



## ANTHELMINTICS IN UNANI MEDICINE: AN EVIDENCE BASED APPROACH

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### ABSTRACT

Medicinal plants have served through ages, as a constant source of medicaments for the treatment of a variety of diseases. The half of world is suffering from bacterial and helminthic infection, due to poor sanitation, unhygienic condition, malnutrition and crowded living conditions. The Latest estimation of W.H.O indicates that more than 880 million children are in need of treatment for these parasites In Unani literature helminthes are of 4 types these are- Long: *Hayyat*. Round: *Mustadeer*. Flat: *Kaddudana*. Small: *Khalli*. According to *Tabri* and *Sarayoon* (*Al Hawi fit Tibb*) the main cause for the production of helminths is heat and putrefaction. It has been mentioned that *Dam* (blood) has no role to play in these diseases *Abujarih al Rahib* stated that helminths also produced by the use of raw and soft things like raw wheat, raw meat, raw vegetables etc. Abdominal pain, dryness of lips, presence of worms in faeces, nausea, and paleness of face are the important symptoms mentioned in Unani medicine. Treatment of helminthes infection in humans according to Unani literature involves in removing the cause of production of the helminths i.e. the *Balgham* (Phlegm) from the intestines and the drugs responsible to kill the worms and those responsible for their expulsion from the body are indicated. For this purpose, those drugs which are bitter in Taste like *Kamela*, *Baobarang*, either of *Haar* or *Barid Mizaj* i.e. (Hot or Cold temperamental drugs) as per the *Mizaj* of the diseased person are recommended.

**KEYWORDS:** Anthelmintics, *Balgham*, Unani Medicine, *Mizaj*.

### INTRODUCTION

**Helminthiasis**, also known as **worm infection**, is a macro-parasitic disease of humans and other animals in which a part of the body is infected with parasitic worms, known as helminths. Helminth infections are caused by worms of various species and are typically transmitted in one of three ways: ingestion of parasitic eggs or larvae in contaminated food, water, or feces; penetration and entry of worms through the skin; or entry via the bite of a vector species, such as a fly. More than 1.5 billion people, or 24% of the world's population, are infected with soil-transmitted helminth infections worldwide. According to the Latest estimation of W.H.O indicates that more than 880 million children are in need of treatment for these parasites.<sup>[1]</sup> In modern text, Worms are classified into 3 categories: Nematoda, Cestoda and Trematoda. While according to Unani classical text helminths are of four types they are as: i) *Hayyat*- long, thin and red. ii) *Mustadeer* – round, small and white. iii) *Kaddudana*- flat, wide and white. iv) *Khalli*-very small and thin.<sup>[2]</sup> In the treatment of parasitic diseases, the anthelmintics drugs are used indiscriminately. In Unani

Literature, Unani physicians describe the different causes and treatments for helminths. According to *Tabri* and *Sarayoon* in *Al Hawi fit Tibb*. The main cause for the production of helminths is heat and putrefaction. Excessive cold, use of viscous diet are the predisposing factors. However, some authors like *Bolis* have indicated the involvement of *Sauda* along with *Safra* and *Balgham* for the production of the helminths in humans. *Abujarih al Rahib* stated that helminths also produced by the use of uncooked food like wheat, meat, vegetables etc. *Daud Antaki* mentioned different causes for the production of helminths like: taking bath and drinking water before digestion of food and no use of anthelmintics for long term.<sup>[3][4]</sup> Abdominal pain, dryness of lips, presence of worms in faeces, nausea, yellowness of face are the important symptoms mentioned in Unani Medicine. While, Fever, bleeding, obstruction, bulimia, colic and epilepsy are the most common complications of gastrointestinal helminths.<sup>[3][4][5]</sup> General treatment: Persian old scholar proposed warm and dry food as like as pigeon meat for treatment and avoidance from viscous, thick and fatty food. Extracts of peas (*Nokhod-*

*Aab*), leaves of cabbage, dried coriander, *Rhus coriaria* (*sumac*) and the use of vinegar before sleeping are effective for treatment of all kinds of worms. Applying hot temperament, bitter and vermifugal drugs in the form of oral, suppositories, enema and plaster is recommended for treatment.<sup>[3][4][5]</sup> Anthelmintics or antihelmintics are drugs that expel parasitic worms (helminths) from the body, by either stunning or killing them.<sup>[6]</sup> There is a lot of the organic & inorganic and antibiotics are anthelmintics drug. The major problem for these antiparasitic drugs is that many of these drugs were developed many years ago and some parasitic strains have become resistant to them and also has some side effects such as constipation, vomiting, gastric irritation hypersensitivity, immune suppression and allergic reaction. The alternative for this is to search for antiparasitic drugs from traditional medicinal plants which are considered to be the best source of bioactive substances. Unani medicine provides a ray of hope in this direction where there is enough literature available for both single as well as compound formulation to address this grave health problem. Hence, in this present review, an attempt has been made to give knowledge about some drugs used in Unani medicine as Anthelmintic.

#### ***Mallotus philippinensis***. Muell. Arg

Family- Euphorbiaceae.

It is a medium sized much-branched tree distributed all over India, commonly known as kamala. Its glands and hairs from the capsules or fruits used medicinally. The crude powder of kamala obtained as a glandular pubescence from the exterior of fruits is found to be useful in case of worm, hook worms, round and earth worms, its chemical constituent's rottlerin and isollorotterin have Anthelmintic activity.<sup>[7]</sup> A study has been done on its alcoholic extract showed taenicial action against *Hymenolepis nana* while the aqueous extract exerted only mild anthelmintic activity. Furthermore, in a clinical study in children kamela powder has proved effective in 96% patients suffering from a cestode infection and the side effects observed were mild like nausea, vomiting and loose stools in about 20% of the children.<sup>[8]</sup>

#### ***Punica granatum*** L.

Family – Lythraceae

It is a shrub to small tree up to 6m high, found in Afghanistan, Baluchistan and cultivated nearly all over India, Commonly known as Anar, pomegranate. Its Flowers, seeds, the rind of the fruit, fresh fruit juices, dried bark of the stem and root used medicinally. An alkaloid pellerine isolated from *Punicagranatum* has anthelmintic activity. Methanolic extracts from the leaves of *Pergularia daemia* Linn. and leaves of *Punica granatum* are investigated for their anthelmintic activity against the earthworm *Pheretima posthuma*. Dose dependent activity was observed in both plant extracts. Both the extracts exhibit significant anthelmintic activity at highest concentration of 150 mg/ml.<sup>[9]</sup> In clinical

studies, the plant showed efficacy against nematodiasis against calves.<sup>[10]</sup>

#### ***Butea monosperma*** Lam.

Family – Papilionaceae

It is a medium-sized deciduous tree, distributed throughout India in deciduous forests. It is commonly known as palas, bastard teak, and flame of forest. Its Gum, seeds, flowers, bark, leaves used medicinally.<sup>[11]</sup> Stigmasterol; Butin; isobutrin, butrin, have anthelmintic, anticonceptive, anticonvulsive, antidiabetic etc.<sup>[12]</sup> A chemical compound Palasonin obtained from seeds have shown the Anthelmintic activity against *Ascarislumbricoides*(human) and *Toxicaracanis* (dogs).<sup>[13]</sup> In a study done by Iqbal et al. the seeds of *B. monosperma* administered as a crude powder at doses of 1, 2 and 3 g/kg to sheep naturally infected with mixed species of gastrointestinal nematodes exhibited a dose and a time-dependent anthelmintic effect. The maximum reduction of 78.4% in eggs per gram of faeces (EPG) was recorded on day 10 after treatment with 3 g/kg. Levamisole (7.5 mg/kg), a standard anthelmintic agent, exhibited a 99.1% reduction in EPG.<sup>[14]</sup> In 2010 Bibbileshtal. Studied on The alcoholic and aqueous extract of the leaves of *B. monosperma* showed significant Anthelmintic activity against adult earthworms (*Pheretimaposthuma*) when compared with standard Albendazole.<sup>[15]</sup> Further, An in vitro study has been done on The methanolic extract of *B. monosperma* seeds and found significant Anthelmintic activity.<sup>[16]</sup>

#### ***Hollarhena antidysentrica*** (ROTH.)A.DC.

Family – Apocynaceae

It is a tree reaching about 10m in height or more, Distributed commonly in forests of India. Indigenous to the tropical Himalayas, Assam, UP. It is commonly called as Karch, Kurchi, bitter oleander, tellicherry, dysentery rosebay. Bark, seeds and leaves used medicinally. Mainly its bark has Anthelmintic activity. Bark contains an alkaloid conessine, a gum- resin and tannin which has an anthelmintic function. A study done by Satpute et.al. in which two extracts viz. Aqueous and alcoholic bark extracts at three different concentration (10, 20 and 40mg/ml) and results were expressed in terms of paralysis time and death time for worms. The results were compared with standard solution, Albendazole (10, 20 and 40mg/ml) Both the extract showed significant anthelmintic activity. The effect was dose-dependent and shortest time taken for paralysis and death was observed in the case of alcoholic extract at 40 mg/ml. concentration.<sup>[17]</sup>

#### ***Melia azedarach*** L.

Family – Meliaceae

*Melia azedarach* is a small to medium deciduous tree attaining a height up to 45 m tall; bole fluted below when old, up to 30-60 (max. 120) cm in diameter, with a spreading crown and sparsely branched limbs.<sup>[18]</sup> distributed throughout India, Burma & Malay peninsula. Indigenous to Jhelum valley in Kashmir. It is commonly

known as Bakain, chinaberry, common bead tree, the pride of India, Margosa tree. its Root bark, fruit or berry, seeds, flowers, leaves, oil & gum used medicinally. The plants are known to provide a rich source of botanical anthelmintics, antibacterials, and insecticides.<sup>[19]</sup> Chemical constituents' chavicol and eugenol have nematicide property while cinnamic acid and carvacrol have vermifuge activity. In vivo anthelmintic activity of *M. azedarach* was demonstrated by Akhtar and Riffat (1985) on *Ascaridiagalli* and by Falbo et al. (2008) on sheep gastrointestinal nematodes, with an efficiency of 33.2%. According to Squires et al. (2010), in small ruminants the rumen may serve as a reservoir, slowing the passage of the Anthelmintic product, thus prolonging the exposure of *H. contortus* to the active substances. On the other hand, Pervez et al. (1994) observed inefficacy of *M. azedarach* and suggested this may be due to the destruction of the active substances by the ruminal flora and other aspects, such as ruminal pH. Antifungal (Carpinella et al., 1999), insecticidal (Gajmer et al., 2002) and acaricidal (Borges et al., 2005) effects of *M. azedarach* extracts from fruits and seeds have been reported. However, this plant's anthelmintic activity on gastrointestinal nematodes in small ruminants remains to be clarified by in vivo experiments.<sup>[20][21][22][23][24][25][26]</sup>

#### ***Dryopteris filix mas (L.) Schott***

Family – Polypodiaceae

The male fern is called *Dryopteris* meaning 'oak fern' in Greek. It acquired this name because the male fern is habitually found to grow in oak woods. This herb grows up to two to four feet in height and bears insipid green leaves also known as fronds. It is a fern. Commonly known as Sarakhs or male fern. its Rhizome and root used medicinally. [kokate] chemical constituent Albaspidin, Aspidin, Aspidinol, Butyric acid, Filicic acid, Filicin have anthelmintic property. The floriglucidos have the property that has to paralyze the muscles of various intestinal worms, which once immobilized, is easily released from the walls of the entire intestinal tract, being eliminated along with faeces.<sup>[27]</sup> shukla et.al. reveals that different dose levels of ethanolic extract of *dryopterisfilix mas* root and rhizomes exerted a depressive effect on the life cycle stages of *C.cephalonica*. the toxicity of this plant extract increases with the increase in its dose levels on each developmental stages i.e larva, pupa and adults. There is significant larval mortality was obtained with an increase of *dropterisfilixmas* root and rhizome ethanolic extract dose level. At 0.001% dose level of this ethanolic extract, larval mortality was only 4±2.82% while 100% larval mortality was observed at its 0.20% dose level.<sup>[28]</sup> In in vitro the plant extracts *Dryopterisfilix mas*, *Tanacetumvulgare*, *Juglansnigra*, *Syzygiumaromaticum* and *Allium sativum* showed high Antischistosomal activity.<sup>[29]</sup>

***Embelia ribes***: Burm.f.

Family –Myrsinaceae

a large scandent shrub; branches long, slender, flexible, terete with long internodes, the bark studded with lenticels. It is distributed in moist deciduous forests of the Western Ghats of South India, Jammu & Kashmir, Arunachal Pradesh, Himachal Pradesh, Madhya Pradesh, Uttar Pradesh, Assam and Maharashtra.<sup>[30]</sup> Commonly known as Baobarang, vidang, *Embelia*. Its dried mature fruits. Embelin is reported to have anthelmintic activity.<sup>[31]</sup> As a vermicide embelin acid. Tannins, the polyphenolic compounds, are shown to interfere with energy generation in helminth parasites by uncoupling oxidative phosphorylation or, binds to the glycoprotein on the cuticle of the parasite, and cause death.<sup>[32]</sup> The Ethanolic extract of *E. ribes* fruits showed an anthelmintic efficacy of up to 93% against gastrointestinal nematodal larvae *Haemonchuscontortus*.<sup>[33]</sup> In 2012 G.P chaudhary used the ethanolic extract of the seeds of *Embeliaribes* (10-200g/mL) and found potent anthelmintic activity against roundworm *Rhabditis pseudoelongata*. Levamisole and ivermectin were used as standards.<sup>[37]</sup> Further, Experimental trials were carried out using Indian earthworms (*Pheretima Posthuma*). The various concentrations were tested for Anthelmintic activity & Albendazole is used as a standard for comparison. The effect of Embelin against parasite was observed in very shorter time. It shows paralysis time 03 minutes 21 seconds and death time 04 minutes 07 seconds which is much superior to that of Albendazole (14.53 minutes and 23.46 minutes).<sup>[34]</sup>

#### ***Citrullus colocynthis (L.) Schard***

Family- Cucurbitaceae

It is a perennial herb usually trailing. found wild in the sandy lands of North West, the Punjab, Sind, and Central and southern India, and coromandalcoast. Commonly known as Hanzal, ghorumba, Indrayani, bitter apple, bitter cucumber or colocynth.<sup>[35]</sup> Its Roots and fruits used medicinally. Its Chemical constituent Decanoic acid, Limonene, Methyl eugenol, Myrastic acid, Palmitic acid have nematicide activity and alpha amycin, citronellal and cucurbitacin B are having Insectifuge property. A study done on *Orthocoeliumscoliocoelium* with the fruit extract of *citrulluscolocynthis* to observe the anthelmintic efficacy of plant. The treated worms became agglutinated shrunken, paralysed and dead after 5 hours at 40mg/ml concentration of alcoholic fruit extract of *citrulluscolocynthis*.<sup>[36]</sup>

#### ***Ricinus communis* Linn.**

Family –Euphorbiaceae

The castor oil plant is a fast-growing, suckering perennial shrub. It is commonly known as Bedanjeer. Arand, arandi, erandi, Castor. seeds are used in medicine.<sup>[37]</sup> Chemical constituent beta amyirin, chlorogenic acid, ricinine, oleic acid, linoleic acid having larvicide, insectifuge property while that of palmitic acid have nematicide activity. The three concentrations (50, 75 and 100 mg/ml) of Aqueous and ethanolic extracts from the bark of *Ricinus communis* were investigated for

their anthelmintic activity against *Pheretimaposthuma*. Both the extract exhibited remarkable anthelmintic activity at all three concentrations. Albendazole suspension is used as standard reference (25 mg/ml) and distilled water as control.<sup>[38]</sup> manthari et.al. done Anthelmintic activity using mustard and ricinus oil on adult earthworm, *Pheretimaposthuma*. The oils were tested at different concentrations for the determination of paralysis time and death time of the earthworms. Albendazole is used as standard and it was found that castor oil and mustard oil showed a better anthelmintic activity in comparison with the standard.<sup>[39]</sup> Later, A Comparative Study has been done on Methanolic extracts of *Musa acuminata* (peel, leaf) and *Ricinus communis* (seed, stem) and result showed that *Ricinus communis* stem showed shortest time of paralysis (14±0.61, 12±0.72, 09±0.89 minutes) and death time (24±0.25, 20±0.82, 15±0.91 minutes) when compared to the standard albendazole.<sup>[40]</sup>

### ***Zingiber officinale* Roscoe**

Family – Zingiberaceae)

*Zingiber officinale* commonly called ginger The plants of Zingiberaceae family have tuberous or non-tuberous rhizomes, which has their particular aroma and possess different medicinal properties.<sup>[41]</sup> In the traditional medicine, gnarly, thick underground stem (rhizome) of ginger is commonly used.<sup>[41]</sup> Lin RJ et.al. isolate chemical compounds :[6]-gingerol, [10]-shogaol, [10]-gingerol, [6]-shogaol and hexahydrocurcumin from the roots of *Z. officinale* and screened for larvicidal activity against the larvae of *A. cantonensis*. Among all, [10]-gingerol showed higher larvicidal than hexahydrocurcumin, mebendazole and albendazole.<sup>[42]</sup> in a study the Crude powder (CP) and crude aqueous extract (CAE) of dried ginger (1–3 g/kg) were administered to sheep naturally infected with mixed species of gastrointestinal nematodes. Both CP and CAE exhibited a dose- and a time-dependent anthelmintic effect with respective maximum reduction of 25.6% and 66.6% in eggs per gram (EPG) of faeces on day 10 of post-treatment. Levamisole (7.5 mg/kg), a standard anthelmintic agent, exhibited 99.2% reduction in EPG. Results showed that ginger possesses in vivo anthelmintic activity in sheep.<sup>[43]</sup> In 2011, Osama et.al. studied Anthelmintic activity using crude aqueous extract of ginger against *Schistosoma mansoni* Sixteen mice of C57 strain were exposed to 100 ± 10 cercariae per mouse by the tail immersion method; the mice were divided into two groups: untreated group and ginger-treated one. All mice were sacrificed at the end of 10th week post-infection. Worm recovery and egg counting in the hepatic tissues and faeces were determined. Surface topography of the recovered worms was studied by scanning electron microscopy. Histopathological examination of liver and intestine was done using routine histological procedures. The worm burden and the egg density in liver and faeces of mice treated with ginger were fewer than in non-treated ones.<sup>[44]</sup>

In Unani system of medicine some Compound formulations are used as anthelmintic they are:<sup>[45]</sup>

1. *Itrifal Deedan*: it has Baobarang (*Embelia ribes*) as a main ingredient.
2. *Majoon Sarakhs*: Sarakhs (*Dryopteris filix mas*) is the main ingredient of this formulation.

It can be say that the above compound formulations have potent Anthelmintic activity as they have the main ingredients on which the anthelmintic studies have already done and shows positive results as anthelmintic.

### **CONCLUSION**

In the recent years, there is an increasing awareness of natural products and its potential, which prime us to develop new antiparasitic drugs. While many of the traditionally used anthelmintic plants have been evaluated for their putative anthelmintic activity, several other such plants still need to be documented and their efficacy is yet to be established under controlled experimentation. The use of untested traditional medicines will no doubt continue, there is need to distinguish between the efficacious and safe products and the ineffective and/or unsafe products to promote their use for the improvement of the health of people in developing countries. This contemporary study summarized a thorough classification of pathogenic worms, their pathogenicity, symptoms and manifestations of gastrointestinal infections, treatment and the control of such maladies by medicinal plants which are mentioned in the Unani system of Medicine, either as a single drug or in combination delivery system and these medicinal plants are promising potential sources for preparation of new drugs or for pharmacological and therapeutic applications as anthelmintic.

### **Conflict of interest**

We declare that we have no conflict of interest.

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