INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES
(p-ISSN: 2348-5213: e-ISSN: 2348-5221)
www.ijcrcps.com
DOI: 10.22192/ijcrcps Coden: IJCROO(USA) Volume 5, Issue 10 - 2018

Research Article

DOI: http://dx.doi.org/10.22192/ijcrcps.2018.05.10.002

An *In-vitro* Evaluation of the Anthelmintic activity of siddha drug Sundai Vatral Chooranam on the *Pheritima posthuma* model

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Abstract

Helminthes infections are among the commonest infections in man, affecting a large proportion of the world's population. In developing countries they pose a major threat to public health and contribute to the prevalence of malnutrition, anemia, eosinophilia, and pneumonia. Anthelmintics are drugs that either kill or expel infesting helminths and the gastrointestinal tract is the abode of many helminthes. Currently prescribed anthelmintic includes albendazole, mebendazole, diethylcarbamazine, ivermectin and praziquantel possess undesirable effects such as nausea, headache, dizziness and drowsiness. The main drawback of the conventional anti-helminthic drugs relies on development of resistance upon long term usage. Hence the focus of developing newer anthelmintic agent with wide margin of safety is highly recommended. The use of traditional medicine such as siddha in one form or other is widespread throughout the world. These practices are based on beliefs that have existed for hundreds of years before the development and spread of modern medicines and are still in use today. As its name suggests, traditional medicine is part of the tradition of each population or culture handed down from generation to generation. The use of herbal supplements as de-wormers for humans has long been practiced, however scientific validation of these practices and identification of active compounds has been lacking. Present research work aimed at evaluating the anthelmintic activity of siddha drug *Sundai Vatral Chooranam* (SVC) on the *Pheritima posthuma* model. The results were expressed in terms of time in minutes to report the paralysis and time of death of the earthworms. Maximum time take for the test drug SVC at the concentration of 1gm to cause death of worms is about 124.3 ± 6.44 mins, similarly the time taken of SVC at the dose of 2gm would be 74.75 ± 6.99 mins for standard drug albendazole it was 36.75 ± 4.27 mins at the concentration of 200mg/ml. The results obtained from the study indicate toward the anthelmintic activity, supporting the literature claim of the formulation SVC when compared with the standard.It was concluded from the result of the present investigation that the formulation SVC possess significant anthelmintic property and may be considered as a first line drug of choice for the clinical management of helminth infections in adults and children's.

Keywords: Helminth infection, Anthelmintic activity, *Sundai Vatral Chooranam*, *Pheritima posthuma*, Albendazole, Earthworm.

1. Introduction

Helminthes infections are among the most common infections in human beings in which human intestinal parasitic worms are vectored through air, food, and water, which causes disease state, secretes toxins, and steals the vital nutrients from host bodies [1]. Present treatment regimens for these diseases have limitations as the currently used anthelmintic drugs are mainly microfilaricidal, with little effect on the adult worms; hence new drugs are urgently required. In this regard, natural products have made and continue to make important contributions to this therapeutic area. The drugs currently used for helminthes infections include combinations of DEC (diethylcarbamazine) and albendazole, ivermectin and albendazole or the use of DEC fortified salt, which has also been described in [2]. Previous studies have also reported that none of these is effective in killing the adult worms, which can live in the host for several years [3]. This emphasizes the need for developing an effective and safe drug to kill or permanently sterilize the adult worms. One of the methods for identifying leads for drug development is to screen drugs for the required activity is the need of the hour for management of helminthes infection.

Herbal preparation becomes important part of the biological heritage of the Earth. Traditional society places a high value on this inheritance, which is expressed through an intimate relationship with nature. It is an undeniable fact that in today's world, herbal medicines play a vital role in health care of large sections of the population, particularly in developing countries, where they often bridge the gap between the availability, and demand for modern medicines [4].Helminthic infestations are now being recognized as a cause of chronic ill health and sluggishness amongst the children. More than half of the population in the world suffers from worm infestations of one or the other. Helminthes also affect domestic animals and livestock causing considerable economic loss. Traditional system of medicine reports the efficacy of several natural products eliminating helminthes[5].

Continued reliance on mass drug administration with a limited number of synthetic anthelmintics has the potential to place heavy selection pressure on drug-resistant parasites, and widespread anthelmintic drug resistance in humans. The use of natural dietary compounds has the potential to be a complementary control option which may reduce this reliance on drug treatment, and slow the development of resistance.

One practical way of developing cheaper and effective anthelmintics is to study indigenous herbal remedies [6]. Evaluation of the activities of medicinal plants claimed for anthelmintic property is getting attention these days. There have been many reports indicating the effectiveness of plant products against helminth infections in animals [7-9]

There is a growing interest in the ethno medicine approach to examine the anthelmintic properties of plants traditionally used by local farmers in different parts of globe due to increasing development of anthelmintic resistance and limited availability of commercial drugs to the rural people as well as the high cost of such synthetic medicines [10]. The World Health Organisation (WHO) estimated that 80 % of the population of developing countries rely on traditional medicine mostly plant drugs, for their primary health care needs.The main aim of the present research work is to evaluate the anthelmintic activity of siddha drug *Sundai Vatral Chooranam* (SVC) on the *Pheritima posthuma* model.

2. Materials and Methods

2.1. Ingredients Present in *Sundai Vatral Chooranam*

The formulation *Sundai Vatral Chooranam* comprises of the following ingredients

1. West Indian Turkey berry - chundai vatral - 1 part.
2. Curry leaves- karuveppilai-1 part.
3. Mango cotyledon s- Mam paruppu- 1 part.
4. Ajowan- Omam- 1 part.
5. Dry emblic myrobalan- Nellimulli 1 part.
6. Pomegranate rind - Madhulai odu - 1 part.
7. Fenugreek- Vendhiyam - 1 part

2.2. Anthelmintic study using Pheretima posthuma Model

2.2.1.Earthworm

Indian adult earthworms (*Pheretima posthuma*) were collected vendor and washed with normal saline were used for the anthelmintic study. The earthworms of 4-6 cm in length and 0.1-0.2 cm in width were used.

2.2.2.Methodology [11]

The worms were acclimatized to the laboratory condition one week prior to the experimentation. The earthworms were divided into three groups of four earthworms in each group of two per petri dish. Albendazole at the concentration of 200mg/ml was served as standard. Clean and sterile petri plates were used for the study. Group I served as low dose treated group of which the worms were exposed to 1 gm of the test formulation and Group II served as high dose treated group of which the worms were exposed to

2 gms of the test formulation. Group III served as standard drug treated group of which the worms were exposed to Albendazole 200mg/ml.

2.2.3.Grouping

Group I – Worms exposed to SVC 1 gm per dish
Group II – Worms exposed to SVC 2 gms per dish
Group III – Worms exposed to Albendazole 200mg/ml

Earthworms of nearly equal size in length and width are taken for each concentration and placed in Petri dishes at room temperature. The time taken for complete paralysis and death are recorded. The mean paralysis time and mean death time for each dose was calculated .The time taken for worms to become motionless was noted as paralysis time and to ascertain death, each worm was frequently applied with external stimuli, which stimulates and induce movement in the earthworms.

3. Results

3.1. Effect of Sundai Vatral Chooranam on duration of in Earth worms

The result obtained from the present clearly indicates that the test drug SVC possess significant anti-helminthic property. Maximum time take for the test drug SVC at the dose of 1 gm to cause paralysis of worms is about 40.75 ± 3.30 mins, similarly the time taken of SVC at the dose of 2 gm would be 31.25 ± 5.37 mins for standard drug albendazole it was 19.5 ± 3.69 mins at the concentration of 200mg/ml. As shown in table 1.

Table 1: Effect of Sundai Vatral Chooranam on Paralysis duration in Earth worms

Group	Treatment	Time taken for paralysis (min)
I	SVC 1 gm	40.75±3.30
II	SVC 2 gms	31.25±5.37
III	Albendazole 200mg/ml	19.5±3.69

3.2. Effect of Sundai Vatral Chooranam on death induction time in Earth worms

Maximum time take for the test drug SVC at the concentration of 1gm to cause death of worms is about 124.3 ± 6.44 mins, similarly the time taken of SVC at the dose of 2gm would be 74.75 ± 6.99 mins for standard drug albendazole it was 36.75 ± 4.27 mins at the concentration of 200mg/ml. As shown in figure 1 and table 2.

Figure 1: Anthelmintic activity of siddha drug SVC on in Earth worms

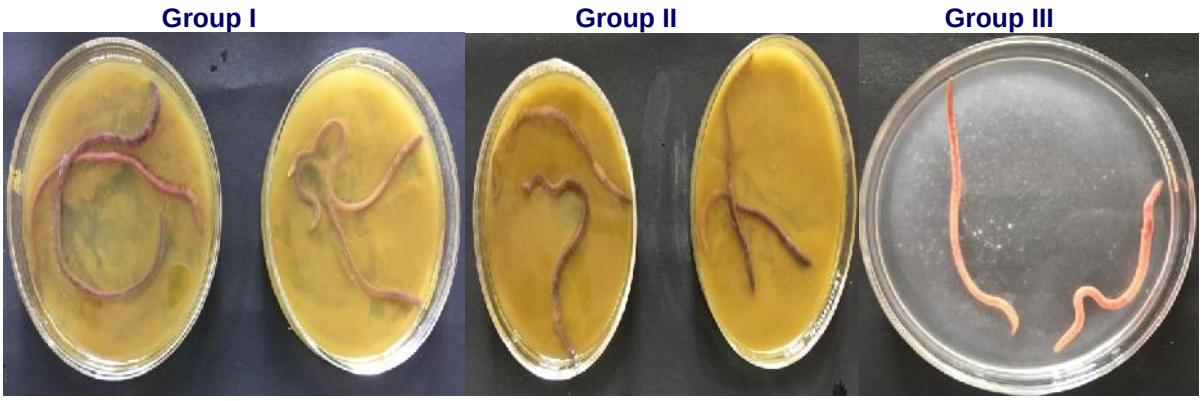

Table 2: Effect of SVC on death induction time in Earth worms

Group	Treatment	Time taken for death (min)
I	SVC 1 gm	124.3±6.44
II	SVC 2 gms	74.75±6.99
III	Albendazole 200mg/ml	36.75±4.27

4. Discussion

Helminth infections are among the most prevalent infections in human beings, affecting a huge proportion of the world's population, particularly in tropical countries [11]. According to the World Health Organization a staggering two billion people harbor parasitic worm infections [12].Poorer personal and environmental hygienic conditions, inadequate sanitary facilities, and lack of supply of pure water, coupled with poverty and illiteracy, are the major fundamental factors responsible for the spreading of helminthiasis in developing countries [13]. Helminth infections also contribute to the prevalence of undernourishment, anemia, eosinophilia, and pneumonia. Although several drugs are available for the treatment of parasitic diseases, yet helminthiasis is principally responsible for the ruthless morbidity affecting the population in endemic areas. Gastrointestinal helminth infections have become resistant to the currently available synthetic anthelmintic drugs, which cause the foremost problem in the treatment of helminths diseases [14 -16]. Hence, the demand for natural anthelmintics is increasing in recent times.

The problem of anthelmintic resistance, toxicity, and the increasing concern over the presence of drug residues in animal products has led to a renewal of interest in the use of plant based drugs. Plant materials evaluated in the current study had been identified from various sources to serve as anthelmintic agents by traditional healers. *In vitro* techniques are preferred to *in vivo* methods due to their low cost, simplicity, and rapid turnover [17].

From the ancient times, indigenous drugs have been used in the Indian medicinal system to treat different ailments and to provide therapeutic benefits. Our traditional system of medicine has made use of the different parts of plants in different types of diseases, including anthelmintic, anti-inflammatory and antimicrobial activities. The result obtained from the present clearly indicates that the test drug SVC possess significant anti-helminthic property. Maximum time take for the test drug SVC at the dose of 1 gm to cause paralysis of worms is about 40.75 ± 3.30 mins, similarly the time taken of SVC at the dose of 2 gm would be 31.25 ± 5.37 mins for standard drug albendazole it was 19.5 ± 3.69 mins at the concentration of 200mg/ml. Maximum time take for the test drug SVC at the concentration of 1gm to cause death of worms is about 124.3 ± 6.44 mins, similarly the time taken of SVC at the dose of 2gm would be 74.75 ± 6.99 mins for standard drug albendazole it was 36.75 ± 4.27 mins at the concentration of 200mg/ml. Parasitic worms (helminths) of the gastrointestinal (GI) tract are pathogens of major global importance. Treating such condition with the siddha formulation like SVC considerably posses higher therapeutic efficacy with good safety and also reliable in cost.

5. Conclusion

It is a hallmark property of an anthelmintic drug to cause immobilization that may prevent the progression of the infection. Further complete eradication of the helminth will be evaluated by the rate of induction of death. From the data's obtained from the present study it was observed that the test drug SVC possess quicker onset of paralysis and death in the treated worms when compare to that of the control group worms. Hence it may conclude that the formulation SVC exerts remarkable anthelmintic activity and may be clinically utilized for the management of the helminthic infections in adults and children's.

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DOI: 10.22192/ijcrcps.2018.05.10.002	

How to cite this article:
J. Nisha, N. J. Muthu Kumar, S. Visweswaran, N. Anbu, V. Banumathi. (2018). An *in-vitro* evaluation of the anthelmintic activity of Siddha drug Sundai Vatral Chooranam on the *Pheritima posthuma* model. Int. J. Curr. Res. Chem. Pharm. Sci. 5(10): 7-11.
DOI: http://dx.doi.org/10.22192/ijcrcps.2018.05.10.002