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Anthelmintic Activity of Malvastrum Coromandelianum Leaf Extracts against Pheretima Posthuma and Ascardia Galli

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ABSTRACT

Principle mode for control of gastrointestinal parasites is based on the commercial anthelmintic. Malvastrum coromandelianum, family Malvaceae, is used as an anti-inflammatory, analgesic, and antidysenteric plant. However, wide spread increase of anthelmintic resistance, scarcity and high cost especially to farmers of low income in developing countries led to the need of other alternative helminth control methods. Among other alternative methods, there is considerable and expanding interest in traditional herbal dewormers. At present, methanolic and ethyl acetate extracts of Malvastrum coromandelianum leaves have been investigated for their anthelmintic activity against Pheretima posthuma and Ascardia galli. Various concentrations were used in the bioassay, which involved paralysis and death time of the worms. Both the extracts showed significant anthelmintic activity.

Keywords: Malvastrum Coromandelianum, Ascardia Galli, Pheretima Posthuma, Anthelmintic Activity.

I. INTRODUCTION

Herbal medicines have received more attention in recent times due to their diversity in curing diseases, safety and well-tolerated remedies compared to conventional medicine[1]. Malvastrum coromandelianum belongs to the Malvaceae family, which has been famous for its medicinal properties for many years[2]. Because of the presence of alkaloids, essential oils and phenolic quleoside the plants of this family are well known for their antibacterial and antifungal activities. Phytochemical screening of the extracts revealed the presence of alkaloids, saponins, flavonoids, triterpenes, tannins and steroids. Helminth infections remain a major constraint on livestock production in all agro-ecological zones[3-4]. Microwave extraction has proved to be more effective and efficient than its conventional counterpart, the soxhlet extraction method. The Soxhlet extraction, which is a standard technique, is a continuous solvent

extraction method. Extraction systems are used to conduct routine solvent extractions of soils, sediments, sludge, polymers and plastics, pulp and paper, biological tissues, textiles and food samples[5-25]. Experiments have proved that microwaves, in comparison with the soxhlet extraction, use a lesser volume of solvent and sample and perform extraction at a much faster rate[26-37]. In the discovery of effective medicines for prevention and treatment, an outbreak of coronavirus disease (COVID-19) caused by the novel extreme acute respiratory syndrome coronavirus-2 (SARS-CoV-2) poses an unprecedented obstacle. The proximity to the patient during dental care, high generation of aerosols, and the identification of SARS-CoV-2 in saliva have suggested the oral cavity as a potential reservoir for COVID-19 transmission. Soon, someday, you might be making your own drugs at home. That is because researchers have adapted a 3D printer from basic, readily available medicinal active agents fed into a drug delivery system[38-41]. Today, gastrointestinal parasite control key mode is based on the commercial anthelmintic. However, wide-spread increases in anthelmintic resistance, scarcity and high costs, particularly for low-income farmers in developing countries, led to the need for other alternative methods of helminth control. There is considerable and growing interest in traditional herbal dewormers among other alternative methods. The aim of the study is to evaluate anthelmintic potential of Malvastrum coromandelianum[42-43].

II. MATERIALS AND METHODS

Collection of Plant Material

Malvastrum Coromandelianum was obtained from Kasegaon, Sangli, Maharashtra, India. The plant was identified and authenticated by Department of botony, Yashwantrao Chavan College of Science, Karad.

Preparation of Plant Extract

Shade drying was done for almost a month as to avoid chemical degradation due to sunlight. Grinding of the dried material was done, with the aid of a grinder and converted into coarse powder. Extraction of malvastrum coromandelianum was done by microwave extraction method further filtered and excess solvent present was evaporated and dried extract were collected and subjected for activity studies.

Animals

Indian adult earthworms (Pheretima posthuma) were collected from water logged areas and Ascardia galli (nematode) worm were obtained from freshly slaughtered fowls (Gallus gallus).

Evaluation of Anthelmintic Activity

The anthelmintic assay was carried as per method of Ajaiyeoba et al., with minor modifications[42]. The anthelmentic activity was evaluated on adult Indian earthworm Pheretima posthuma worm due to its anatomical and physiological resemblance with the intestinal round worms parasites of human beings[43-45]. Ascardia galli (nematode) worms are easily available in slaughtered fowls and it can be used as a screening model for anthelminthic drugs as advocated earlier[46-48]. Three different concentrations, each of crude methanolic and ethyl acetate extract (10, 50,100 mg/ml in distilled water) was and six worms (same type) were placed in it. This was done for both type of worms. Observation were made for the time taken to cause paralysis and death of the individual[16]. Mean time for the paralysis (P) in min was noted when no movement of any sort could be observed, except when the worm was shaken vigorously; time of death (D) in min was recorded after ascertaining the worms neither moved when shaken vigorously nor when dipped in warm water (50°C). Albendazole (10mg/ml) was included as reference compound[49-55].

III. RESULTS AND DISCUSSION

As shown in table 1, methanolic and ethyl acetate extract exhibited anthelmintic activity in dose-dependent manner giving shortest time of paralysis (P) and death (D) with 100 mg/ml concentration. The methanolic extract of Malvastrum coromandelianum caused paralysis of 10 min. and time of death of 29 min. While ethyl acetate revealed paralysis of 9 and 31 min. respectively against the earthworm Pheretima posthuma. The reference drug Albendazole showed the same at 9 and 31 minutes, respectively. Ascardia galli worms also showed sensitivity to the methanolic and aqueous extract of Malvastrum coromandelianum. The methanolic extract caused paralysis in 12 min, death in 31 min and the ethyl acetate extract displayed P and D in 8 and 28 min, respectively. Albendazole did the same at 18 and 45 min.

Table 1. Anthelmintic activity of methanolic and ethyl acetate extract of Malvastrum coromandelianum

Test subs	**Concentrations (mg/ml)**	**Time taken for paralysis (P) and death (D) of worms in min**			
		P. posthuma		**A. galli**	
		P	**D**	**P**	**D**
Control	-	-	-	-	-
Methanolic extract	10	21.8 ± 0.45	69.0 ± 0.32	24.55 ± 0.54	42.28 ± 0.68
	50	16.05 ± 0.51	48.4 ± 0.12	16.87 ± 0.50	33.50 ± 0.31
	100	10.53 ± 0.38	29.3 ± 0.65	12.27 ± 0.49	31.68 ± 0.42
Ethyl acetate extract	10	27.12 ± 0.39	64.82 ±0.43	20.62 ± 0.41	50.09 ± 0.41
	50	18.37 ± 0.68	50.67 ±0.32	11.56 ± 0.28	35.30 ± 0.62
	100	09.45 ± 0.29	31.85 ±0.24	8.17 ± 0.53	28.14 ± 0.38
Standard (Albendazole)	10	19.48 ± 0.50	59.68 ±0.52	18.12 ± 0.45	45.74 ± 0.65

IV. CONCLUSION

Leaf extract of Malvastrum coromandelianum not only demonstrated paralysis, but also caused death of worms especially at higher concentration of 100mg/ml in shorter time as compared to reference drug albendazole. Phytochemical screening of the extracts revealed the presence of alkaloids, saponins, flavonoids, triterpenes, tannins and steroids. Tannins were shown to produce anthelmintic activities chemically tannins are polyphenolic compounds. It is possible that tannins contained in the extracts of Malvastrum coromandelianum produced similar effects. Reported anthelmintic effect of tannins is that they can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and may cause death. Further studies are in process to identify the possible phytoconstituents responsible for anthelmintic activity.

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