetate

The anthelmintic activity of ethyl acetate extract was comparable with that of standard drug albendazole. At the concentration of 100 mg/ml extract of showed similar significant activity as compared to the standard drug albendazole (100 mg/ml), the time of paralysis and death being 15 min and 25 min respectively. The ethyl acetate extract produced a significant anthelmintic activity in dose dependent manner as shown in Table 2 and Figures 3-5.

Earthworms have the ability to move by ciliary movement. The outer layer of the earthworm is a mucilaginous layer and composed of complex polysaccharides. This layer being slimy, enables the earthworm to move freely. Any damage to the mucopolysaccharide membrane will expose the outer layer and this restricts its movement and can cause paralysis. This action may lead to the death of the worm by causing damage to the mucopolysaccharide layer. This causes irritation leading to paralysis. All anthelmintics essentially kill worms by either starving them to death or paralyzing them. Any disruption in this process results in energy depletion. Interfering with feeding for 24 h or less is sufficient to kill most adult parasites.

Parasites will also die if they become paralyzed and temporarily lose their ability to maintain their position in the gut. Preliminary phytochemical screening revealed the presence of alkaloids, tannins, glycosides, flavonoids, phenols, saponins and steroids. The possible mechanism of action of tannins may to interfere with energy generation by uncoupling oxidative phosphorylation. Tannin containing plants increase the supply and absorption of digestible protein by animals. This is achieved by formation of protein complexes in the rumen by tannins, which later dissociate at low pH in the abdomen to release more protein for metabolism in the small intestines of ruminant animals. Alkaloids may act on central nervous system and caused paralysis of the earthworm.

CONCLUSION

Medicinal plants are being widely used, either as a single drug or in combination in health care delivery system. Medicinal plants can be important source of previously unknown chemical substances with potential

therapeutic effects. From this study, it can be concluded that active constituents responsible for anthelmintic activity are present in the ethyl acetate extract of *Samanea saman*. As there are a number of phytoconstituents, the plant possesses wide range of medicinal properties also. Further studies might be carried out to explore more about the plant. From the result, we found that, ethyl acetate extract has significant biological activity. Further work will emphasize the isolation and characterization of active principles responsible for anthelmintic activity of extract of *Samanea saman* plant.

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Conflict of interest

The authors declare that they have no competing interests.

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