In-vitro anthelmintic activity of Akanda (Calotropis gigantea L.) whole plant methanolic extract in Indian adult earthworm

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ABSTRACT

From ancient time Calotropis gigantea has lots of beneficial effects already reported, but in this research work two different concentration of plant methanolic extracts showed remarkable anthelmintic activity against India earthworms Pheretima posthuma. The result was also compared by standard drug Albendazole and Carboxy Methyl Cellulose (CMC) as a control group. Here we also find out the phytochemical constituent of this plant.

Keywords: Anthelmintic activity, Calotropis gigantea, Pheretima posthuma, methanol extract, aqueous extract, phytochemical analysis.

INTRODUCTION

Man has been suffering from different dreaded disease throughout the year. From ancient time numbers of medicinal plants are used to treat them. Calotropis gigantea (L.) is one of the most important medicinal plants which have lots of therapeutic activities [1]. Numbers of disease like piles, tumours, wounds, parasitic infections and dysentery are quire by root bark of this plant [2]. Different kinds of worms can create helminthiasis which may also burrow our internal organs. Helminthic infections spread from eggs or larvae of worms in contaminated foods and one of the most widespread infections in humans, affecting a huge population of the world. It create a lots of harmful health hazards. As per the reports of WHO most of the drugs used against these worms are synthetic and have a lot of side effect [3-6].

Now-a-days helmintiasis is tedious problems to us to overcome this problem we have to find out an alternative way in the form of traditional medicines have an effective anti-helminthic agents [7]. Generally people, particularly in tropical developing countries totally depends on herbal medicines because it provide a great value to rural people and may be of value to global society as a source of new drugs. Many plants are the potent sources of anthelmintic activity found from recent research investigation and their efficacy have been tested on the following plants including Piper sp, Ficus benghalensis, Alpinia nigra, etc have been tested for their anthelmintic efficacy [8].

The purpose of the present work was to investigate the phytochemical and anthelmintic activity of different extracts of akanda (Calotropis gigantea L.) leaves in Indian earthworm.

MATERIALS AND METHODS

Plant material

Most of the villagers and tribal’s used the Calotropis gigantea (Linn.) for their common diseases regularly. On that context we have chosen the material as experimental tools. It is collected in the month of October, 2018 form Purba Medinipur district (Latitude- 22°23′38″ north, Longitude- 87°44′20″ east, Altitude- 5.41 meters from mean sea level), West Bengal, India and it is available in any season of year.

Experimental worms

Different kinds of round worm parasites of human are very much alike or physiological and anatomical resemblance with Pheretima posthuma. Separate beaker was taken for different concentrations and placed two earth worms generally in equal size in each beaker.
Then carefully observed and noted the paralysis and death time of worms. The standard anthelmintic drug albendazole (20 mg/ml) was taken to compare the tested results.

Preparation of extracts

The leaves of *Calotropis gigantea* were dried under shade and crushed in an electric blender to form powder and subjected to Soxhlet extraction (Continuous hot extraction) by using methanol and water as solvent. The methalonic extracts of plant were con\textsuperscript{c} by rotary evaporator and checking for their anthelmintic activity.

Administration of Albendazole

Standard drug, Albendazole (20 mg/ml) and 0.5% w/v of Carboxy Methyl Cellulose (CMC) was prepared during this study a compared it with the results of different concentration of methanol plant extract.

Administration of extract

The two different extracts in different concentration i.e. methanolic and aqueous (50,100mg/ml) were prepared. 0.5% w/v of CMC was prepared as a control. Albendazole was used as standard drug. Separate beaker was taken for different concentrations and placed two earth worms generally in equal size in each beaker \[9\].

Experimental design

The anthelmintic activity was performed according to the method \[10\]. Different kinds of round worm parasites of human are very much alike or physiological and anatomical resemblance with *Pheretima posthuma*. Separate beaker was taken for different concentrations and placed two earth worms generally in equal size in each beaker. Then carefully observed and noted the paralysis and death time of worms. The standard anthelmintic drug albendazole(20 mg/ml) was taken to compare the tested results.

Phytochemical Analysis of the Plant Extracts

Phytochemical constitutes of *Calotropis gigantea* was carried out according to the method \[11\].

RESULTS AND DISCUSSION

The data revealed that the methanol extract and aqueous extract of *Calotropis gigantea* showed very significant anthelmintic activity. Both are showed different paralysis and death time at similar concentrations. During this experiment standard drug albendazole are used to compare their results with test concentration. But this drug should have lots of serious side effects. Investigation of modern research clearly evaluates the activity of medicinal plant claimed for possessing the anthelmintic property. As expected control (0.5% CMC) does not show any positive results. But standard drug (albendazole 20mg/ml), methanol and aqueous plant extract (50mg/ml and 100mg/ml) showed significant results of paralysis and death time of each worms. The potential anthelmintic activity showed in the Table 1, Figure 1 and Figure 2. Qualitative phytochemical analysis of different extracts of the plant was shown in the Table 2.

Table 1: Anthelmintic potency of methanolic and aqueous extract of *Calotropis gigantea*

| Extract                | Concentration (mg/ml) | Pheretima posthuma |
|------------------------|-----------------------|--------------------|
|                        |                       | Paralysis (P)       |
|                        |                       | Death (D)          |
| Control (0.5% CMC)     |                       | -                  |
| Standard (Albendazole) | 20 mg/ml              | 3.28 ± 0.621       | 7.50 ± 0.215 |
|                       | 50 mg/ml              | 5.14 ± 0.271       | 7.79 ± 0.271 |
|                       | 100 mg/ml             | 2.12 ± 0.162       | 6.25 ± 0.261 |
| Methanolic extract     | 50 mg/ml              | 5.14 ± 0.562       | 7.70 ± 0.261 |
|                        | 100 mg/ml             | 2.61 ± 0.103       | 6.30 ± 0.312 |
| Aqueous extract        | 50 mg/ml              | 5.14 ± 0.562       | 7.70 ± 0.261 |
|                        | 100 mg/ml             | 2.61 ± 0.103       | 6.30 ± 0.312 |

All Values represent Mean ± SD; n=2 in each group. Comparisons made between standard versus treated groups, P<0.05 was considered significant

Figure 1: Anthelmintic activity of *Calotropis gigantea* leaves on *Pheretima posthuma*. MELC stands for methanolic extract, AELC stands for aqueous extract.

Figure 2: Anthelmintic activity of *Calotropis gigantea* leaves on *Pheretima posthuma* by A) Control B) Standard Albendazole C) different concentrations of methanolic extract D) different concentrations of aqueous extract.
Table 2: Preliminary phytochemical screening of *Calotropis gigantea*

| S. No. | Phytochemical test                  | Petroleum ether extract | Methanol extract | Aqueous extract |
|--------|-------------------------------------|-------------------------|------------------|-----------------|
| 1.     | Test for alkaloid (Wagner’s reagent) | +                       | +                | +               |
| 2.     | Test for carbohydrate (Molisch’s reagent) | -                       | -                | -               |
| 3.     | Test for Glycolides                 | +                       | +                | -               |
| 4.     | Test for flavonoids                 | -                       | -                | -               |
| 5.     | Test for phenols                    | -                       | -                | -               |
| 6.     | Test for coumarins                  | -                       | +                | +               |
| 7.     | Test for tannins                    | -                       | -                | -               |
| 8.     | Test for saponins                   | -                       | +                | +               |
| 9.     | Test for Protein and amino acids    | -                       | -                | -               |
| 10.    | Test for anthroquinone              | +                       | +                | +               |

+ = Positive, - = Negative

CONCLUSION

After done all observation it may conclude that of *Calotropis gigantea* did produce very anthelmintic activity against India earthworms. During study this plant showed very significant anthelmintic activity at 100 mg/dl Con measured by time taken for paralysis / death of the earthworms. The result of different conc of methanolic extracts of plants can compared with the rules of standard drug. Albendazole and Carboxy Methyl Cellulose (CMC) acts as a control. Future details research work on this plant will open a new avenue of drug industries.

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Conflict of Interest

Authors have no conflict of interest.

REFERENCES

1. Yelne M, Sharma P, Dennis T. Database on medicinal plants used in ayurveda, central council for research in ayurveda and siddha, New Delhi. 2000; 2:69-73.
2. Kirtikar KR, Basu BD. *Indian Medicinal Plants*. 2nd edn, (Published by Basu, L.M. Allahabad, India).1994; 3:1606-1609.
3. Argal A, Pathak AK. CNS activity of *Calotropis gigantea* roots. Journal of Ethnopharmacology. 2006; 106(1):142-5.
4. Prashant KR, Dolly J, Singh KR, Gupta KR, Watal G. Glycemic properties of Trichosanthes dioica leaves, Pharm Biol. 2008; 12:894-899.
5. Idika IK, Okonkwo EA, Onah DN, Ezeh IO, Iheagwam CN, Nwosu CO. Efficacy of levamisole and ivermectin in the control of bovine parasitic gastroenteritis in the sub-humid savanna zone of southeastern Nigeria. Parasitol. Res. 2012; 111:1683-7.
6. Bundy DA. Immunoepidemiology of intestinal helminthic infection I: The global burden of intestinal nematode disease. Trans Roya Soc Trop Med Hyg 1994; 8:259-261.
7. Sundhi SM, Shah R, Magan Archana. *Indian Drugs* 1994; 31:317-320.
8. Kirchofer C, Vargas M, Brassant O. Activity of OZ78 analogues against Fasciola hepatica and Echinostoma caproni. Acta Tropica. 2011; 118:56-62.
9. De S, Das DC, Mandal T. *In-vitro* anthelmintic activity of Cardanthera difformis Druce whole plant methanolic extract in Indian adult earthworm. Journal of Pharmacognosy and Phytochemistry. 2016; 5(1):203-205.
10. Ghosh T, Maty TK, Bose A, Dash GK. Indian J Nat Product. 2009; 16-19.
11. Harborne JB. Phytochemical methods, a guide to modern techniques of plant analysis. London: Chapman and Hall, 1984.

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