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# EVALUATION OF ANTHELMINTIC ACTIVITY OF INDIAN HERBS

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**ABSTRACT**

Helminthic infections are major cause of chronic ill health among tropical people. Traditional medicines contain several plant products for eliminating helminthic worms. However, standardization of individual ingredients is lacking in many cases. Present investigations are undertaken to ascertain anthelmintic activity of aqueous and ethanolic extracts of *Terminalia belerica* fruit, *Boerrhavia diffusa* leaf and *Saxifraga granulata* root against *Pheretima posthuma* and *Eisenia foetida*. Albendazole 20mg/ml is used as a reference standard drug and normal saline as control. The result is expressed in terms of time for paralysis and time for death. The study indicated significant anthelmintic activity of aqueous as well as ethanolic extracts of *Terminalia belerica* and *Boerrhavia diffusa*. Ethanolic extract of *Saxifraga granulata* at concentration of 50mg/ml showed comparable anthelmintic activity with reference standard against *Pheretima posthuma.*

**KEYWORDS:** Anthelmintic activity, *Pheretima posthuma*, *Eisenia foetida, Terminalia belerica, Boerrhavia diffusa.*

## INTRODUCTION

Helminthic infestations are very common in human beings, affecting a large proportion of population. In tropical developing countries they pose a big threat to community health by contributing to prevalence of anaemia, malnutrition, pneumonia, etc[(1)]. Helminths also affect millions of livestock resulting in considerable economic losses in domestic and farm yard animals.

An ideal anthelmintic should have a broad spectrum activity & be free from toxicity to the host & should be cheap. Also, it should achieve the cure with a single therapeutic dose. Because of limited availability and affordability of modern medicines, financially weaker population depends greatly on traditional remedies. Multidrug resistance shown by most of the parasitic worms necessitates search of newer anthelmintic drugs. Since many effective drugs find their origin in traditionally exploited herbs, a systematic study of traditionally used herbs and exploration of their medicinal properties becomes inevitable.

Three Indian herbs are therefore studied with respect to their anthelmintic activity.

## MATERIALS AND METHODS

### Collection and identification of Plants

Information regarding vernacular name, plant parts used, etc. was collected and authentic identification of plants was done with the help of different flora and monographs [(2-16)].

### Extraction Procedure

Plant parts (Refer table 1) were air dried and reduced to fine powder in a pulveriser. Aqueous and alcoholic extracts of respective plant parts were concentrated [(17)].

### Experimental animals

*Pheretima posthuma*(Indian Earthworm) were collected from moist soil, near Government College of Pharmacy, Vidyanagar Karad (India) and *Eisenia foetida* were collected from Vermiculture plant, Saidapur,Karad (India) .The collected worms were washed with normal saline (0.9% w/v NaCl) to remove soil and dirt. The collected *Pheretima*

*posthuma* measured 14cm in length and 3mm in diameter whereas, *Eisenia foetida were* 17cm long and 6mm wide approximately. Identity of worms was confirmed by a registered veterinery practioner at Kanfe Globuz pet polyclinic, Kolhapur (India).

**Evaluation of anthelmintic activity**

Adult *Eisenia foetida* & *Pheretima posthuma* were used to evaluate anthelmintic activity of various phytoextracts because of their anatomical and physiological resemblance with intestinal round worm parasites of human beings [18-22]. Test samples of various extracts were prepared at the concentrations, 20mg/ml and 50mg/ml in double distilled water

Anthelmintic activity of extracts was assessed by comparing the paralysis time and death time required for worms in presence of various extracts and comparing it with 20mg/ml Albendazole as a reference standard and normal saline as control [23-25]. All experiments were done in triplicate. The 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 the worms neither moved when shaken vigorously nor when dipped in warm water ($50^0$C)[21,25-27].

## RESULTS

**1. Study with respect to *Eisenia foetida*:**

Aqueous and alcoholic extracts of *Terminalia belerica* took 35 and 30 minutes respectively, for *Eisenia foetida* death at the concentration of 20 mg/ml whereas 19 and 16 minutes were required at the concentration of 50 mg/ml (Refer figure 1-4). Comparable activity with *Terminalia belerica* was shown by *Boerrhaavia diffusa* at corresponding extract concentrations. It took longer period by *Saxifraga granulata* to paralyse and kill *Eisenia foetida* as compared to the reference standard Albendazole.

**2. Study with respect to *Pheretima posthuma***

Aqueous and alcoholic extracts of tested plant parts against *Pheretima posthuma* indicated nearly equivalent to better activity in case of *Terminalia belerica* and *Boerrhavia diffusa* (Refer figure 5-8). *Saxifraga granulata* alcoholic extract showed equivalent death activity at 50mg/ml in comparision with reference standard.

## DISCUSSION

Percent decrease study with respect to paralysis and death time of *Eisenia foetida* clearly suggested a dose dependent result under the set of conditions applied during evaluation. A sharp decrease over 66% was shown by ethanolic extract of *Terminalia belerica* at the concentrations of 50mg/ml as compared to 37.5% at 20 mg/ml. An equivalent decrease in death time was observed by equivalent concentration of aqueous extract of *Terminalia belerica*. A similar dose dependent activity was observed for *Boerrhavia diffusa* extract. The best time dependent activity was shown by ethanolic extract of *Terminalia belerica* at 50mg/ml concentration (Refer table 2).

Paralysis and death time study with respect to *Pheretima posthuma* showed interesting features with *Boerrhavia diffusa* ethanolic extract at 50mg/ml concentration showing the best killer (Refer table 3). Ethanolic extract of *Terminalia belerica* at equivalent concentration took up the second position. Among the extracts and concentrations of *Saxifraga granulata* only ethanolic extract at 50 mg/ml concentration had anthelmintic activity comparable with reference standard.

## CONCLUSION

From the above results it is concluded that ethanolic extract of fruit of *Terminalia belerica* at 50mg/ml concentration has showed best anthelmintic activity among all studied plants against *Eisenia foetida*. Ethanolic extracts of plants are proved to be better paralysers and death inducers as compared to aqueous extracts.

Ethanolic extract of *Boerrhavia diffusa* proved to be the best death inducer for *Pheretima posthuma* at concentration of 50mg/ml.

The present study can be considered as step towards rationalisation of herbal drugs. *In vivo* studies need to be done as a next step towards the same.

## ACKNOWLEDGEMENTS

Authors are thankful to all who helped us for this study directly or indirectly.

**Table 1: Indian herbs and their parts under current study**

| Sr. No. | Plant names | Vernacular name | Part used |
|---|---|---|---|
| 1 | *Terminalia belerica* | Baheda | Fruit |
| 2 | *Boerrhavia diffusa* | Punarnava | Leaves |
| 3 | *Saxifraga granulata* | Pashanbheda | Roots |

**Table 2: Anthelmintic activity of plant extracts against *Eisenia foetida***

| Sr. No. | Plant names | Type of Extract | Concentration of extract (mg/ml) | Percentage decrease in Paralysis time | Percentage decrease in Death time |
|---|---|---|---|---|---|
| 1 | *Terminalia belerica* | Aqueous | 20 | 15.38 | 27.08 |
| | | | 50 | 34.62 | 60.17 |
| | | Ethanolic | 20 | 7.69 | 37.5 |
| | | | 50 | 46.15 | 66.67 |
| 2 | *Boerrhavia diffusa* | Aqueous | 20 | -11.54 | 20.83 |
| | | | 50 | 19.23 | 50 |
| | | Ethanolic | 20 | 15.38 | 39.38 |
| | | | 50 | 42.30 | 58.33 |
| 3 | *Saxifraga granulata* | Aqueous | 20 | -46.15 | -35.41 |
| | | | 50 | -26.93 | -8.33 |
| | | Ethanolic | 20 | -50 | -29.16 |
| | | | 50 | -38.46 | -4.17 |

**Table 3: Anthelmintic activity of plants against *Pheretima posthuma***

| Sr. No. | Plant names | Type of Extract | Concentration of extract (mg/ml) | Percentage decrease in Paralysis time | Percentage decrease in Death time |
|---|---|---|---|---|---|
| 1 | *Terminalia belerica* | Aqueous | 20 | -3.33 | 2.38 |
| | | | 50 | 23.33 | 16.67 |
| | | Ethanolic | 20 | 10 | 7.14 |
| | | | 50 | 30 | 19.4 |
| 2 | *Boerrhavia diffusa* | Aqueous | 20 | -26.66 | -7.14 |
| | | | 50 | 23.33 | 23.80 |
| | | Ethanolic | 20 | 13.33 | 26.19 |
| | | | 50 | 46.67 | 40.48 |
| 3 | *Saxifraga granulata* | Aqueous | 20 | -30 | -30.95 |
| | | | 50 | -6.67 | -11.90 |
| | | Ethanolic | 20 | -16.67 | -23.80 |
| | | | 50 | 3.33 | 2.38 |

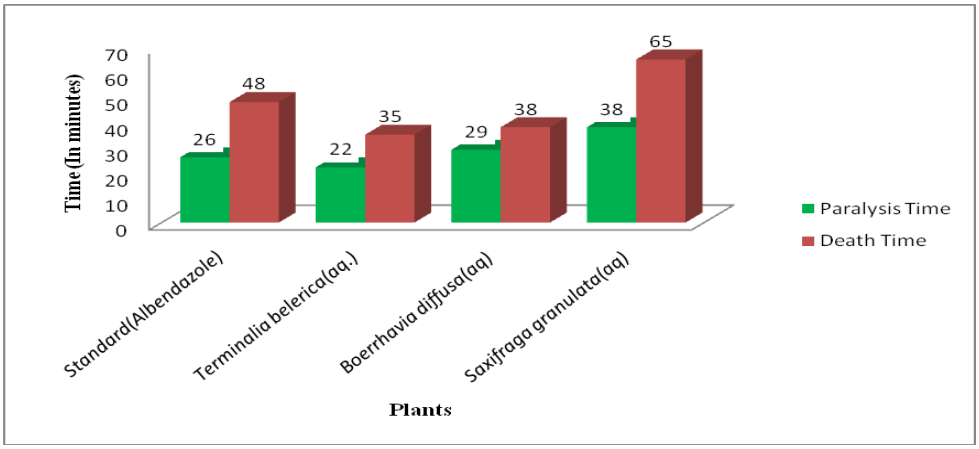


**Figure 1: Anthelmintic activity of aqueous plant extracts at 20mg/ml against *Eisenia foetida***

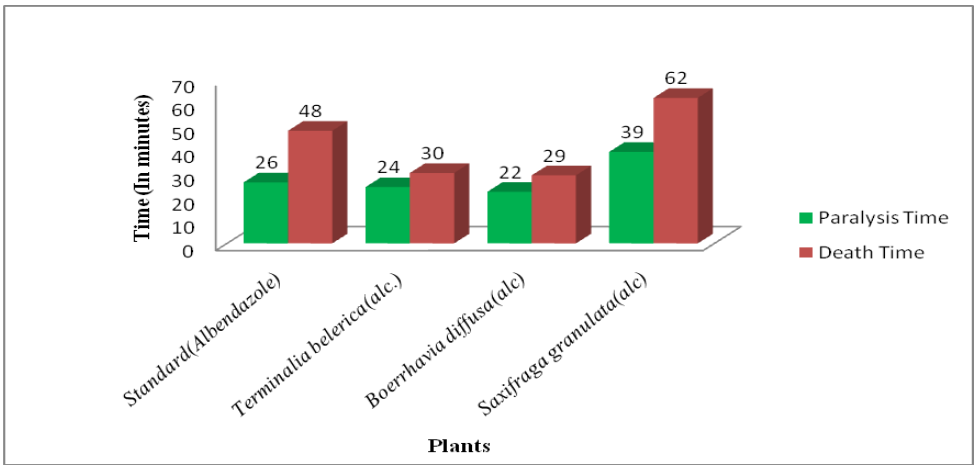


**Figure 2: Anthelmintic activity of ethanolic plant extracts at 20mg/ml against *Eisenia foetida***

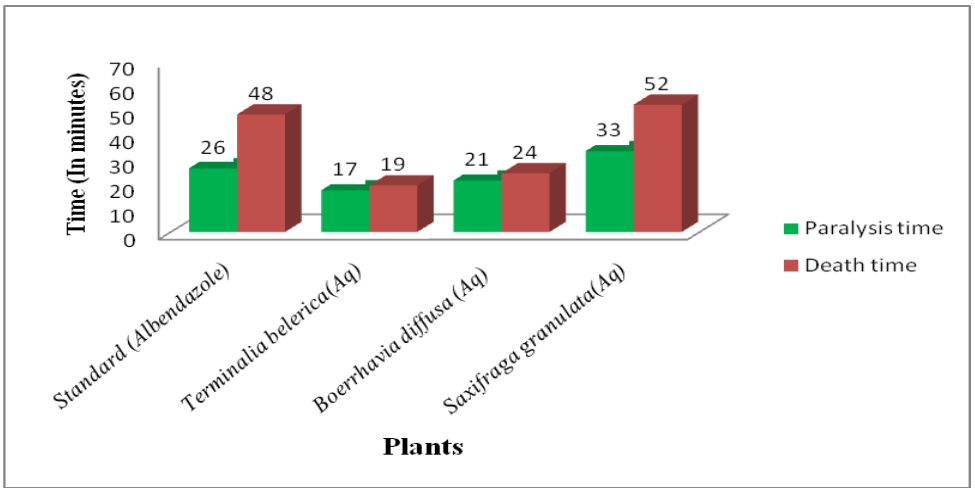


**Figure 3: Anthelmintic activity of aqueous plant extracts at 50mg/ml against *Eisenia foetida***

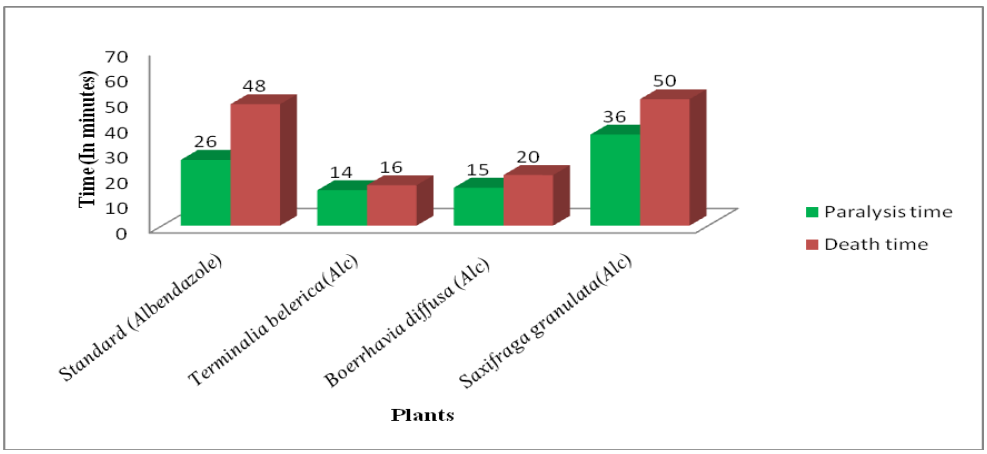


**Figure 4: Anthelmintic activity of ethanolic plant extracts at 50mg/ml against *Eisenia foetida***

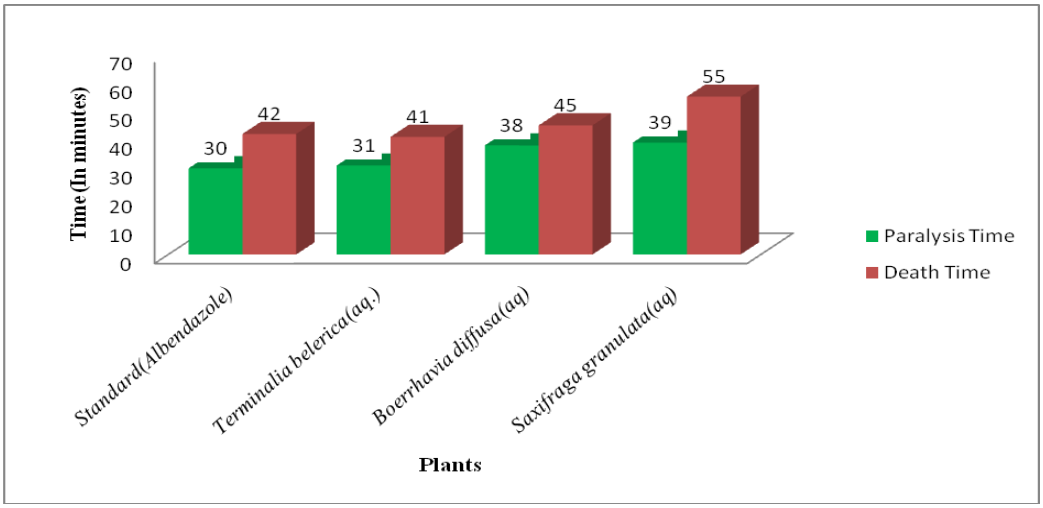


**Figure 5: Anthelmintic activity of aqueous plant extracts at 20mg/ml against *Pheretima posthuma***

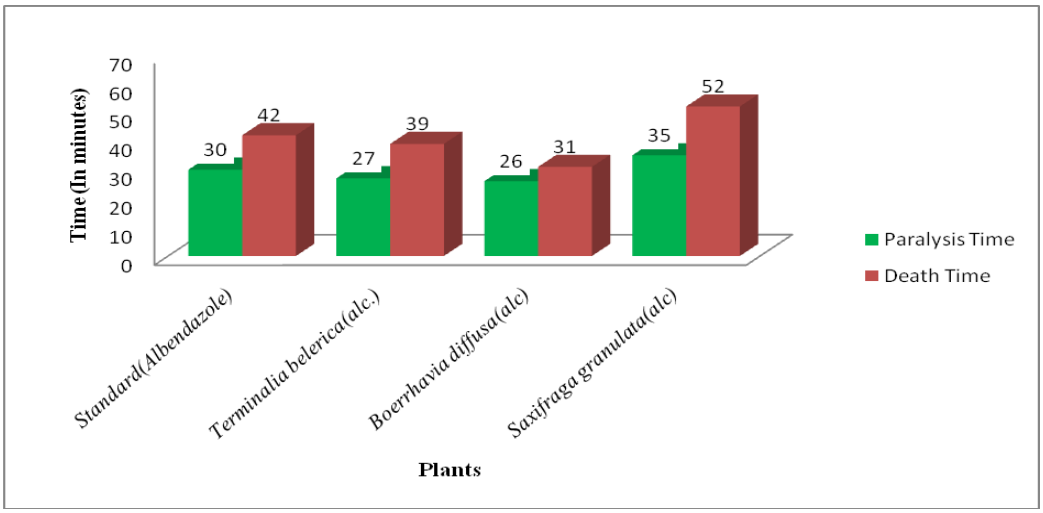


**Figure 6: Anthelmintic activity of ethanolic plant extracts at 20mg/ml against *Pheretima posthuma***

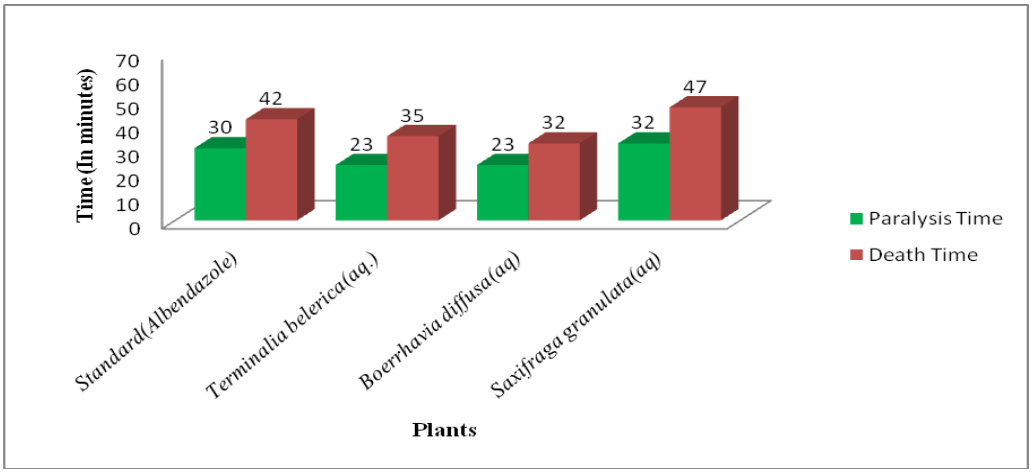


**Figure 7: Anthelmintic activity of aqueous plant extracts at 50mg/ml against *Pheretima posthuma***

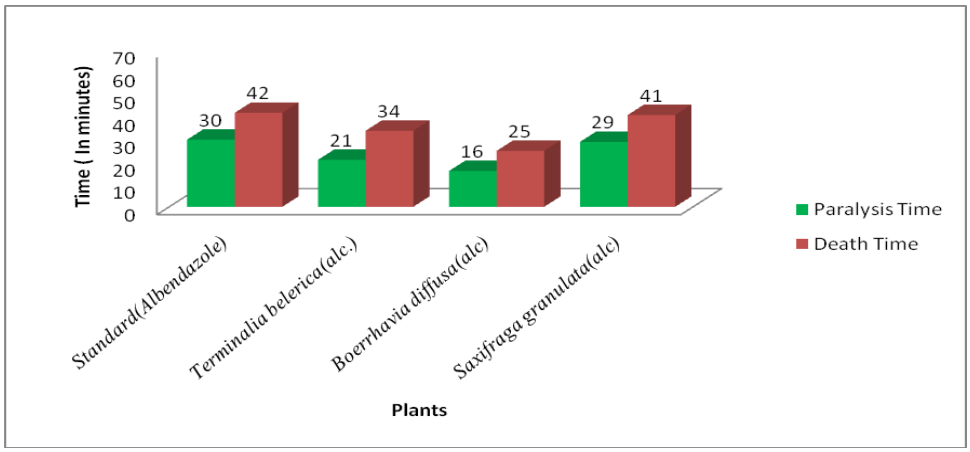


**Figure 8: Anthelmintic activity of ethanolic plant extracts at 50mg/ml against *Pheretima posthuma***

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