

Types of helminthic infection: An overview

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ABSTRACT:

Helminth is a parasitic worm that cause severe infection in human body. The helminth is a worm that is either round or tapeworm type of worm which lies grows in outside environment and when it enters inside human body through various routes it leads to infections which ranges from mild to severe depending upon severity of worm. The various helminthiasis infections are leishmaniasis, Schistosomiasis, Lymphatic filariasis etc. These infections are prevailing in Africans and Asians countries at great extent. To treat this infection various drugs such as Mebendazole, Albendazole, Pyrantel are used. But these drugs are having various side effects which lead to greater risk. In order to overcome this infection various plants-based products are coming in market. *Examples Moringa Olifera, Rauwolfia vomitoria, Alium sativum, Carica papaya, Datura stramonium* etc. These products are having less side effects and are more stable as compared to drugs which are available in market.

KEYWORDS: Schistosomiasis, Lymphatic filariasis, Leishmaniasis, Rauwolfia vomitoria etc.

Introduction

The word *helminth* is derived from the Greek *helmins* (“parasitic worm”). Helminthic worms are highly prevalent and, depending on the species, may exist as free-living organisms or as parasites of plant or animal hosts. The parasitic helminths have co-evolved with specific mammalian and other host species. Accordingly, most helminthic infections are restricted to nonhuman hosts, and only rarely do these zoonotic helminths accidentally cause human infections. Helminthic parasites differ substantially from protozoan parasites in several respects. First, protozoan parasites are unicellular organisms, whereas helminthic parasites are multicellular worms that possess differentiated organ systems. Second, helminthic parasites have complex life cycles that require sequential stages of development outside the human host. Thus, most helminths do not complete their replication within the human host; rather, they develop to a certain stage within the mammalian host and, as part of their obligatory life cycle, must mature further outside that host. During the “extra-human” stages of their life cycle, helminths exist either as free-living organisms or as parasites within another host species and thereafter mature into new developmental stages capable of infecting humans (Lone. B, et al; 2012).

Table 1: Type of Helminths

S. No.	Class	Name of the Organism	Disease	Vector	References
1.	Nematodes	<i>Diospyros anisandra</i>	Trichuris trichiura	<i>Ancylostoma Caninum</i>	(Montejo, et al.; 2019).
2.	Nematodes	<i>Vernonia amygdalina</i>	Schistosomiasis	<i>Haemonchus contortus</i>	(Oyeyemi, et al.; 2018)
3.	Nematodes	<i>Cymbopogon citratus</i>	Lymphatic filariasis	<i>Colossoma macropomum</i> .	(Sherwani, et al.; 2013)
4.	Intestinal nematode	<i>mangostin diacetate</i>	Hydatid disease	<i>Heligmosomoides polygyrus</i>	(Ibrahim, et al; 2016)
5.	Cestodes	<i>Ocimum gratissimum</i>	Leishmaniasis	<i>Colossoma macropomum</i>	(Prabhu, et al.; 2009)
6.	Nematodes	<i>Achillea millifolium</i>	Onchocerciasis	<i>Haemonchus contortus</i>	(Orengo, et al., 2016)
7.	Nematodes	<i>Allium sativum</i>	Schistosomiasis	<i>Ancylostoma caninum</i>	(Sawarkar, et al., 2011)
8.	Tapeworm	<i>Ficus Carica.</i>	Lymphatic filariasis	<i>Pheretima Posthuma</i>	(Devi, et al.; 2013)
9.	Cestodes	<i>Morus alba linn</i>	Hydatid disease	<i>Haemonchus contortus</i>	(Upwar, et al., 2011)
10.	Cestodes	<i>Brassica nigra</i>	Leishmaniasis	<i>Pheretima posthuma</i>	(Zajickova, et al., 2020)

Classification of helminth or worm:-

1. **Platyhelminths**:- These are also known as flat worms. Flatworms (Platyhelminthes) are a group of bilaterally symmetrical, acoelomate, soft-bodied invertebrate species found in marine, freshwater as well as moist terrestrial habitats. These are generally of two types

A. **Cestodes**:- Cestodes are a typical parasite worm widely known as tapeworms and can be found in their hosts' gastrointestinal tract (definitive hosts). Although it has been shown that most infections occur in developed countries, they are widely spread across the world. Common species of cestodes includes the following

- Turbellaria
- Tapeworms
- Polycladida
- Hymenolepis
- Girardia tigrina

B. **Trematodes**:- Trematodes are a group of parasitic flatworms (leaf-shaped). While they are mainly associated with such aquatic fauna as fish and mollusks, they also influence various vertebrates as

part of their indirect life cycle. They are veterinary and medical essential species (since both humans and animals are contaminated and affected). Trematodes can be found in various habitats around the world with more than 20,000 species in the Trematoda class. Some examples of trematodes are following

- *S. japonicum*
- *S. haematobium*
- *C. sinensis*
- *F. hepatica*
- *P. westermani*

2. **Nematodes**:- Nematodes are a group of worms that make up the phylum Nematoda. With well over 15,000 species known today, they can be found in diverse ecosystems ranging from terrestrial to marine environments. Nematodes occur in terrestrial and marine ecosystems as free living organisms or as plant or animal parasites. These are further classified into two categories.

a. Aphasmodia:- Nematoda subclass consisting of worms in which sensory organs are often bristle, lack or significantly reduced in the phasmids and no lateral cervical papillae.

b. Phasmidia:- Nematoda's subclass comprises worms with typically papillose sensory organs, phasmids, cervical side papillae and simple, antequous, pores-like lateral sensory depressions.

Diseases caused by different worms.

1. Schistosomiasis:- Schistosomiasis is an acute and chronic parasite worm disease. People are contaminated with infested water during farming, domestic, technical or recreational routines. Lack of grooming and certain play activities in infesting water make children highly vulnerable to infection, eg swimming or fishing in school-aged children.

Schistosomiasis control is centred on decreasing diseases through routine, broad-based population praziquantel treatment; a wider approach will also decrease transmission, with drinking water, adequate sanitation and snail control. It is estimated that at least 290,8 million people needed schistosomiasis preventive care in 2018, with over 97,2 million of them reportedly being treated. (Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018).

2. Trichuris trichiura is a roundworm known as the human whipworm which causes human trichuriasis. It is called the whipworm, since it looks like a whip with big handles at the back. A small fore oesophagus and a thick rear anus are present on the whipworm. Typically, the worms are rose and attached through the slim anterior end to the host. These worms are 3 to 5 cm in size. The woman is always bigger than the man. Everywhere between 2000 and 10,000 eggs per day the female worm will lay. The eggs are laid in human waste in the soil. Eggs mature and go through an infectious stage after 14 to 21 days. When humans consume

embryonic eggs, they begin to hatch in the human gut and to multiply and expand the gut microflora and nutrients.(Bansal. R, et al; 2018).

3. Hydatid disease:- Human echinococcosis is a parasite of Echinococcus-like tapeworms.Cystic echinococcosis (hydrate doses) and alveolar echinococcosis are the two most important types in humans.Human beings are infected either by egg parasite ingestion or direct contact with animal hosts in contaminated food, water / soil. Echinococcosis is also costly and difficult to treat and can require extensive surgery and/or extensive prescription care. The deworming of dogs which are definitive hosts is the priority of prevention programmes. Preventive steps also include deworming dogs, sanitation in slaughterhouses, and public education with respect to cystic echinococcosis. Echinococcosis affects more than 1 million people at any time.(Hymann. D et al; 2018).

4. Lymphatic filariasis: Such an irregular expansion of the body parts causing discomfort, serious injury and social stigma may result, and lymph filariasis impairs the lymphatic system. In 49 countries worldwide, 893 million people appear to be endangered by lymphoid filariase and need preventive chemotherapy to avoid this infection spreading. About 120 million people were infected in 2000, with nearly 40 million people disfigured and disabled. The spreading of the infection by preventative chemotherapy with safe combinations of medicines repeated every year can eradicate lymphatic filariasis. Since 2000 there have been over 7.7 billion therapies to avoid the spread of infection. When WHO interventions have been applied successfully, 597 million people no longer need preventive chemotherapy. A simple and recommended health care package can relieve distress among people living with lymphatic filariosis and avoid more impairment. (Thomas. B, et al; 2015).

5. Onchocerciasis, or rivers blindness, caused by parasite onchocerca volvulus is a neglected tropical disease (NTD). The blackflies of the Simulium genus transmit it by repeated bites. The disease is known as river blindness, because it lives and breeds near fast-flowing streams and streams, mostly near far-flung rural villages. The infection can lead to visual impairment and blindness occasionally. Onchocercose may also cause skin disease, such as extreme itching, rashes, or skin nodules. The only explanation for contagious blindness is world-wide onchocercose. (David. O, 2016).

6. Loiasis: eye worm disease known as loa loa, a human and other primates-living parasite. When bitten by infected deer, people contract the parasite. The worm larvae enter the bloodstream and then become adult worms. Months or years after the fly bite may not be symptomatic. The worms migrate to the skin and cause local inflammatory responses called swellings of Calabar. Sometimes, the worms move through the conjunctive and cornea of the skin. The worm often enters the brain that triggers encephalitis. During the day and in the night, the microfilarial (minor file-like) outline of the worm can be found in blood and lymph fluid. (Elizabet.D, 2007).

Anthelmintics:- Anthelmintics or antihelminthics are a group of antiparasitic drugs that by either stunning or killing them and without causing any harm to the host, remove parasitic worms and other internal parasites from the body. They might be labelled vermifuges or vermicides as well. Medicinal plants hold great promise as a source of effective treatments, including anthelmintic therapy. They have been used traditionally for centuries and are mostly safe (if not, their toxicity is well-known). However, in most medicinal plants the compounds active against nematodes have not been identified thus far. The free-living nematode *C. elegans* was demonstrated to be an excellent model system for the discovery of new anthelmintics and for characterizing their mechanism of action or resistance.

Natural products as anthelmintics:- Intestinal parasites infect about two billion people worldwide. The control of infections currently depends mainly upon chemotherapy, but the absence of vaccines for human intestinal nematodes is a growing issue. Thus, new anthelmintic drugs, in particular new ones with a new action mechanism, urgently need to be identified and created. As an important source of therapies like anthelmintic therapy, medicinal plants are very promising. They have been used for centuries historically and are largely healthy.

Table 2: List of the plants reported for Montejo Plants

Name of Plant	Name of organism	Part of plant	Chemical used	Function	References
Curcuma Zedsaria	Gyrodactylus	Extracts	Sesquiterpene	Treatment of Dyspepsia	Amol, et al; 2014.
Dichrocephala integrifolia	Heligmosomoides bakeri	Dried extracts	Dimethyl sulfoxide	Antibacterial	Wabo, et al; 2013.
Piptadenia viridiflora	Haemonchus contortus	Leaf extracts	Flavonoids	Anticancer	Franciellean, et al; 2016.
Ocimum gratissimum	colossoma macroponum	Essential oil	Terpens	Treatment of bronchitis	Segun, et al; 2020.
Cymbopogen Citratus oil	Colossoma macropomum	Essential oil	Gerennial, Neral	Antiamoebic	Iara, et al; 2016.
Leucas aspera herb	Pherctima posthuma	Aqueous extract	Piperazine citrate	Antioxidant	Swati, et al; 2011.
Diospyrus anisandra	Cyathostominae	Methanolic extracts	Benzimidazoles	Antibacterial	Gabriela, et al; 2017.
Duranta erecta L	Albino mice	Plant extract	Albondazole extracts	Antimalarial	Lakshami, et al; 2016.

Conclusions

Anthelmintics drugs are available in the market from decades. These drugs are used to treat and manage the infection caused by different types of worms. The commonly used drug is ivermectin. Apart from the beneficial effect these synthetic drugs having so many side effects which will cause damage to humans. In order to reduce the damage and to reduce the side effects the use of plants based or we can say natural products is increasing. Now a days there are so many natural products are available to treat helminthic. These drugs are having no side effects and are easy to use and maintain. So, we need to promote the use of natural products as much as we can.

Future Scope of Natural Products

The challenges for the companies engaged in anthelmintic drug behaviour, since the demand of anthelmintic drug is cost efficient and a major concern, are not shared across the rich phases in the pharmaceutical industry. In the chemotherapy programmes in places where clinical support is limited, and medicines must be very well tolerated for humans, anthelmintics are primarily used for tropical medicine. In the past 20 years a limited number of drugs has been used, particularly ivermectin, whereas in veterinary and tropical medicine ivermectin has been extremely effective. The key concern for the future is the advent of anthelmintic-resistance currently used, including ivermectin, which is important to identifying the mode of action for all of these medicinal products and can also help to understand resistance mechanisms, in particular through the "model-hopping" approach.

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