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Evaluation of anthelmintic activity of aqueous and alcoholic extract of bark of *Terminalia arjuna* W. & A. against earthworm

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Abstract

The extracts of dried bark of *Terminalia arjuna* W. & A. were screened to evaluate anthelmintic activity in adult earthworm *pheritima posthuma*. The aqueous and alcoholic extract of the bark showed significant anthelmintic activity and it was found that the aqueous extract activity is higher than alcoholic extract and the standard drug of albendazole.

Keywords: *Terminalia arjuna* W. & A., Anthelmintic activity, Albendazole, Earthworm, Bark extract

Introduction

Terminalia arjuna W. & A. (Arjuna) is a plant belongs to the family combertaceae, commonly called the king of medicine and is always listed in the Ayurveda¹. The tree is abundantly grown in North India at the altitude of 1000-3000 ft. It is large, evergreen tree, with a spreading crown and drooping branches, common in most parts of India and also planted in many parts for shade and ornament. Stems rarely long or straight, generally always buttressed and often fluted; bark very thick, grey or pinkish green, smooth, exfoliating in large, thin, irregular sheets; leaves sub-opposite, oblong or elliptic, coriaceous, usually 10-15 cm. long, occasionally 25 cm., cordate, shortly acute or obtuse at the apex; flowers in paniced spikes; fruits 2.5-5.0 cm. long, nearly glabrous, ovoid or ovoid-oblong, with 5-7 hard, winged angles. Every parts of Arjun plant are useful. The fruits of arjun are used to check Asthma, roundworm and hard stool. The dry bark of Arjun is used to prepare medicine. Mainly this plant is used to check heart diseases. The Arjun tree also used for sericulture industry. Lerva of silk moth feed its leave. The wood of Arjun also used as fuel and home making²⁻³. The present study was undertaken to evaluate the anthelmintic activity of the fruits extracts of *Terminalia arjuna* W. & A.

Material and methods

Collection of Plant Materials

The bark of the *Terminalia arjuna* W. & A. were collected from the forest of Rewa District of Madhya Pradesh, India during May-June 2010 and then authenticated and confirmed by Dr. S. N. Dwivedi, Head, Department of Botany, Janata PG College, A.P.S. University, Rewa, Madhya Pradesh, India.

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Preparation of Extract

The bark of *Terminalia arjuna* W. & A. was collected, then dried bark were powdered to get a coarse powder. The dried powder fruits (200 gm) were taken in 1 lit. beaker and alcohol in sufficient quantity was added, then it was kept for maceration for 72 hours. The alcoholic extract obtained was filtered and concentrated on hot plate. Similarly, the aqueous extract of bark was prepared by macerating coarse powder for 24 hours and was filtered and concentrated. The bark extracts were prepared by dissolving 2.5 ml of 1% gum acacia solution prepared in normal saline to give 100mg/ml, 80mg/ml, 60mg/ml, 40mg/ml and 20mg/ml concentration.

Experimental Model

Adult earthworm *phertima prosthuma* were collected (due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human being) from moist soil and washed out of sand. Five groups of approximately equal size earthworms consisting of six earthworms in each group were used for the present study⁴.

Standard Drug

Albendazole is taken as standard drug and the concentration of the standard drug was prepared in 1% gum acacia in normal saline to give 100mg/ml, 80mg/ml, 60mg/ml, 40mg/ml and 20mg/ml concentration.

Anthelmintic Investigation

Five groups of approximately equal size earthworms consisting of six earthworms in each group were used for the present study. Each group was treated with one of the following vehicle (1% gum acacia in normal saline), albendazole, alcoholic and aqueous extract (100mg/ml, 80mg/ml, 60mg/ml, 40mg/ml and 20mg/ml concentration). Observations were made for the time taken to paralysis and death of individual worms. Paralysis was said to occur when the worms do not revive even in normal saline. Death was concluded when the worms lost their motility followed with fading away of their body color⁵.

Statistical analysis

All the data obtained was presented as Mean + SEM (Table 1) and were analyzed with student- t test.

Results and Conclusion

The aqueous and alcoholic extracts of bark of *arjuna* W. & A. showed significant anthelmintic activity. The result of anthelmintic activity of aqueous and alcoholic extract of *arjuna* W. & A. on earthworms *phertima prosthuma* were given in Table 1. It was concluded from the study that the aqueous extract of *Terminalia arjuna* W. & A. showed marked and potent anthelmintic activity than the alcoholic extract and standard drug albendazole. Standard drug albendazole is showing least activity while alcoholic extract is showing comparatively less anthelmintic activity than aqueous extract but more than that of standard drug albendazole. The results are expressed as Mean \pm SEM from six observations.

Table 1: Anthelmintic activity of bark extract of *Terminalia chebula* Retz.

| Treatment | Conc. (mg/ml) | Paralysis time (min.) | Death time (min.) |
|--------------------------------|---------------|-----------------------|-------------------|
| Aqueous Extract | 100 | 4.30+3.50 | 10.20+5.30 |
| | 80 | 6.50+4.35 | 11.70+6.25 |
| | 60 | 6.80+4.10 | 11.20+6.00 |
| | 40 | 8.80+3.50 | 32.00+10.40 |
| | 20 | 9.60+5.20 | 35.00+13.35 |
| Alcoholic Extract | 100 | 5.13+3.45 | 8.70+5.40 |
| | 80 | 11.20+4.15 | 19.30+6.35 |
| | 60 | 11.45+4.17 | 26.65+10.43 |
| | 40 | 16.20+3.35 | 43.50+16.44 |
| | 20 | 21.10+5.48 | 49.00+18.50 |
| Standard Drug (Albendazole) | 100 | 11.00+4.50 | 22.50+9.01 |
| | 80 | 11.60+4.75 | 47.60+27.70 |
| | 60 | 14.10+5.77 | 48.16+19.23 |
| | 40 | 14.30+5.86 | 48.83+20.00 |
| | 20 | 19.60+8.03 | 61.33+25.13 |

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