

**REVIEW: AN OVERVIEW OF HERBALS USED IN HELMINTHIASIS****A. Nandhini\* and C. Sumathi**

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Helminthiasis, worm infestation is the most common problem irrespective of gender and age that accounts due to poor sanitation, hygiene, malnutrition and crowded living conditions. Most of the antihelminthic drugs are contraindicated in pregnancy and their use are restricted in certain conditions. Recent research findings suggest that the use of herbals drugs are safer and effectively kill the worms with few or no side effects. Hence, the elimination of worms with the natural remedy of herbals as an alternative method has been discussed in detail in this review.

**KEYWORDS:** Helminthiasis, herbals, worms**INTRODUCTION**

Helminthiasis is the major global problems, in tropics. There are innumerable incidences of human infections caused due to helminths worldwide due to increased world travel and immigration from the developing countries. Worm infestations contribute to the prevalence of malnutrition, anaemia, eosinophilia and pneumonia in developing countries. Parasitosis have been of concern to the medical field for centuries and the helminths still cause considerable problems for human beings. Internal parasitic infection is a great threat to the productivity of the sheep and goat industry as well. The helminths are multicellular organism with three germ layers showing a bilateral symmetry. They are divided into phylum nemathelminthes (Roundworms: nematodes) and plathyhelminthes (flatworm: cestodes & trematodes). The common parasites are roundworms, hookworms, threadworms, filarial worms and schistosomes. Worms can cause various problems that include the blood loss, nutritional deficiencies, intestinal obstruction, hepatasplenomagaly, urticaria and allergic manifestations.<sup>[1]</sup>

The drugs which either kill or expel infesting helminthes are called antihelminthic drugs, vermicides or vermifuges. In the recent years tremendous progress has been made in the development of antihelminthic drugs. Most of the existing synthetic drugs including the benzimidazoles and imidazothiazoles (such as levamisole) were developed in the last decade. Another major step was achieved with the introduction of the avermectin class of macrolactones in the early 1980s which in turn led to discovery of ivermectin and doramectin with high potency and excellent broad-spectrum activity. However, development of the resistance against these drugs has led to the persistent search to discover new classes of antihelminthics, especially those with novel modes of action.

Resistant against the available drugs pose a serious problem in expulsion of these worms. Hence, there is an increasing demand towards natural antihelminthics.<sup>[2]</sup>

**ROLE OF HERBALS IN HELMINTHS:** This is the era of competition between Allopathic and Herbal extracts wherein, plant products occupy a significant place in consumer consciousness in the developed world and plays a key role in healthcare in most developing countries.<sup>[3]</sup> There is increasing interest from the medical and scientific communities to include them in evidence-based medicine, and this is consolidated by a more sympathetic attitude on the part of regulatory authorities than has previously been the case. Numerous medicinal plants justify the therapeutic value of herbs.<sup>[4,5]</sup> Since ancient times, plants, animals and mineral sources have been used to cure and prevent diseases. Plants are intensely studied as the major source of drugs in modern medicine today.<sup>[6]</sup> The usage of herbs in traditional medicine is widespread and contributes a large source of novel active biological compounds that includes anti-inflammatory, anticancer, anti-viral, anti-bacterial and cardioprotective activities.

A large number of medicinal plants have been used to treat parasitic infections in humans and animals.<sup>[7]</sup> However, the development of naturally-occurring compounds as medicines for human use and for treatment of animals is fraught with problems.<sup>[8]</sup> It would, therefore, be imperative to explore possibilities of developing new antihelminthic compounds. Herbal products have gained attention of researchers to the validation of its antihelminthic effect.<sup>[9-12]</sup>

The use of plants with antihelminthic properties seems to be an dual beneficiary due to parasite control and their low environmental impact.<sup>[9]</sup> In addition, the resistance is likely to develop more slowly in the natural product. The natural products are a mixture of components which act in synergy producing the anthelminthic effect varying from synthetic

drugs which have one molecule acting on the parasite when not combination formulation . This includes the secondary metabolites produced by plants and their use as active principles in medicinal preparations. Infusions and aqueous decoctions are the main methods of preparation used in traditional medicine. <sup>[13]</sup>

The value and credibility of herbal medicines depend on the recognition of the healing properties of some plants. Thus, experimental evidence is a crucial and obligatory step to prove the effectiveness of plants popularly used as anthelmintics. <sup>[14,15]</sup>

### PLANTS WITH ANTIHELMINTHIC EFFECT

To assess the anthelmintic properties of plant extracts, in vitro studies can be used as a initial step to characterize the possible effects. <sup>[16]</sup> Because of easy availability, earthworms have been used widely for the evaluation of anthelmintic compounds in vitro. <sup>[17-20]</sup>

Few species of plants recognized as anthelmenthics include Embelia ribes, Chenopodium ambrosioides, Dryopteris sps and Artemisia sps <sup>[21]</sup>, Indigofera frutescens, Leucosidea sericea <sup>[22,23]</sup>, Melia azedarach <sup>[22,24,25]</sup>, Clausena anisata, Cyathea dregei Anthelmintics <sup>[26]</sup>, Milletia grandis. <sup>[22,27]</sup>

#### *Molgaard*

The Molgaard group has reported that the most of its parts like leaf, bark and root extracts exhibited anticestodal activity (0.5 mg/mL) on the parasitic worm Hymenolepis diminutia. <sup>[28]</sup> The extracts had a concentration dependant inhibition of Haemonchus contortus and Trichostrongylus colubriformis larval development which was attributed to larval motility. <sup>[29-31]</sup> The anthelmintic activities of the water extracts were not established, while the active secondary metabolites of the crude extracts are not known.

#### *Calotropis procera*

Calotropis procera belonging to the family Asclepiadaceae is a soft wooded, evergreen perennial shrub having few stems, few branches and relatively few leaves concentrated near the growing tip that possess an anthelmentic activity. <sup>[32]</sup>

#### *Melia azedarach L.*

Melia azedarach L, commonly called white cedar is a species of deciduous tree that belongs to Meliaceae the mahogany family, native to Indomalaya and Australasia. <sup>[33]</sup> Trichilia claussenii C belongs to the family meliaceae, commonly called as coffee-to-kill, occurs in all forest, except in Araucaria forest. <sup>[34]</sup>

*Melia azedarach* L. and *Trichilia claussenii* C plant extracts exhibits act against sheep gastrointestinal nematodes. <sup>[35]</sup> The experimental study proves that *M. Azedarach* and *T. claussenii* extracts have considerable effect on egg hatching and larval development (L1 to L3) of gastrointestinal nematodes (95% *H. contortus* and 5% *Trichostrongylus* sps.). An analogous method has been used to test the ovicidal and larvicidal effects of plant extracts <sup>[30,36,37]</sup>, which proves the effect of the plant extract towards the nematodes.

### ***Benincasa hispida***

Ash Gourd (***Benincasa hispida***) is believed to have originated in Java, Indonesia. In Ayurveda, the fruit is beneficial for the management of a most of the serious ailments that includes convulsions, lung diseases, asthma, cough, urine retention and internal hemorrhage. It is also an excellent remedy for tapeworms. <sup>[38]</sup>

The petroleum ether and chloroform extract of leaves of *Benincasa hispida* not only caused paralysis, but also led to death of worms especially at higher concentration of 50 mg/ml, in very short duration compared to reference drug piperazine citrate, alcoholic and aqueous extracts. <sup>[39]</sup>

### ***Bridelia retusa***

The chloroform, aqueous, petroleum ether and ethonolic extracts of *B. retusa* bark exhibit the antihelmintic activity. <sup>[40]</sup>

### ***Lantana camara***

*Lantana camara*, commonly called known as big sage, belongs to the family verbanaceae. *Lantana* leaves can display fungicidal, insecticidal and antimicrobial properties. It is also used traditionally in herbal medicines for treating a variety of ailments that includes cancer, skin, itches, leprosy, rabies, chicken pox, asthma and ulcers. <sup>[41]</sup>

### ***Alpinia zerumbet***

belongs to the family zingiberaceae commonly called as shell ginger. It has rich antioxidant activities.

### ***Menthe villosa***

belongs to the family lamiaceae, it has been used in plenty of medicinal purposes.

***Tagetes minuta***

belongs to the family asteraceae popularly called as southern cone marigold. Used in respiratory inflammations, colds or stomach problems.

The invitro study of the natural products of *Lantana camara*, *Alpinia zerumbet*<sup>[42]</sup>, *Mentha villosa*<sup>[43]</sup> and *Tagetes minuta* on nematode *Haemonchus contortus*, shows the positive effect of herbals towards nematode both in egg & larval form.<sup>[44]</sup>

***Brachylaena discolor***

*Brachylaena discolor*, it's a flowering plant that belongs to the family Asteraceae, commonly called as coastal silver oak. It is used as a purgative against intestinal parasites, anthelmintics for calves, sheep and goats.<sup>[45]</sup>

***Zanthoxylum capense***

*Zanthoxylum capense*, small multi-branched tree under the family Rutaceae, commonly called as small knobwood. *Zanthoxylum* species contain biologically active benzophenanthridine alkaloids. It has anti-plaque, anti inflammatory and anthelmintic property.<sup>[24]</sup> Due to its anti-plaque property it is used in toothpaste and oral rinses.

***Heteromorpha trifoliata***

*Heteromorpha trifoliata*, small to medium sized deciduous tree belongs to the family Apiaceae is active against intestinal worms.<sup>[46,22]</sup> It is also used to treat nervous and mental disorders.

***Maesa lanceolata***

*Maesa lanceolata* belongs to the Family Maesaceae. It is an evergreen shrub belonging to *indigofera frutescens*, Family Papilionaceae. These are effective against most of the helminths.<sup>[25]</sup>

***Ocimum gratissimum* Linn**

*Ocimum gratissimum* Linn. is an aromatic plant traditionally used in treating different digestive disorders as anthelmintic and physical drench/balls. Similarly, *Ocimum lamifolium* Hochst. Ex Benth finds traditional indication in the treatment of intestinal disorder.<sup>[46]</sup>

***Thymus schimperi***

*Thymus schimperi* is a small herb that is widely used. A tea made from the herb with water has been recommended as medicinal remedy for respiratory problem, gastrointestinal disorders (colic, flatulence, diarrhea & antihelmentic) and liver disease. <sup>[47]</sup>

***Echinops kebericho Mesfin***

*Echinops kebericho Mesfin* is claimed to be useful in treatment of migraine, diarrhoea and intestinal worm infestation. <sup>[47,48]</sup>

***Melia azedarach L***

The ethanolic extract of the drupes of *Melia azedarach L.* was active against both the tapeworm and the earthworm tested and found to be comparatively more active than piperazine phosphate against *Taenia solium* <sup>[49]</sup> as seen in chloroform extract.

***Momordica charantia***

*Momordica charantia* Linn, Fruits are known as karela or bitter gourd, which belongs to the family Cucurbitaceae. It possesses many uses like antidiabetic, antihelmentic, antimicrobial, anticancer and antioxidant drug. <sup>[50]</sup> The fruit peel ethanolic extracts of the *Momordica charantia* displayed a significant anthelmintic activity.

***Trichosanthes dioica Roxb***

*Trichosanthes dioica* Roxb. family Cucurbitaceae Whole plant is antipyretic, antihelmentic, aphrodisiac, stomachic, appetiser, and cathartic.

***B. ferruginea***

A study revealed a trypanocidal potential of methanolic extract of *B. ferruginea* stem bark which was attributed to the presence of tannins, alkaloids steroids, phlobatanins and saponins. <sup>[51]</sup>

***Cassia auriculata***

*Cassia auriculata L.* (Caselpinaceae) is a tall densely branched bushy shrub growing wild throughout forests and along roadsides and in wastelands. Leaves(Leaflets) are oblong-obovate and useful in treatment of leprosy, ulcers and have anthelmintic activity. <sup>[52]</sup>

***Erythrina variegata L.***

*Erythrina variegata* L. belongs to the Fabaceae is a medium size tree. Leaves are 3-foliolate and used in inflammation, as antiseptic, anthelmintic and in treatment of joint pain. <sup>[53]</sup>

***Dioscorea bulbifera L.***

*Dioscorea bulbifera* L. (Dioscoreaceae) is a twining or climbing, dioecious herb having ovate-cordate leaves fairly common along the edges of the forests. Tubers are used as an expectorant in asthma, aphrodisiac and an anthelmintic. <sup>[54]</sup>

In southern Africa, about 13 plant species are used to treat helminth infections in livestock . In human beings these species possess additional antifungal effect. <sup>[55]</sup>

There are several other indigenous medicinal plants (Neem, Pineapple and Tobacco) having anthelmintics action <sup>[56,57]</sup> and are used against both ecto and endo parasites in Bangladesh. <sup>[58,59]</sup>

**TANNINS AND ANTIHELMINTHIC ACTIVITY**

Recent studies have suggested that plants containing condensed tannins may offer a promising alternative approach to control parasitism. <sup>[60]</sup> Condensed tannins are secondary plant metabolites that comprise the most widespread class in nature. Tannins compounds exhibit anthelmintic activity. <sup>[61]</sup> Chemically tannins are polyphenolic compounds. Some phenolic anthelmintics e.g., niclosamide, oxiclozanide and bithionol are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation. <sup>[62]</sup>

The role of condensed tannins in many biological processes related to different nematode stages have been confirmed by in vitro studies. <sup>[63]</sup> The mechanisms by which condensed tannins neutralize the parasites can vary based on the nature and composition of the different forage species. <sup>[64,65]</sup> Antihelminthic effect of tannins is that they can bind to free protein in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and cause death. <sup>[66]</sup>

The search for new antihelminthics among plant extracts, have considerable significance. There are the various range and capacity of antihelminthic bioassays utilised in preclinical studies in vitro on plant extracts, the phenomenon of coexistent allelochemicals with overlapping activity spectra within single plants, and non-specific cytotoxins among plant allelochemicals.

Herbal therapy can enhance the profits by reducing the use of conventional antihelminthics and can be beneficial in extending the life of the limited number of antihelminthics available. [67]

Moreover, misuse and indiscriminate treatment with synthetic drugs have allowed the rapid selection of herbs against resistant helminth populations. [68] Thus, it has become necessary to develop studies aimed at searching complementary alternatives to traditional methods. [69]

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