

Comparative Study of Anthelmintic Activity of Different Leaf Extracts of *Tecoma stans* (L.) on Adult Indian Earthworms

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ABSTRACT

Tecoma stans (L.) belonging to the family *Bignoniaceae*, is an ornamental tropical shrub predominately found in India, America, tropical and subtropical Africa, the Pacific islands, and Australia. The present study is an attempt to explore the anthelmintic activity of aqueous, alcoholic, hydro-alcoholic and methanolic extract (sohxlet) of leaves of *Tecoma stans* (L.). The study was carried out for anthelmintic activity on adult Indian earthworm (*Pheretima posthuma*). All leaf extracts showed anthelmintic activity at 100, 200 and 500 µg/ml concentration. The activities were compared with the standard drug-Albendazole. Aqueous, alcoholic, hydro-alcoholic methanolic extract (sohxlet) of leaves of *Tecoma stans* showed better anthelmintic activity than the standard drugs. When the dose of the extract is increased, a gradual increase in anthelmintic activity was observed. Alcoholic extract showed better anthelmintic activity in comparison to the hydro-alcoholic, aqueous and methanolic extracts (sohxlet) of *Tecoma stans*. The data were verified as statistically significant by using one way ANOVA at 1 % level of significance ($p < 0.001$).

Keywords: *Tecoma stans*, *Pheretima posthuma*, Anthelmintic activity.

INTRODUCTION

Helminthes infections are the most widespread infections in humans, distressing a huge population of the world. Although the majority of infections due to helminthes 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. The gastro-intestinal helminthes becomes resistant to currently available Anthelmintic drugs therefore there is a foremost problem in treatment of helminthes diseases. Hence there is an increasing demand towards natural Anthelmintic. [1-4]

Tecoma stans (L.) from *Bignoniaceae* family is a semi-evergreen ornamental tropical shrub or small tree originally from Latin American, which has been cultivated in Iran (particularly in west and southwest parts) recently. *Tecoma stans* also known as roble Amarillo, saico Amarillo, bois caraibe, trumpet flower, yellow-elder, Ginger-thomas, and many other common names. Its leaves are used traditionally in Mexico in order to control diabetes. The tecostanine

isolated from the leaves of *Tecoma stans* is suggested for antihyperglycemic effect. *Tecoma stans* is not a toxic herb because the same is used in Latin America as a remedy for diabetes and moreover for feeding cattle and goats in Mexico. Despite the traditional use of *Tecoma stans*, its pharmacological properties on smooth muscle have not been carried out. The plant is extensively used traditionally by the tribal people as Anthelmintic. Therefore, The aim of the present study was to investigate the anthelmintic effect of aqueous, alcoholic and hydro-alcoholic and methanolic extract (sohxlet) of leaf extract of *Tecoma stans* (L.) on adult Indian earthworms (*Pheretima posthuma*). [5]

MATERIALS AND METHODS

The leaves of *Tecoma stans* were collected from local area of Anantapur. The plant material was dried in sunlight, pulverized and stored in air tight container and used for further extraction. The plant was identified and authenticated by Dr. Prasad, Professor, Department of Botany; the voucher specimen is available in the herbarium file of the Studies in Ethno-Botany Field Research Laboratory S K University, Anantapur, Andhra Pradesh, India.

Preparation of Extract

Aqueous extract (maceration method): Powdered material of *Tecoma stans* leaf (100 g) was kept for maceration with 500 ml of distilled water for 24 h. The extract was double filtered by using muslin cloth and Whatman filter paper no.1

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and the extract was concentrated then dried by *Heidolph* Rotavapour at 60-70°C. The percentage yield of the semi solid extract was found to be 3.4 %.

Alcoholic extract (maceration method): Powdered material of *Tecoma stans* leaf (100 g) was kept for maceration with 500 ml of ethanol for 24 h. The extract was double filtered by using muslin cloth and Whatman filter no.1 filter paper no.1 and the extract was concentrated then dried by *Heidolph* Rotavapour at 60-70°C. The percentage yield of the semi solid extract was found to be 4.8 %.

Hydro-alcoholic extract (maceration method): Powdered material of *Tecoma stans* leaf (100 g) was kept for maceration with 500 ml of hydroalcoholic (water: ethanol in equal proportion) for 24 h. The extract was double filtered by using muslin cloth and Whatman filter paper no.1 and the extract was concentrated then dried by *Heidolph* Rotavapour at 60-70°C. The percentage yield of the semi solid extract was found to be 5.7 %.

Alcoholic extract (soxhlation): Powdered material of *Tecoma stans* leaf (150 g) was kept for soxhlation method with 2500 ml of methanol for 12 h. The extract was concentrated then dried by *Heidolph* Rotavapour at 60-70°C. The percentage yield of the semi solid extract was found to be 11 %.

Animals

Adult earthworms (*Pheretima posthuma*), were used to evaluate anthelmintic activity by *in-vitro* method. *Earthworms* were collected near the swampy water in village Marala in Anantapur district. The average size of earthworm was 8-15 cm; the same was identified by Dr. Philip, Department of Zoology, S K University, Anantapur, Andhra Pradesh, India.

Drugs and Chemicals

Albendazole and Normal saline water were used during the experimental protocol. Aqueous, alcoholic, hydro-alcoholic and methanolic extract (sohxlet) of leaves of *Tecoma stans* was tested in various doses in each group. Normal saline water was used as control. Albendazole (Albendazole tablet, GSK) was used as the standard drugs for comparative study with all the extracts.

Anthelmintic Activity

The Anthelmintic assay was carried out as per the method of Ajaiyeoba *et al.* The assay was performed *in-vitro* using adult Indian earthworm (*Pheretima posthuma*) owing to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings for preliminary evaluation for anthelmintic activity. Test samples of the extract were prepared at the concentrations - 100, 200 and 500 µg/ml in distilled water and six worms i.e. *Pheretima posthuma* approximately equal size (same type) were placed in each nine cm petri dish containing 25 ml of above test solution of extracts. Albendazole (100µg/ml) was used as reference standard and normal saline water as control. This procedure was adopted for earthworms. All the test solution and standard drug solution were prepared freshly before starting the experiments. Observations were made for the time taken 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 (50°C).^[6-12]

RESULTS AND DISCUSSION

Table 1: Comparative study of anthelmintic activity of different leaf extracts of *Tecoma stans* (L.)

| S. No | Treatment | Dose (µg/ml) | Time Taken For Paralysis | Time Taken For Death |
|-------|-----------------------------|--------------|--------------------------|----------------------|
| | | | (min) | (min) |
| | | | Mean±SEM | Mean±SEM |
| 1 | Control (Distilled Water) | --- | --- | --- |
| | Standard (Albendazole. Tab) | 100 | 119±0.49 | 179±0.49 |
| 2 | 200 | 100 | 78.5±0.42 | 138.5±0.42 |
| | | 500 | 59.8±0.47 | 94±0.49 |
| 3 | TSCMAL | 100 | 47±0.49 | 164±0.47 |
| | | 200 | 29±0.49 | 115±0.49 |
| 4 | TSCMHA | 200 | 24±0.49 | 89.5±0.42 |
| | | 100 | 49±0.49 | 152±0.42 |
| 5 | TSCMAQ | 200 | 30.5±0.42 | 103±0.49 |
| | | 500 | 28.5±0.42 | 77.8±0.47 |
| 6 | TSSME | 100 | 65±0.70 | 167±0.47 |
| | | 200 | 34±0.49 | 112±0.49 |
| | | 500 | 29±0.49 | 89±0.49 |
| | | 100 | 67±0.42 | 168±0.42 |
| | | 200 | 35±0.87 | 113±0.49 |
| | | 500 | 27.8±0.47 | 86.8±0.47 |

Abbreviations: TSCMAL- Alcoholic extract (maceration method), TSCMHA- Hydro-alcoholic extract (maceration method), TSCMAQ- Aqueous extract (maceration method), TSSME- Alcoholic extract (soxhlation)

Table 2: Statistical variance of analysis (ANOVA) on anthelmintic activity of different leaf extracts of *Tecoma stans* (L.)

| S. No | Source of Variation | SS | df | MS | F | P-value |
|-------|---------------------|--------|----|--------|-------|---------|
| 1 | Between Groups | 5508.2 | 4 | 1377.1 | 3.433 | 0.0001 |
| 2 | Within Groups | 4011.2 | 10 | 401.12 | | |
| 3 | Total | 9519.4 | 14 | | | |

Each value represents mean±SEM (N=6). Data are found to be significant by testing through one way ANOVA at 1 % level of significance ($p < 0.0001$)

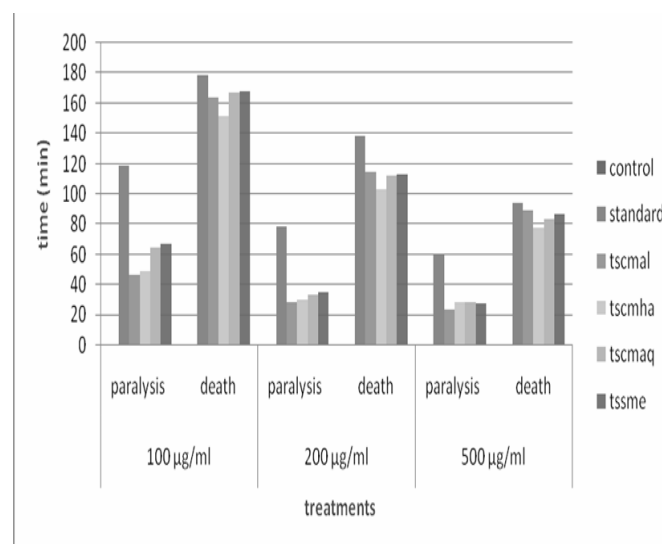


Fig. 1: Comparative study of anthelmintic activity of different leaf extracts of *Tecoma stans* (L.) on adult Indian earth worms

Alcoholic extract of *Tecoma stans* (leaves) showed better anthelmintic activity in comparison to the hydro-alcoholic, aqueous and methanolic extract (sohxlet). The data were verified as statistically significant by using one way ANOVA at 1 % level of significance ($p < 0.001$). The result of Anthelmintic activity of on adult Indian earthworm *Phertima prosthuma* was given in Table 1, 2 and Fig. 1. Thus the present study reveals that alcoholic extract of *Tecoma stans* (leaves) showed marked and potent Anthelmintic activity in different concentration of the extracts i.e., 100, 200, 500 (µg/ml) dose level.

REFERENCES

1. Ajaiyeoba EO, Onocha PA, Olarenwaju OT. *In-vitro* anthelmintic properties of *Buchholzia coriacea* and *Gynandropsis gynandra* extract. *Pharm Biol.* 2001; 39: 217- 220.
2. Bundy DA. Immunoepidemiology of intestinal helminthic infection I: The global burden of intestinal nematode disease. *Trans Royal Soc Trop Med Hyg* 1994; 8: 259-261.
3. Tagbota S, Townson S. Antiparasitic properties of medicinal and other naturally occurring products, *Adv Parasitol* 2001; 50:199-205.
4. Vidyarthi RD. A Textbook of Zoology. 14th Ed. New Delhi: Chand and Co. Press; 1977, pp. 329-331.
5. Anonymous, the Treatise on Indian Medicinal Plant. In: Asima Chatterjee, Satyesh Chandra Pakrashi, editors. New Delhi: Publication and Information Directorate 1995, Vol. pp. 149.
6. Dash GK, Suresh P, Kar DM, Ganpaty S, Panda SB. Evaluation of *Evolvulus alsinoides* Linn. For anthelmintic and antimicrobial activities, *J Nat Rem.* 2002; 2: 182-185.
7. Shivkumar YM, Kumar VL. Anthelmintic activity of latex of *Calotropis procera*. *Pharma Biol.* 2003; 41: 263-265.
8. Kaushik RK, Katiyar JC, Sen AB. Studies on the mode of action of anthelmintics with *Ascardia galli* as a test parasite. *Indian J Med Res.* 1974; 64: 1367-1375.
9. Yadav AK, Temjenmongla. Anthelmintic activity of *Gynura angulosa* against *Trichinella spiralis* infections in mice. *Pharmacologyonline* 2006; 2: 299-306.
10. Mali RG, Shailaja Mahajan, Patil KS. Anthelmintic activity of root bark of *Capparis spinosa*. *Indian J Nat Prod.* 2005; 21: 50-51.
11. Mali RG, Wadekar RR. In Vitro anthelmintic activity of *Baliospermum montanum* Muell. Arg roots. *Indian J Pharm Sci.* 2008; Jan-Feb: 131-133.
12. Gbolade AA, Adeyemi AA. Investigation of *in vitro* anthelmintic activities of *Pycnanthus angeolensis* and *Sphenocentrum jollyanum*. *Fitoterapia* 2008; 79: 200-222.