



RESEARCH ARTICLE

PHARMACOGNOSY

COMPARATIVE HEMINTHOLYTIC POTENTIAL OF EXTRACTS OBTAINED FROM *CYMBOPOGON CITRATUS* AND *WRIGHTIA TINCTORIA* LEAVES



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ABSTRACT

The present communication deals with the comparative studies on anthelmintic potential of methanolic and aqueous extracts of *Cymbopogon citratus* and *Wrightia tinctoria* against *Pheritima posthuma*. Methanolic and aqueous extracts of both 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 anthelmintic activity than that of *Wrightia tinctoria* extracts. Further it will be interesting to isolate the active chemical constituents from both the plants.

KEY WORDS

Anthelmintic potential, *Pheritima posthuma*, *Cymbopogon citratus*, Piperazine citrate, *Wrightia tinctoria*

INTRODUCTION

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, anthelmintic, anti-inflammatory etc. Thus, plant derived drug serve as a prototype to develop more effective and less toxic medicine (Mali et.al., 2008). 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 (Deore et.al., 2010). During the past few decades, despite numerous advances made in understanding the mode of transmission and the treatment of the helminthes there are still no efficient products to control certain helminthes and the indiscriminate use of some drugs has generated several cases of resistance (Zafar et.al., 2001).

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 repellent. Studies on extracts from *Cymbopogon citratus* leaves have demonstrated anti-inflammatory, vasorelaxing, diuretic and valuable remedy in treating ringworm as local application (Omotade, 2009). Similarly, *Wrightia tinctoria* also known as Sweet Indrajao belonging to family apocynaceae, is a small, deciduous tree with a light gray, scaly smooth bark native to India and Burma. The fruits are pendulous, long paired follicles joined at their tips. The hairy seeds are released as the fruit dehisces. The leaves of this tree yield a blue dye called Pala Indigo. Sweet Indrajao is called as dhudi in Hindi because of its preservative nature. The leaves are applied as a poultice for mumps and herpes; the pungent fresh leaves quickly relieve toothache. In folk medicine, the dried and powdered leaves are used in piles, fever, diarrhoea, roundworm and colic.

The bark and seeds are effective against psoriasis and non-specific dermatitis. It has anti-inflammatory and anti-dandruff properties and hence is used in hair oil preparations. The leaves are acrid, thermogenic, anodyne and hypotensive and are very useful in odontalgia, vitiated conditions of vata and hypertension. The seeds are bitter, astringent, acrid, carminative, constipating, depurative, anthelmintic and febrifuge. They are useful in vitiated conditions of Pitta, Kapha and dyspepsia etc.



Leaves and barks of *Wrightia tinctoria* were used traditionally by the tribes of Maharashtra, India for anthelmintic purpose. Lemongrass oil and leaves were also claimed to have anthelmintic activity (Kokate et.al, 1971). Hence, we decided to study and compare the anthelmintic effects of *Wrightia tinctoria* and *Cymbopogon citratus*.

MATERIALS AND METHODS

The methodology adopted for comparative evaluation of the helmintholytic potential of *Cymbopogon citratus* and *Wrightia tinctoria* is described hereunder.

Plant Material

Leaves of *Cymbopogon citratus* and *Wrightia tinctoria* were collected from rural area of Pune district (M.S.). Both the collected materials were identified at Department of Pharmacognosy of Sharadchandra Pawar College of Pharmacy, Dumbarwadi (Otur), Dist. Pune (M.S.).

Drugs and Chemicals

The following drugs and chemicals were used, Piperazine citrate, Sodium chloride, Dimethyl formamide (DMF), Ethyl acetate (Research Lab Fine Chem Industries, Mumbai, India) and methanol (Qualigens, Navi Mumbai, India).

Worm Collection and Authentication

The Indian Earthworms belonging to species *Pheritima posthuma* (Annelida) were collected from muddy area near Ambegaon, 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

From *Cymbopogon citratus* leaves

The collected leaves were washed thoroughly in water, chopped, air-dried for a week at 35-40 °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 were soaked in water for 7 days then filtered and filtrate was evaporated to obtain the crude powdered extract.

From *Wrightia tinctoria* leaves

The air-dried leaves (for a week at 35-40 °C), were pulverized in electric grinder. Soxhlet extraction method was followed for the methanolic extract preparation. 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 *Wrightia tinctoria* leaves were soaked in water for a week then filtered and filtrate was evaporated to obtain the crude powdered extract.(Omotade, 2009).

Phytochemical Screening of the Extracts

Plant extracts obtained from *Cymbopogon citratus* and *Wrightia tinctoria* leaves were subjected to preliminary phytochemical screening by means of chemical tests. (Table – 1)



Table-1

Preliminary phytochemical screening of methanolic and aqueous extracts obtained from *Cymbopogon citratus* and *Wrightia tinctoria* leaves.

Sr.No.	Test	<i>Cymbopogon citratus</i> leaves		<i>Wrightia tinctoria</i> leaves	
		Methanolic Extract	Aqueous Extract	Methanolic Extract	Aqueous Extract
1	Alkaloids	--	--	--	--
2	Glycosides	+	--	--	--
3	Saponins	--	--	+	+
4	Steroids	--	--	--	--
5	Sugars	+	--	--	+
6	Tannins and Phenolic compounds	--	+	+	+
7	Terpenoids	+	+	--	--

Sr.No.	Test	<i>Cymbopogon citratus</i> leaves		<i>Wrightia tinctoria</i> leaves	
		Methanolic Extract	Aqueous Extract	Methanolic Extract	Aqueous Extract
1	Alkaloids	--	--	--	--
2	Glycosides	+	--	--	--
3	Saponins	--	--	+	+
4	Steroids	--	--	--	--
5	Sugars	+	--	--	+
6	Tannins and Phenolic compounds	--	+	+	+
7	Terpenoids	+	+	--	--

(+) = Present and (--) = Absent

Anthelmintic activity

The anthelmintic activity was performed according to the method of Trapti R. et.al., (2009) on adult Indian Earthworm *Pheritima posthuma* as it has anatomical and physiological resemblance with the intestinal round worm parasites of human beings. Fourteen 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 colours (Girme et. al., 2006, Jinu J.

et.al., 2009, Mali et.al., 2008, Mahavir C. et. al., 2008, Nirmal et.al., 2007). The results are shown in Table-2.

Table-2
Comparative helmintholytic potential of *Cymbopogon citratus* and *Wrightia tinctoria* leaves

Test Substance	Concentration (mg/ml)	Time taken for Paralysis(P) and Death(D) of worms (min)	
		<i>Pheritima posthuma</i>	
		P	D
Methanolic extract of <i>Cymbopogon citratus</i> leaves	2	27.53±0.60	45.65±3.93
	5	19.05±2.01	34.45±3.13
	10	13.97±1.39	23.30±1.06
Aqueous extract of <i>Cymbopogon citratus</i> leaves	2	31.62±2.26	68.6±2.22
	5	25.08±4.82	48.13±3.77
	10	14.63±4.16	33.26±5.15
Methanolic extract of <i>Wrightia tinctoria</i> leaves	2	62.00±3.83	77.00±7.59
	5	54.50±3.39	69.61±5.45
	10	31.16±0.52	59.10±2.89
Aqueous extract of <i>Wrightia tinctoria</i> leaves	2	95.51±3.10	111.23±8.32
	5	82.85±1.56	95.81±1.39
	10	61.93±2.21	87.03±2.58
Piperazine citrate	10	21.43±3.42	57.15±1.95
Normal Saline	----	----	----

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

RESULTS AND DISCUSSION

Preliminary phytochemical screening has shown the presence of terpenoids, glycosides, sugars and phenolic compounds in the extracts obtained from the leaves of *Cymbopogon citratus*. At the same time the *Wrightia tinctoria* leaves extracts has shown the presence of tannins, saponins and phenolic compounds. The function of the anthelmintic drug, like piperazine citrate, is known to cause paralysis of the worms so that

they are expelled in feces of man and animals. The predominant effect of piperazine citrate on worm is to cause flaccid paralysis that result in expulsion of the worm by peristalsis. Piperazine citrate by increasing chloride ion conductance of worm muscle membrane produces hyperpolarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis (Mali et.al., 2008). Extracts obtained from both *Cymbopogon citratus* and *Wrightia tinctoria* has shown the helmintholytic



potential in dose dependent manner. The minimum time taken by the methanolic extract of *Cymbopogon citratus* leaves (100mg/ml) was 13.97 and 23.3 minutes to cause paralysis and death of the worms respectively while the minimum time required for the paralysis and death of worms by using methanolic extract of *Wrightia tinctoria* leaves (100 mg/ml) was 31.16 and 59.1 minutes respectively. Hence, both the extracts not only demonstrated paralysis but they also caused death of the worms, but the *Cymbopogon citratus* leaves extracts were found to be potent as compared to the *Wrightia tinctoria* leaves extracts.

In conclusion, the traditional claim of leaves of *Cymbopogon citratus* as an anthelmintic have

been confirmed as the extracts displayed activity against the worms used in the study while the *Wrightia tinctoria* has taken long time for the same. 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 of both the plants.

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