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Evaluation of *Mussaenda erythrophylla* Schumach. & Thonn. for Anthelmintic Activity

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ABSTRACT

Medicinal plants are an essential source of treatment for various ailments. The Rubiaceae family is a rich source of medicinally important herbs. *Mussaenda* is an active member of the family Rubiaceae. It is largely seen in parks and gardens as an ornamental plant of India. It is a native of Western tropical Africa. Helminths are a wide choice of organisms which include worms such as parasitic intestinal worms, whipworms (*Trichuris trichiura*), (*Ascaris lumbricoides*) or hookworms (*Necator americanus* and *Ancylostoma duodenale*) etc. Helminthiasis is a condition of infection by worms. It is commonly known as worm infection. As per WHO statistics near about 2 billion peoples are infected by soil-transmitted helminths worldwide. The infected class of peoples were found to be nutritionally and physically impaired. The current study aims at exploring the anthelmintic property of the leaves of *Mussaenda erythrophylla* Schumach. & Thonn. Anthelmintic properties of *Mussaenda erythrophylla* leaves extracts using petroleum ether (60-80°C), chloroform, ethyl acetate and methanol were evaluated against *Phertima posthuma* (Indian earth worms) at five concentrations viz., 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml. Piperazine citrate is used as the reference standard. The duration taken for paralysis and death of the *Phertima posthuma* were assessed for all the groups. Methanolic extract of *Mussaenda erythrophylla* shows moderately significant anthelmintic property as compared to the non-treated group.



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INTRODUCTION

Folklore medicine has its history and dates back to many centuries ([Gunasekaran et al., 2015](#)). It is helpful for humanity with treatment for enormous

diseases and disorders ([Astalakshmi et al., 2019](#)). Medicinal plants of the Rubiaceae family are rich in medicinally important phytoconstituents. *Mussaenda* is an active member of the family Rubiaceae ([Astalakshmi and Sundaraganapathy, 2017](#)). It is an evergreen shrub, with hairy leaves and found its nativity in tropical regions. The plant is used for jaundice, cough, leprosy, etc. ([Eswaraiah et al., 2012](#)). World Health Organization states that 2 billion people of the world are affected by various kind of worm infections. These parasitic worms infect a large area of livestock ([Kumar et al., 2014](#)). Plant kingdom always serves as a rich source for the remedy of various parasitic infections ([Astalakshmi et al., 2015](#)).

The present study evaluates the anthelmintic perspective of petroleum ether (60-80°C), chloroform, ethyl acetate, and methanolic extracts of *Mussaenda*

Table 1: Anthelmintic activity of *Mussaenda erythrophylla* leaves extract and Piperazine citrate.

Group	Treatment	Dose	Time taken for Paralysis (min)	Time taken for Death (min)
I	Control	-	-	-
II	<i>Mussaenda erythrophylla</i>	10	>240	>240
III	leaves petroleum ether	20	>240	>240
IV	extract	30	>240	>240
V		40	>240	>240
VI		50	>240	>240
VII	<i>Mussaenda erythrophylla</i>	10	>240	>240
VIII	leaves chloroform extract	20	>240	>240
IX		30	>240	>240
X		40	>240	>240
XI		50	185.6 ± 0.62***	206.4 ± 0.50***
XII	<i>Mussaenda erythrophylla</i>	10	>240	>240
XIII	leaves ethyl acetate extract	20	>240	>240
XIV		30	>240	>240
XV		40	192.3 ± 0.74***	214.4 ± 0.12***
XVI		50	181.0 ± 0.17***	199.4 ± 0.50***
XVII	<i>Mussaenda erythrophylla</i>	10	>240	>240
XVIII	leaves methanol extract	20	>240	>240
XIX		30	>240	>240
XX		40	175.6 ± 0.27***	198.4 ± 0.24***
XXI		50	162.1 ± 0.07***	183.21 ± 0.36***
XXII	Piperazine citrate	10	85.6 ± 0.50***	104.8 ± 0.37***
XXIII		20	32.4 ± 0.50***	047.4 ± 0.40***
XXIV		30	16.4 ± 0.85***	026.6 ± 0.74***
XXV		40	10.1 ± 0.70***	020.4 ± 0.50***
XXVI		50	05.6 ± 0.24***	008.2 ± 0.37***

The values are expressed as mean ± SEM and compared to control.

***p < 0.001, n = 6

erythrophylla leaves on the Indian earthworms (*Phertima posthuma*).

MATERIALS AND METHODS

Plant Material Collection

Mussaenda erythrophylla Schumach. & Thonn. The plant was collected from in and outskirts of Malappuram district of Kerala and authenticated by Botanical Survey of India, Coimbatore.

Preparation of extract

Mussaenda erythrophylla leaves were collected and dried in the shade. The dried leaves were reduced to a size of 150 - 175mm and extracted successively using petroleum ether (60-80°), chloroform, ethyl acetate and methanol in increasing order of polarity using soxhlet extraction process (Sasidharan *et al.*, 2011). The preliminary phytochemical analysis shows the presence of alkaloids, flavonoids,

glycosides, tannins, steroids in the extracts.

Animals

Earthworms shows resemblance in its anatomical and physiological nature similar to that of human intestinal roundworms (Vidyarthi, 1977; Thorn *et al.*, 1977; Vigar, 1984). The healthy adult earthworms were collected from wet soil. They were cleaned using water and sorted on their dimension range and employed for the study.

Anthelmintic studies

Indian Earthworms ranging in size of 3-5cm length and 0.1-0.2cm width were selected. The study was carried out with twenty-six groups of six earthworms for each group. Each group contains 10ml of specified solutions. Group I, contains normal saline and served as a negative control. Group II to VI contains petroleum ether (60-80°C) extract of *Mussaenda erythrophylla* leaves in concentrations

of 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml respectively. VII to XI groups was treated with the same concentrations as above of chloroform extract of *Mussaenda erythrophylla* leaves. Ethyl acetate extract of *Mussaenda erythrophylla* leaves was given to Group XII to XVI as the previous test groups. Group XVII to XXI was treated with methanolic extract of *Mussaenda erythrophylla* leaves as above. Whereas, Group XXII to XXVI were treated with the reference standard drug piperazine citrate with the above-specified concentrations. The time taken for paralyze and death for earthworms were observed. The observation was carried out for a test period of 4 hours (Table 1). Paralysis of the earthworms was confirmed by non-revival in 0.9% saline solution, and mortality was confirmed by losing up of movement and losing away of their body colours (Singh *et al.*, 2011; Dash *et al.*, 2002).

Statistical Analysis

The obtained data were analyzed statistically with One-way ANOVA and expressed as Mean \pm S.E.M, n = 6 earthworms. The significance level was P<0.05.

RESULTS AND DISCUSSION

Helminthiasis is one of the common infections in humans, affecting a significant part of the globe. Mainly, in developing countries, helminthiasis is a massive threat to public health (Das *et al.*, 2011). As per statistics from WHO, it is estimated that near about 2 billion people were affected by parasitic worm infections throughout the world (Astalakshmi *et al.*, 2015). This alarming condition is due to the deficiencies in pure water supply related to poverty, illiteracy and lack of hygiene (Walter and Richard, 1985). Helminthiasis is a common condition seen globally among the majority of the population. It is highly prevalent in a country like India, especially in countryside areas and to a smaller extent in city regions. An anthelmintic drug will expel the parasitic worms (helminths) from the human body by striking or slaughter them (Temjenmongla and Yadav, 2005). The currently available anthelmintic drugs are not able to kill these gastrointestinal helminths due to their resistance (Subhasish *et al.*, 2010). Moreover, the presently available anthelmintic drugs in the market are also at a high cost (Nisha *et al.*, 2012). These complications encourage researchers to search for novel anthelmintic agents from herbal resources. *Mussaenda erythrophylla* Schumach. & Thonn. Is an ornamental plant widely seen in the southern part of India. Preliminary phytochemical investigation of the leaves extracts shows the presence of alkaloids, flavonoids, tannins, carbohydrates and pro-

teins. Anthelmintic properties of *Mussaenda erythrophylla* leaves extracts viz., petroleum ether(60-80°C), chloroform, ethyl acetate and methanol were evaluated against *Phertima posthuma* at 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml concentrations, using piperazine citrate as reference standard drug (Table 1). The study reveals that chloroform, ethyl acetate and methanolic extracts of *Mussaenda erythrophylla* possesses anthelmintic properties. However, the effect of these extracts was found to be less significant as compared to the standard drug piperazine citrate.

CONCLUSIONS

Mussaenda erythrophylla Schumach. & Thonn. Is an ornamental plant widely seen in the southern part of India. The present study evaluates petroleum ether(60-80°C), chloroform, ethyl acetate and methanolic extracts of *Mussaenda erythrophylla* leaves at 10mg/ml, 20mg/ml, 30mg/ml, 40mg/ml and 50mg/ml for anthelmintic potential using piperazine citrate as a reference standard. Based on the study, it can be concluded that the chloroform, ethyl acetate and methanolic extracts of *Mussaenda erythrophylla* possess anthelmintic properties to dose-dependently. The time taken for paralysis by the chloroform extract, ethyl acetate extract and methanolic extracts at the highest concentration 50mg/ml was found to be 185.6 min, 181.0 min and 162.1 min respectively. These extracts were less significant than the standard piperazine citrate (time taken for paralysis 5.6min at 50mg/ml). However, *Mussaenda erythrophylla* methanolic extract is found to be more significant than the other extracts.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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