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In-vitro anthelmintic activity of *Colocasia esculenta*

Meenal S. Kubde*, S. S. Khadabadi, I. A. Farooqui, S. L. Deore.

Govt. College of Pharmacy, Kathora Naka, Amravati (M.S.), INDIA

Abstract

Maharashtra is inhabited by several tribes and they are using several plants or plant-based preparations for the treatment of various ailments in their traditional system of medicine. During our course of studies on ethno medicine of this region, the plant being used as anthelmintic is leaves of Colocasia esculenta .This plant has a wide reputation among natives of being curative for intestinal-worm infections in the form of aqueous extract. Based on this, an attempt has been made to evaluate the anthelmintic potential of this plant. Aqueous and Ethanolic extract of the leaf from Colocasia esculenta were examined for anthelmintic activity against earthworm. The extract demonstrated a concentration-dependent activity at tested concentrations of 10–50 mg/ml. Piperazine citrate (10 mg/ml) was used as reference standard drug whereas distilled water as control. Determination of paralysis time and death time of the worms were recorded. Extract exhibited significant anthelmintic activity at highest concentrations, 50 mg/ml extract.

Keywords: Colocasia esculenta; Helminthosis; Anthelmintic activity.

INTRODUCTION

Helminthosis play a crucial role in small ruminant production leading to enormous economic losses particularly in areas where extensive grazing is practiced [1]. Development of resistance to most of commercially available anthelmintic became a severe problem worldwide [2]. Evaluation of the activities of medicinal plants claimed for anthelmintic property is getting attention these days [3-7]. *Colocasia esculenta*, commonly known as Taro, belongs to the family Araceae. The leaf juice of the plant is styptic, stimulant and rubefacient, and is useful in internal haemorrhages, otalgia, adenitis and buboes. The juice of the corm is laxative, demulcent and anodyne [8] Colocasia *esculenta* Schott. (PSN-748) belongs to the family Araceae. True taro probably originates from the tropical region between India and Indonesia and has been grown in the South Pacific for hundreds of years. Taro produces edible corms) and the leaves are also used

as a vegetable [9]. The plant is a hearty succulent herb, with clusters of long heart or arrowhead-shaped leaves that point earthwards. It grows on erect stems that may be green, red black or variegated. The stems are a few meters high. The species is thought to be a native of India. The young leaves are rich in Vitamin C, and the roots are rich in starch. It contains thiamine, riboflavin, niacin, oxalic acid, calcium oxalate and sapotoxin. The tubers contain amino acids and proteins. The corms contain the anthocyanins perlargonidin 3-glucoside, cyaniding 3-rhamnoside and cyaniding 3-glucoside.Traditionally it is used to settle the stomach, to prevent swelling and pain and to reduce fever. It is also used as a poultice on infected sores [10].

MATERIALS AND METHODS

Plant Collection and Authentication

Colocasia esculenta leaves were collected from the local farms of Amravati District, Maharashtra state, India, and authenticated by the authority of the botany department, VMV, Amravati. In the month of November-December. The collected leaves were air-dried under the shade in laboratory for 7-12 days. After complete drying, leaves were powdered. The aqueous extracts were prepared by dissolving 100 g of powdered plant material in 500 ml of distilled water in a glass percolator. It was allowed to macerate for 24 h at room temperature and the brew was filtered using Whatman number one filter paper. The process of percolation was repeated three times (500 ml). The combined filtrate was then concentrated in a water bath to ensure the complete evaporation of the solvent. The final crude aqueous extract was transferred to a vial and kept air tight. The ethanolic extracts were prepared by placing 200 g of powdered plant material in a conical glass percolator to which 1000 ml of 95% ethanol was added. Plant material was allowed to macerate for 16 h at room temperature and the percolate was collected by filtering through cotton wool (non-absorbent). The process of maceration/percolation was repeated three times (1000 ml). The combined filtrate was evaporated to give the crude ethanolic extract. The extract was scraped off and transferred to a container and kept air tight. The extracts were preserved properly before subjecting to anthelmintic activity.

Worm's collection

Indian earthworm *Pheritima posthuma* (Annelid) were collected from the VMV college of Amravati. Earthworm were washed with normal saline solution to remove all the fecal
Matter and kept in normal saline solution. The average size of earthworm was 6-8 cm

Preparation of test sample

Samples for in-vitro study were prepared by dissolving the extracts in distilled water to obtain different working solutions as 10, 50, and 100 mg/ml.

Anthelmintic Assay

The anthelmintic assay was carried as per the method of Ajaiyeoba E.O. *et al* [11] with minor modifications. The assay was performed on adult Indian earthworm, *Pheretima posthuma* due to its anatomical and physiological resemblance with the intestinal roundworm parasite of human beings [12-15] Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds in vitro [16-19]. Indian adult earthworms (*Pheretima posthuma*) collected from moist soil and washed with normal saline to remove all fecal matter were used for the anthelmintic study. The earthworms of 3-5 cm in length and 0.1-0.2 cm in

width were used for all the experimental protocol. Various concentrations (10-50 mg/ml) of each extract were tested in the bioassay, which involved determination of time of paralysis and time of death of the worms. Piperazine citrate was included as standard reference and distilled water as control. Observations were made for the time taken to paralyze and death of individual worms. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Death was concluded when the worms lost their motility followed with fading away of their body colors as shown in Table 1.

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Table 1

Test Substance.	**Concentration Time of (mg/ml)**	**Time of Paralysis (P)And Death (D) of *Colocasia esculenta* in minutes**	
WE		P	D
	10	90.75 ± 1.7	162.15 ± 0.4
	20	76 ± 0.56	135± 0.17
	30	58.23 ± 0.41	122.9 ± 0.5
	40	45 ± 0.12	109± 0.54
	50	31.25 ± 0.81	60.34 ± 0.02
EE	10	82.03 ± 0.2	115.05 ± 0.3
	20	56 ±0.12	97 ± 0.96
	30	40 + 0.04	83 + 0.67
	40	26 ± 0.67	51 ± 0.87
	50	16 ± 0.23	42 ± 0.54
PC	10	12.76 ± 0.5	26.7 ± 0.5

Where EE: Ethanolic extract, WE: Water extract, PC: Piperazine citrate
All values represent Mean + SEM

RESULTS AND DISCUSSION

Preliminary Phytochemical screening of the crude extracts revealed the presence of riboflavin, niacin, oxalic acid, calcium oxalate and sapotoxin, anthocyanins perlargonidin 3-glucoside, cyaniding 3-rhamnoside and cyaniding 3-glucoside, saponins. As shown in Table 1, the different extracts exhibited anthelmintic activity in dose dependent manner giving shortest time of paralysis (P) and death (D) with 50 mg/ml concentration. The ethanolic extract of *Colocasia esculenta* caused paralysis of 16 min and time of death of 42 min while water extract revealed paralysis of 31.25 min and death of 60.34 min against the earthworm *Pheritima posthuma*. The reference drug Piperazine citrate showed the same at 12 and 26 minutes respectively. The predominant effect of Piperazine citrate on worm is to cause a flaccid paralysis which results in expulsion of the worm by peristalsis. Piperazine citrate by increasing chloride ion conductance of worm muscle membrane produces hyper polarization and reduced excitability that leads to muscle relaxation and flaccid paralysis [20]. The crude extracts of *Colocasia esculenta* not only demonstrated paralysis but also caused death of worms especially at higher concentration of 100

mg/ml in shorter time as compared to reference drug Piperazine citrate. Phytochemical analysis of crude extracts revealed the presence of saponins among the other chemical constituents

CONCLUSION

From this study, all the *Colocasia esculenta* plants investigated were found to be active as traditional anthelmintic with regard to both paralysis and death times. Its validates their uses in ethno medicine in treating worm infestations. However, *Colocasia esculenta* outstanding and worthy of further investigation to ascertain their active constituents.

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