



Anthelmintic Activity of Aqueous Extracts of the *Alpinia galangal* Willd. Rhizomes

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Accepted on: 18-01-2014; Finalized on: 31-03-2014.

ABSTRACT

The burden of ill health due to anthelmintic infection increasing day by day, in addition to this present anthelmintics are suffering from the problems of resistance and side effects, so it is strictly recommended to find out the anthelmintic drug with assured safety and less chances of resistance. Ayurveda is considered as one of the safest system of medicine and number of plant has reported for anthelmintic use, but activity of those plants is not proved scientifically in case of number of plants. Present study is based on the same objective so as to make an attempt to find out, to evaluate and to prove the anthelmintic activity of Ayurvedic plant *Alpinia galangal* Willd. scientifically. Extraction was made by maceration, freshly prepared extract was first used for in-vitro anthelmintic activity against earth worms by using Albendazol as standard. Current study found that the plant *Alpinia galangal* Willd. possess good anthelmintic activity in dose dependent manner.

Keywords: *Alpinia galangal* Willd., anthelmintic activity, aqueous extract.

INTRODUCTION

Helminthic infections continue to be major health hazard of people, especially those living in tropical developing countries. Current estimates suggest that over half of the world population is infected with intestinal helminths, such as *Ascaris*, hookworms, *Trichuris*, *Enterobius*, *Strongyloides*, and tapeworms, and that most of these infected people live in remote rural areas in the developing countries.^{1,2} Although helminthic infections do not cause significant morbidity and mortality when compared with many other parasitic infections, they do cause substantial, but often less measurable effects. For example, infections with gastrointestinal helminths often lead into malabsorption, diarrhoea, anaemia and other states of poor health, particularly in infants and school-age children.^{3,4} Helminthiasis a parasitic infection still considered as the major cause of ill health of number of peoples throughout the world especially peoples from deprived communities of undeveloped countries with poorer sanitary and health facilities, because it is mostly caused and spread through to environmental contamination and transmission.^{5,6} Recent estimates suggest that *Ascaris lumbricoides* infects more than 1 billion people and hookworms (*Ancylostomaduodenale* and *Necator americanus* combined) infect about 740 million peoples.^{7,8} The condition is more serious in case of countries with low income which affected worstly and having high risk of morbidity. The problem associated with ill health is getting more and more day to day and approximately 2.9 billion people are infected with different forms of Helminthiasis throughout the world and in case of China condition is more serious. In China 63% population is infected with either one of the nematode species.^{9,10} Though the mortality is considerably low as compared to

huge amount of infections, still it causes more than 500,000 deaths annually.^{5,7,9}

This huge burden of ill health is acknowledged by health organizations of some countries, but need to take more steps in more serious manner because most of the research organization and countries are not taking interest in anthelmintic drug as they are busy on working with more glamorous drugs for treating diseases associated with cardiac system, central nervous system, cancer, etc. So it is strictly recommended to take steps in serious manner so as to control the enormous health burden caused by these parasites. In addition to this the present anthelmintics are suffering from the problem of resistance, side effects and reinfection after removal of drug therapy. Side effects of anthelmintic commonly include intestinal gastro-intestinal disturbances nausea and giddiness, while various studies and reviews have showed the resistance to anthelmintic is increasing day to day.^{10,15}

So it is recommended to develop new alternatives which can treat helminthiasis completely with giving assurance about the safety in significant manner. In the recent years, the importance of Herbal drugs in the field of Medicine has greatly increased because of their assurance about safety and complete cure. Therefore the demand for the herbal formulation is also increasing accordingly. But the major problem associated with herbal drugs was lack of quality control and standardization methods, so standardization and quality control of phytochemical constituents is accelerated now days greatly with the development of different instrumental methods of analysis and this field becomes the center of attraction and interest for number of researcher and organizations working to develop the new drugs with sufficient safety profile.^{9,15}



Nature has provided a complete storehouse of remedies to cure almost all the diseases of mankind and other animals too. Number of plant has reported anthelmintic activity but they are considered as underutilized because of lack of scientific proofs and records. Number of plants have reported and scientifically proved anthelmintic activity and use as well. While some plants were used as anthelmintics in ancient days but now days they are underutilized because of lack of scientific data because their anthelmintic activity is not proved scientifically. The plant *Alpinia galanga* belongs to family Zingiberaceae had been reported for its anthelmintic use in ancient literature, but its anthelmintic activity was not scientifically proved, so through this study we had evaluated and proved the anthelmintic activity of *Alpinia galanga* scientifically.^{14,16}

MATERIALS AND METHODS

Biological Study

Indian adult earthworms collected from moist soil and washed with normal saline to remove all faecal matter was used for the anthelmintic study. Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds *in vitro*. The earthworms of 8±1 cm in length and 0.3-0.4 cm in width were used for all experimental protocol due to its anatomical and physiological resemblance with intestinal roundworms parasite of human beings intestinal roundworm parasites of human being and also in intestinal roundworms.¹⁷⁻¹⁹

Screening for phytochemicals:

Qualitative assay of the extracts for the presence of phytoconstituents such as alkaloids, glycosides, tannins, flavonoids, carbohydrates and proteins etc were performed Standard procedure.^{8,20,21}

Drug

The drug were used, Drugs: Albendazole (GlaxoSmithkline).

Determination of Anthelmintic Activity

Six groups containing earth worms of nearly size (8±1) cm of the same type were selected and released into 8ml normal saline as a vehicle. Albendazole in same concentration as that of extract was included as standard reference and normal saline water as control. The plant extract and the standard albendazole were prepared in the concentration 25, 50, 75, 100 % w/v by dissolving them in a minimum quantity of distilled water and taken indifferent petridishes. Flaccid paralysis of the worms followed by death occurs. The time taken to complete paralysis and death were recorded. The mean paralysis and lethal time for each concentration was recorded. Time for paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Death was concluded when the worms lost their motility followed with fading away of their body colour.

Evaluation of anthelmintic activity

Anthelmintic activity was evaluated by using the common method of evaluation of anthelmintic activity of plant extract. First petri plates were named and grouped as per dilution codes for different extract as shown in Table -1; then one worm is placed in each plate after that respective dilution of extracts was poured in that plates. After pouring the extract worms were placed in plates and plates were kept under observation until the death of worms. Observations were recorded in the form of time required for consecutive attacks of paralysis till the death of earthworm and at the end time required for complete death of worm was noted, death of worm has been confirmed by pointing with needle.²²⁻²⁵

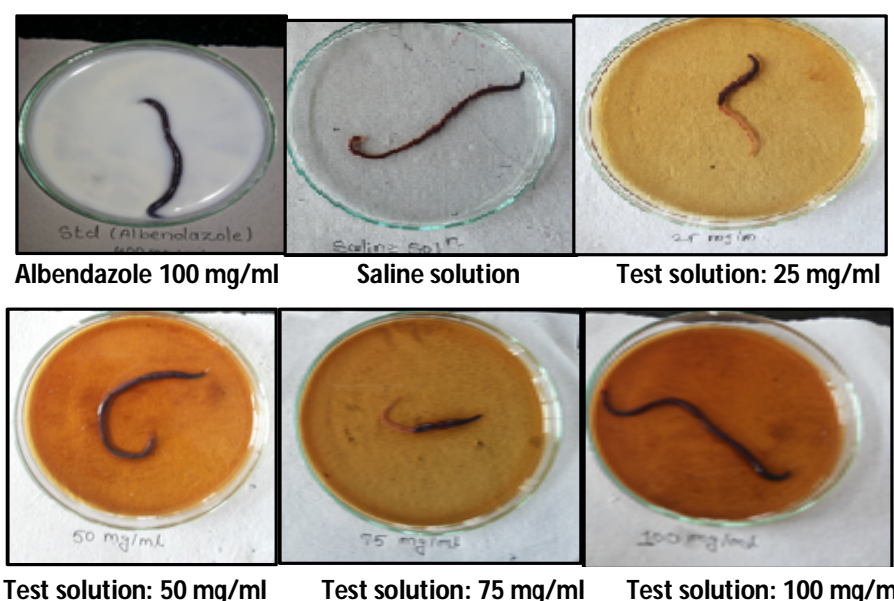


Figure 1: Observed Paralysis & Death of earth worms in aqueous extract of rhizomes of *Alpinia galanga* as well as standard drug solution.

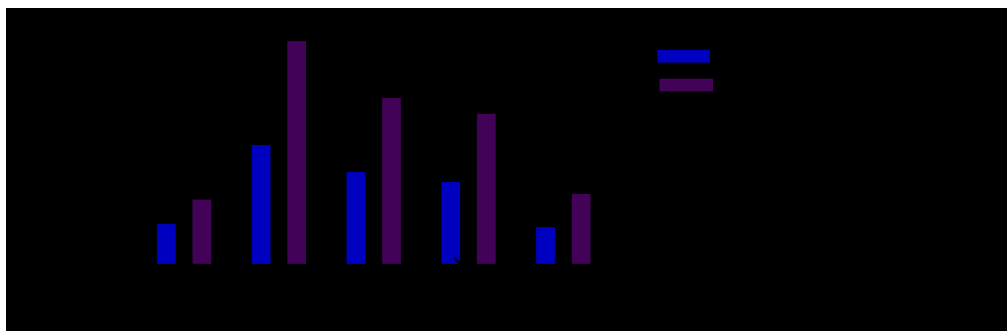


Figure 2: Observed Paralysis Time & Death time of aqueous extract of rhizomes of *Alpinia galangal* willd

RESULTS

Table 1: Observed Paralysis Time & Death time of aqueous extract of rhizomes of *Alpinia galangal* Willd

Concentration	Paralysis Time	Death Time
Saline	No Paralysis	No Death
Albendazole 100 mg/ml	144 Sec	225 Sec
Test (25 mg/ml)	408 Sec	750 Sec
Test (50 mg/ml)	316 Sec	566 Sec
Test (75 mg/ml)	253 Sec	510 Sec
Test (100 mg/ml)	139 Sec	245 Sec

Each crude extract containing 25, 50, 75 and 100 mg/mL, produced dose-dependent paralysis ranging from loss of motility to loss of response to external stimuli, which eventually progressed to death. All the investigational extract acquired the anthelmintic activity at minimal dose of 25 mg/ml. its significant activity ($P < 0.05$) at 10 mg/ml for time taken to paralysis and death when compared to the standard.

DISCUSSION

The assay of biological activity aqueous extracts was used to evaluate anthelmintic activity has shown dose dependant activity as shown in figure 2. The Mean \pm S.E.M. values were calculated for the extract. The result of anthelmintic activity on earthworm was given in table-1 reveals that, the different concentration used for both aqueous extract has shown paralysis and death of earthworms and it was compared in the same concentration with Albendazole as reference drug. It is a broad-spectrum anthelmintic drug which causes degenerative alterations in the tegument and intestinal cells of the worm by binding to the colchicine-sensitive site of tubulin, thus inhibiting its polymerization or assembly into microtubules. Albendazole also has been shown to inhibit the enzyme fumarate reductase, which is helminth-specific. This action may be considered secondary to the effect on the microtubules due to the decreased absorption of glucose.

The rhizomes extract of *Alpinia galangal* Willd. not only demonstrated paralysis, but also caused death of worms especially at higher concentration of 100 mg/ml, in shorter time. Aqueous extract of rhizomes of *Alpinia*

galangal willd. shows highest efficacy and potency towards anthelmintic activity. Preliminary phytochemical tests of the crude Aqueous extract of rhizomes of *Alpinia galangal* willd. showed the presence of flavonoids, alkaloid, glycosides, carbohydrates, proteins and tannins.

CONCLUSION

Biological parameter can be concluded that the plant *Alpinia galangal* willd. has significant anthelmintic activity. Further studies using in vivo model are required to find out and to establish effectiveness, mechanism of action and pharmacological rationale for the use of rhizomes as anthelmintic drug. In the light of above mentioned pharmacological effects, it may be concluded that aqueous extract of rhizomes of *Alpinia galangal* willd. has the maximum anthelmintic activity.

Acknowledgement: We are grateful to Principal Dr. R.Y.Patil, Shankarrao Ursal college of Pharmaceutical Sciences & Research Center, Kahradi, Pune for providing Lab. facilities for this research work.

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Source of Support: Nil, Conflict of Interest: None.