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Original Research Article

Anthelmintic activity of *Asterales vulgaris* (*Mugwort*) extracted with ethanol and rice gruel solvents

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ABSTRACT

This laboratory study was carried out to explore the anthelmintic properties of *Asterales Vulgaris* (Mugwort) extracts aligned with Indian earthworms *Pheretimaposthuma.* Alcoholic extract and Rice Gruel extract of *mugwort* leaves were used as test. Albendazole was incorporated as standard drug and normal saline as control. Observations were made for the time taken to paralyze and death of the earthworm. Three concentrations 30, 60, 100mg/ml of every extract and standard drug at the concentration of 30mg/ml were studied. The outcome of study indicated that rice gruel extract of *Mugwort* exhibited anthelmintic activity significantly higher than standard and also in a dose dependent manner. For the ethanolic extract group the time of paralysis and death time was 3.38 minute and 13.82 minute, while rice gruel extract group showed shortest time of paralysis (P) at 2.12 minute and death (D) at 7.45 minute of earthworms at higher concentration 100mg/ml as compared to standard Albendazole (30mg/ml) paralysis 2.27 minute and death at 6.44 minute respectively. Rice gruel extract showed more pronounced effect than ethanolic extract. Whereas the control group worms were observed for full day and night and there was no paralysis or death was found during that period.

1. Introduction

Infections with helminths, or parasitic worms, influence more than two billion people worldwide. They are the most common infectious agents of humans in developing countries and produce a global burden of disease and contribute to the prevalence of malnutrition, anaemia, eosinophilia, and pneumonia.[1] Parasites have been of concern to the medical field for centuries and the helminths still cause considerable problems for human being and animals. During the past few decades, despite numerous advances made in understanding the mode of transmission and the treatment of these parasites, there are still no efficient products to control certain helminths and the indiscriminate use of some drugs has generated several cases of resistance. Modern synthetic medicines are very effective in curing diseases but also cause a number of side effects. Crude drugs are less efficient with respect to cure of disease but are relatively free from side effects. A large number of medicinal plants are claimed to possess anthelmintic property in traditional system of medicine and are also utilized by ethnic groups worldwide.[2,3]

Artemisia vulgaris L. (common mugwort) is a species with great importance in the history of medicine and was called the "mother of herbs" in the middle ages. It is a common herbaceous plant that exhibits high morphological and phytochemical variability depending on the location where it occurs. This species is well known almost all over the world. Its herb— *Artemisiae vulgaris herba*—is used as a raw material due to the

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presence of essential oil, flavonoids, and sesquiterpenoids lactones and their associated biological activities. The European Pharmacopoeia has listed this species as a potential homeopathic raw material. Moreover, this species has been used in traditional Chinese, Hindu, and European medicine to regulate the functioning of the gastrointestinal system and treat various gynecological diseases. Thus far, numerous authors have confirmed the beneficial properties of A. vulgaris herb extracts, including their anthelmintic, antioxidant, hepatoprotective, antispasmolytic, antinociceptive, estrogenic, cytotoxic, antibacterial, and antifungal effects.

Rice Gruel is popularly known as Congee and it is a type of rice porridge or gruel popular in many Asian countries. When eaten as plain rice congee, it is most often served with side dishes. When additional ingredients, such as meat, fish, and flavorings, are added while preparing the congee, it is most often served as a meal on its own, especially when one is ill. Names for congee are as varied as the style of its preparation. Despite its many variations, it is definitionally a thick porridge of rice largely disintegrated after prolonged cooking in water. In some cultures, congee is eaten primarily as a breakfast food or late supper; in others, it is eaten as a substitute for rice at other meals. It is often considered particularly suitable for the sick as a mild, easily digestible food.

The literature survey reveals that, the leaves of *mugwort* for anthelmintic activity, has been systematically investigated, but, so far but no work was found with its Rice Gruel (RG) extract. In this work RG was used as a solvent for the extraction of mugwort leaves. Therefore the present study was designed to investigate the anthelmintic properties of alcoholic and RG extract of mugwort against Indian earthworms Pheretimaposthuma.[4–12]

2. Materials and Methods

2.1. Plant material

The fresh leaves of mugwort were collected from the Himalayan region, in the month of Aug 2021. The plant material was authenticated by Dr. K. MadhavaChetty, Department of Botany, S.V. University, Tirupathi, Andhra Pradesh, India.[4,5]

2.2. Preparation of extracts

The collected fresh leaves about 1kg were dried under shade for two weeks than powdered and stored in air tight plastic jar for further use. The dried leaf powder 450g was exhaustively extracted by hot continuous extraction using soxhlet apparatus with 95% ethanol at a temp. 70°C. The total alcoholic extract was filtered and concentrated by distillation process. The concentrated mass was dried under vacuum till constant weight.

The 300g of raw rice is cooked with 600ml of distilled water. After the cooking of rice, the washing of raw rice is collected by filtration through muslin cloth initially and through cotton plug finally. It was known as rice gruel (RG). RG is popularly known as Congee and it is a type of rice porridge or gruel popular in many Asian countries. When eaten as plain rice congee, it is most often served with side dishes. When additional ingredients, such as meat, fish, and flavorings, are added while preparing the congee, it is most often served as a meal on its own, especially when one is ill. Names for congee are as varied as the style of its preparation. Despite its many variations, it is definitional a thick porridge of rice largely disintegrated after prolonged cooking in water. In some cultures, congee is eaten primarily as a breakfast food or late supper; in others, it is eaten as a substitute for rice at other meals. It is often considered particularly suitable for the sick as a mild, easily digestible food.[11]

For RG extract, the dried leaf powder 200g was macerated with 1000 ml RG solvent for seven days. Chloroform (1%) was added to RG to prevent the growth of microorganism in the extract. The extractive was filtered and concentrated over a water bath and further dried in vacuum oven till constant weight.[6–8]

2.3. Animals

Indian adult earthworms (*Pheretimaposthuma*) were selected for the in vitro anthelmintic assay. The earthworms were collected from department of zoology, S.V.University, Tirupathi, Andhra Pradesh, India. The earthworms of 3-5 cmin length and 0.1-0.2 cm in width were used for the present experimental protocol. The earthworm resembles both anatomically and physiologically to the intestinal roundworm parasites of human beings, hence can be used to study the anthelmintic activity.[13]

3. In Vitro Anthelmintic Assay

Alcoholic and RG extracts of *mugwort* investigated for their anthelmintic activity against *Pheretimaposthuma.* The earthworms were divided in to eight groups containing six earthworms in each group. Both the extracts were dissolved in the normal saline at different concentrations and then the volume was adjusted to 20 ml with normal saline. The standard drug solution was prepared with distilled water and volume was adjusted 20 ml with normal saline. Both of the extracts and standard drug solution were freshly prepared before starting the experiment. Different concentrations 30, 60 and 100mg/ml of both extracts and 30mg/ml of standard drug solution at the volume of 20 ml were poured in different petridishes. All the earthworms before released in petridishes were washed in normal saline solution.

The each group of six earthworms was released in to 20 ml of prepared formulations as following manner

Table 1:

1st group:	Normal saline as control
2nd group:	Albendazole (30mg/ml) solution as standard
3, 4, 5 groups:	Alcoholic extract solution at different concentrations
6, 7, 8groups:	RG extract solution at different concentrations.

Table 2: Anthelmintic activity of alcoholic and RG extracts of *Mugwort* against Indian earthworms - Pheretimaposthuma.

Groups	Extract/ Drug	Concentration (mg/ml)	Time taken for Paralysis (Min)	Time taken for Death (Min)
1	Normal Saline (Control)	–	–	–
2	Albendazole (Standard)	30	2.27±0.45	6.44±1.66
3	Rice Gruel Extract of Mugwort	30	3.63±1.60	10.00±0.34
4	Rice Gruel Extract of Mugwort	60	3.00±1.88	8.30±1.34
5	Rice Gruel Extract of Mugwort	100	2.12±1.77	7.45±0.34
6	Alcohol Extract of Mugwort	30	4.99±0.23	16.00±1.56
7	Alcohol Extract of Mugwort	60	4.37±1.67	14.87±0.26
8	Alcohol Extract of Mugwort	100	3.38±1.89	13.82±0.33

respectively.

Fig. 1: The prepared rice gruel

Fig. 2: Themugwort leaves

Observations were made for the time taken to paralyze and death of individual earthworm. Time for paralysis was noted until there was no movement could be observed in earthworms. Paralysis was said to occur when the worms do not revive even in normal saline. Death was concluded when the worms lost their mortality followed with fading away of their body colour. [14]

4. Result and Discussion

The predominant effect of albendazole on the worm is to cause a flaccid paralysis that result in expulsion of the worm by peristalsis. Albendazole by increasing chloride ion conductance of worm muscle membrane produces hyperpolarisation and reduced excitability that leads to muscle relaxation and flaccid paralysis. [12,15] From the observations (Table 1) the Ethanol and RG extracts of *mugwort* showed not only paralysis but also showed death of earthworms. Both the extracts were found to show a potent anthelmintic activity when compared to standard drug. Ethanolic extract at 30, 60, 100mg/ml concentrations shows paralysis at 4.99 min, 4.37 min, 3.38 min and death at 16.00 min, 14.87 min, 13.82 min. whereas RG extract at the similar concentrations shows paralysis at 3.63 min, 3.00 min, 2.12 min and death at 10.00 min, 8.30 min, and 7.45 min. RG extract at the concentration of 100mg/ml shoe shortest time of paralysis as compared to standard drug. The standard drug albendazole at 30mg/ml concentration shows paralysis at 2.27 min and death at 6.44 min of earthworms respectively.

5. Conclusion

From the above laboratory results, Itwas concluded that RG extract and ethanolic extract of *mugwort* have a potent anthelmintic activity when compared with standard drug. In this present study anthelmintic assay was performed on the adult Indian earthworm *Pheretimaposthumadue* to its anatomical and physiological resemblance with the intestinal roundworm parasite of human beings.[13] Further studies are needed to standardize the RG solvent.

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8. Conflict of Interest

None.

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