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Research article

Anthelmintic activity of the flowers of *Sesbania grandiflora* Pers.

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Abstract

In present study acetone, ethanol and aqueous extracts of the flowers of *Sesbania grandiflora* were investigated for their anthelmintic activity against *Pheretima posthuma.* Three concentrations (100, 150, 200 mg/ml) of each extract were studied. This study is mainly concerned with the determination of time of paralysis and time of death of the worms. When there was a gradual increase in the dose, a gradual increase in the anthelmintic activity was observed. The ethanolic extract of the flower showed a significant anthelmintic activity at highest concentration of 200 mg/ml.

Key words: Anthelmintic activity, *Sesbania grandiflora*, *Pheretima posthuma*

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Introduction

A herbal remedy is one in which the main therapeutic activity depends upon the plant metabolite which it contain. Many plant products are consumed in reasonable quantity as food but known to have medicinal effects. From pharmacognostical view point, the study of herbal medicines differs from that for the allopathic medicines. Many of the plants used in herbal medicine contain active constituents, whose effects can be demonstrated pharmacologically and action of whole plant extract can usually be related to that of isolated constituents [1].

Helminthis also commonly known as parasitic worm are larger multi cellular organisms, which when mature can generally be seen with naked eye. Helminthiasis or worm infection is one of the most prevalent diseases in the world. Helminths are able to survive in their mammalian host for many years due to their immune response by secreting immunomodulatory products [2].

Sesbania grandiflora (Fabaceae) is a fast growing tree, leaves are regular and rounded and the flowers are red in color. The fruits look like flat, long and thin green beans. The tree thrives under full exposure to sunshine and is extremely frost sensitive. Indigenous from Malaysia to North Australia and cultivated in many parts of India. It has a large number of traditional uses [2]. It grows where there is good soil and hot humid temperature. It's a tropical plant. Flowers of the plant are used in headache, dimness of vision, cooling and

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improving appetite, astringent, and as an antipyretic [3].

Materials and methods

Plant material

The flowers of *Sesbania grandiflora* were collected from the Pariyaram Medical College campus, Kannur District, Kerala State. After confirming its botanical identity, the flowers were shade dried and powdered.

Preparation of extracts

The powdered plant materials were subjected to the extraction process. Extracts were prepared using solvents like, acetone, ethanol, and water. The extracts were vacuum dried and used for the study.

Chemicals and reagents

Albendazole was used as standard drug for anthelmintic activity, saline was used as control and various chemicals and reagents of analytical grade were used for phytochemical evaluation.

Parasites

Indian earthworm *Pheretima posthuma* were collected from moist soil. The authenticities of the parasites collected were confirmed before the study. The worms with length of 4-5cm and 0.1-0.2 mm in width were used for the evaluation. The worms were washed with normal saline to remove all fecal matter before experimentation. Since its anatomical and physiological resemblances with the human parasitic intestinal round worms [7,11] and also because of their easy availability, they have been used widely for the *in vitro* evaluation of anthelmintic compounds [9,10].

Phytochemical screening

Preliminary phytochemical analysis of the flowers were carried out as per the standard procedure [4,5].

Experimental

The experiments were done on adult Indian earth worm *Pheretima posthuma*. Before starting the study, all the test solutions and standard drug solutions were prepared freshly. The anthelmintic assay was carried as per the method of Ajayieoba E. O. et al. with minor modifications [6]. Six groups of earth worms of approximately equal size were released in to 25 ml solutions of three different concentrations (100,150 and 200 mg/ml) in petri dishes containing above solutions of extracts. Albendazole was used as reference standard and saline as control. Determination of time of paralysis and time of death of the worms were taken. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Time for death of worms were recorded after ascertaining that worms neither moved when shaken vigorously nor when dipped in warm water followed by observable colour changes in their body.

Results

Phytochemical screening

Phytochemical screening of the crude extracts reveals the presence of proteins, tannins, alkaloids and glycosides.

Anthelmintic evaluation

To be an effective anthelmintic, a drug must be able to penetrate the cuticle of the worm or gain access to its alimentary tract [7]. An anthelmintic drug can act by causing paralysis of the worm or by damaging its cuticle, leading to partial digestion or rejection by immune mechanisms [8]. The extracts of the plant displays a significant anthelmintic activity in dose dependent manner. The anthelmintic activities of ethanolic and aqueous extracts were comparable with that of albendazole which is used as standard drug. The phytochemical screening revealed the presence of tannins, proteins, alkaloids and glycosides in ethanolic and aqueous extracts of the flower.

The ethanolic extract of flowers were found to be effective upon comparison with the standard drug albendazole and that of aqueous extract in causing paralysis and death of earthworms. It can be concluded that the concentration of active constituents responsible for anthelmintic activity might be present in the flower extract. Since alcoholic extract took less time to cause paralysis and death of the earthworms, it was found to be more potent than that of aqueous extract. The time taken for paralysis and death of the earth worms are tabulated in table 1.

Table 1. Anthelmintic activity of *Sesbania grandiflora* flowers extracts

Extracts	Concentration (mg/ml)	*Pheretima posthuma*	
		Paralysis (minutes)	Death (minutes)
Saline (Control)	……	……	……
Aqueous extracxt	100	80±0.124	188±0.578
	150	71±0.046	91±0.076
	200	60±0.135	69±0.289
Ethanolic extract	100	89±0.029	161±0.044
	150	57±0.044	80±0.129
	200	29±0.088	45±0.055
Acetone extract	100	97±0.036	199±0.024
	150	51±0.610	76±0.067
	200	39±0.027	44±0.257
Albendazole (Standard)	100	155±0.980	209±0.432
	150	129±0.035	189±0.687
	200	101±0.078	147±0.033

(Values are mean ± S.E.M. from six observations)

Discussion

It seems that glycosides, alkaloids and tannins were responsible for demonstrating anthelmintic activity of the flower extract of *Sesbania grandiflora*. Plants exhibit anthelmintic activity mainly because of the phytoconstituents which is distributed throughout the plant or in certain cases the phytoconstituents may accumilate in certain particular morphological part of the plant. The plants are not explored scientifically to study the mechanism of action of these phytoconstituents as anthelmintic. A single plant may contain a single constituent or group of constituents. Sometimes the anthelmintic action may be due to single compound or sometimes these compounds

jointly act by the inhibition of tubulin polymerisation and blocking glucose uptake [12, 15]. Any damage to the mucoploysacharide membrane of worms will expose the outer layer restricting their movement which finally results in paralysis and there after the death of the parasites [12,14].

The phytochemical screening of the crude flower extracts of *Sesbania grandiflora* reveals the presence of proteins, tannins, alkaloids and glycosides. The anthelmintic action of tannins could be due to its capacity to bind with free protein available for larval nutrition and thus reducing the nutrient availability resulting in larval starvation or decrease in gastro intestinal metabolism directly through inhibition of oxidative phosphorilation causing larval death [16]. The alkaloids present in the flower extract may act on the central nervous system and causes paralysis of the earth worms [17]. The alkaloids may suppress the transfer of sucrose from the stomach to the small intestine together with their antioxidant effect which is capable of reducing the nitrate generation which can interfere in local homeostasis and is essential for the development of helminths [13].

Conclusion

The flowers of *Sesbania grandiflora* used by tribals traditionally to treat intestinal worm infections, showed significant anthelmintic activity. The experimental evidence obtained in the laboratory model could provide a rationale for the traditional use of this plant as an anthelmintic. The plant may be further explored for its phytochemical profile to recognize and to isolate the different active constituents accountable for anthelmintic activity.

References

1. Muhammed Ali: Pharmacognosy and Phytochemistry. First edition 2008:6-9
2. WIKIPEDIA available at (en m wikipedia.org/wiki/Helminths)
3. S.Nesamony: Medicinal plants, State Institute of Languages, Kerala, First edition 2001:1-3.
4. Kokate CK :Practical Pharmacognosy, Vallabha Prakashan, New Delhi, Fourth edition 1999:149-156.
5. Khandelwal KR: Practical Pharmacognosy Technique and Experiments, Nirali Prakashan, Pune, Second edition 2000: 149-156
6. Ajaiyeoba EO, Onocha PA, Olarenwaju OT. In-vitro anthelmintic properties of *Buchholziacoiaceae* and *Gynandropsisgynandra* extract. Pharm. Biol. 2001; 39(3): 217-20.
7. Vigar Z:Atlas of Medical Parasitology. Singapore: P.G. Publishing House, Second edition 1984.
8. Thorn GW, Adams RD, Braunwald E, Isselbacher KJ, Petersdorf RG. Harrison's Principles of Internal Medicine. New York:McGraw Hill Co; 1977
9. Sollmann, T. Anthelmintics: Their efficiency as tested on earthworms. J Pharmacol. Exp. Ther 1918; 12(1s):29-70
10. Szewezuk, V.D., Mongelli, E.R and Pomillio, A.b. Ant parasitic activity of Meliaazardirachgowing in Argentina. Molecular Med Chem 2003; 1:54-7.
11. Shivkumar YM, Kumar VL. Anthelmintic activity of latex of *Calotropisprocera*. Pharm. Bio. 2003; 41:263-265.
12. Piyush Jain et.al, Anthelmintic potential of herbal drugs. Int. J. Res. Dev. L. Sci 2013; 2(3):412-417.
13. Barba H.R et.al. Anthelmintic comparative study of *Solanumlycocarpum* St. Hill extracts in mice naturally infected with *Aspiculuris tetraptera*. Nature and Science 2010; 8(4):94-100.
14. Chandrasekhar C.H et.al. Anthelmintic activity of the crude extract of *Ficusrecemosa.* International journal of Green Pharmacy 2008; 100-103.
15. Jain D et.al. Anthelmintic drugs. Journal of advances in drug research 2011; 1(2):965-967.
16. Scalbert A. Antimicrobial properties of tannins. Phytochem 1991; 30:3875-3883.
17. Roy H et al. Preliminary phytochemical investigation and anthelmintic activity of *Acanthospermumhispidum*. Journal of Pharmaceutical Science and Technology. 2010; 2(5):217-221.