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HEMINTHOLYTIC POTENTIAL OF *CYMBOPOGON CITRATUS* LEAVES EXTRACT AND ITS FORMULATION AS AN EMULSION

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ABSTRACT

The present communication deals with the laboratory studies carried out to determine the antihelmintic activity of *Cymbopogon citratus* leaves extracts against *Pheritima posthuma*. Methanolic and aqueous extracts were used as test solutions. Piperazine citrate was used as standard drug and normal saline as a control. Study involved the determination of time of paralysis as well as time of death of worms. The results revealed that methanolic extract of *Cymbopogon citratus* leaves have better antihelmintic activity than the aqueous extract of the same. Further studies including preparation of emulsion from the oils obtained from the leaves were also carried out.

INTRODUCTION: The World Health Organization (WHO) has estimated that approximately 80% of the world's population depends on traditional medicines for meeting their primary health care needs. Helminthes have been of concern to the medical field for centuries and still cause considerable problems for human beings and animals. During the past few decades, despite numerous advances made in understanding the mode of transmission and the treatment of these helminthes there are still no efficient products to control certain helminthes and the indiscriminate use of some drugs has generated several cases of resistance. Since the time immemorial, traditional system of India and the folklore are claiming that medicinal plants as a whole or their parts are being used in all types of diseases successfully including antibacterial, antihelmintic, anti-inflammatory etc.

Thus, plant derived drug serve as a prototype to develop more effective and less toxic medicine. *Cymbopogon citratus* (Lemon grass) is an aromatic perennial tall grass with rhizomes and densely tufted fibrous root. It has short underground stems with ringed segments, coarse, green slightly leathery leaves in dense clusters. The plant is a native herb from India and is cultivated in other tropical and subtropical countries. It is used as traditional folk medicine in the treatment of nervous, gastrointestinal disturbances, fevers and hypertension. Lemon grass is also a folk remedy for coughs, consumption, elephantiasis, flu, gingivitis, headache, leprosy, malaria, ophthalmia, pneumonia and vascular disorders. It is principally taken in the form of tea as a remedy for digestive problems, diarrhoea and stomach ache. As a medicinal plant, lemon grass has been considered a carminative and insect repellant. Studies on extracts from *Cymbopogon citratus* leaves have demonstrated anti-inflammatory, vasorelaxing, diuretic and valuable remedy in treating ringworm as local application. Lemongrass oil was claimed to have antihelmintic activity [1]. Hence, we decided to study the antihelmintic activity of lemongrass leaf extracts.

MATERIALS AND METHODS: The methodology adopted to evaluate the anthelmintic activity of *Cymbopogon citratus* is described hereunder.

Plant Material: Leaves of *Cymbopogon citratus* were collected from rural area of Pune, (M.S.). The collected material was identified at Department of Pharmacognosy of Sharadchandra Pawar College of Pharmacy, Dumbarwadi (Otur), Dist. Pune (M.S.).

Worm Collection and Authentication: The Indian Earthworms belonging to species *Pheritima posthuma* (Annelida) were collected from muddy area near Manchar, Dist. Pune (M.S.) and authenticated from the Department of Pharmacology of Sharadchandra Pawar College of Pharmacy, Dumbarwadi (Otur), Dist. Pune (M.S.)

Extract Preparation: The collected materials were washed thoroughly in water, chopped, air-dried for a week at 35-40 ^{0}C, pulverized in electric grinder. The methanolic extract was prepared by using the soxhlet extraction. The leaves were extracted with 90% methanol for 72 hours to get crude methanolic extract, the extract was concentrated under vacuum for complete removal of the solvent and the residue was used for the analysis. The aqueous extract was prepared by using maceration technique. The powder of *Cymbopogon citratus* leaves was soaked in water for 7 days, then filtered and filtrate was evaporated to obtain the crude powdered extract [2].

Anthelmintic activity: The anthelmintic activity was performed according to the method of Jinu John et.al. on adult Indian Earthworm *Pheritima posthuma* as it has anatomical and physiological

resemblance with the intestinal round worm parasites of human beings. Eight groups of approximately equal sized Indian earthworms consisting of six earthworms in each group were released into 50ml of desired formulation. Both Methanolic and Aqueous extracts were dissolved in normal saline containing 5% DMF and diluted to get concentrations of 10, 25, 50 mg/ml. Piperazine citrate (10 mg/ml) was used as standard drug. All drug and extract solutions were freshly prepared before starting the experiment. Observations were made for the time taken until the paralysis and death of an individual worm. The paralysis was said to occur when the worms were not able to move even in normal saline. Death was concluded when the worms lost their motility followed with fading away of their body colors [3-9]. The results are shown in **Table 1**.

TABLE 1: ANTIHELMINTIC ACTIVITY OF *CYMBOPOGON CITRATUS* LEAVES EXTRACTS

Test Substance	Concentration (mg/ml)	Time taken for Paralysis(P) and Death(D) of worms (min)	
		Pheritima posthuma	
		P	D
Methanolic extract	25	27.53±0.259	45.65±1.606
	50	19.05±0.824	34.45±1.379
	100	13.97±0.568	23.30± 0.434
Aqueous extract	25	31.62± 0.925	68.60±0.909
	50	25.08± 1.970	48.13±1.542
	100	14.63± 1.699	33.26± 2.105
Emulsion	----	12.53±0.850	32.78±2.565
Piperazine citrate	10	21.43±1.399	57.15±0.800
Normal Saline	----	----	----

All the values represent Mean ± SEM; no. of worms (n) = 6 in each group

Formulation of an Emulsion: The emulsion was formulated by using the standard methodology[12]. The essential oils obtained from the *Cymbopogon citratus* were used for the preparation of oil in water emulsion. The compounding formula is given in **Table 2**.

TABLE 2: COMPOUNDING FORMULA FOR EMULSION

Ingredients	Quantity Taken	Use
Cymbopogon citratus oil	50ml	Claimed to be Antihelmintic
Gum Acacia	5gm	Emulsifying agent
Freshly boiled and cooled water	q.s.1000ml	Vehicle

RESULTS AND DISCUSSION: Preliminary phytochemical screening has shown the presence of Terpenoids, Glycosides, Oxalate and Phenolic compounds in the extracts obtained from the leaves of *Cymbopogon citratus.* The function of the antihelmintic drug, like piperazine citrate, is known to cause paralysis of the worms so that they are expelled in feces of man and animals. The extracts not only demonstrated this property but they also caused death of the worms. The formulated emulsion has also shown the promising results against the helminthes used.

In conclusion, the traditional claim of leaves of *Cymbopogon citratus* as an antihelmintic have been confirmed as the extracts displayed activity against the worms used in the study. Further it will be interesting not only to isolate the active chemical constituents that are responsible for the activity but also to determine the possible mechanism of action.

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