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The Ultimate Resource for Fungal and Yeast Infections

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Antiparasitic Drugs For Intestinal Parasite Infections From Worms

FIVE DRUGS COVER THE MOST COMMON PARASITIC WORM INFECTIONS

Introduction

The World Health Organization (WHO) has recommended community-wide mass treatment of helminth (parasitic worm) infections. Virtually all of the important parasitic worm infections in humans can be treated with one of 5 anthelmintics currently in use: **albendazole**, **mebendazole, diethylcarbamazine, ivermectin** and **praziquantel**. The aim of anthelmintic therapy is to reduce the intensity of infection below the level of clinical significance. However, measures must also be taken to avoid the emergence of resistance against the available therapies.

Over 25% of World Population Infected

The helminths that infect humans can be categorized into 3 groups:

- nematodes (round/thread/pinworms)
- trematodes (flukeworms)
- cestodes (tapeworms).

Together, these helminths **infect more than a quarter of the world's population**, giving rise to much morbidity. With a few exceptions, the occurrence of disease or disability because of the infection is dependent on the intensity of infection: heavy infections are much more likely to result in disease than light infections. Thus, although the ideal aim of chemotherapy would be a complete cure, reduction of the intensity of infection below the level of clinical significance may be sufficient to reduce the occurrence of morbidity and to reduce transmission.

Most Worms Do Not Multiply in Human Host

Helminths have complex life cycles, but in many of the species of human parasites (with a few important exceptions), the adult worms do not actually multiply in the human host. Thus, in most of these helminth infections, each individual parasite may be considered to be the result of a separately acquired infective stage.

However, a few of the helminths that infect humans can either complete their entire life cycle in the same host (such as in strongyloidiasis) or infect humans only during the larval phase (e.g. larva migrans, hydatidosis, cysticercosis). They are much less common, but can cause much more serious disease. Thus, the principal value of chemotherapeutic agents in these infections is in the treatment of the individual rather than in controlling transmission.

Five Agents Treat Most Infections

Many of the anthelmintics available for human use are effective against several helminth species, and although there are over 20 different species of helminths that cause disease of global significance in humans (see table 1), almost all of these infections can be treated or controlled with one of 5 anthelmintics: the benzimidazoles albendazole and mebendazole, diethylcarbamazine, ivermectin, and praziquantel.

WHO Recommended Treatments

The WHO has made various recommendations regarding the treatment of helminth infections. Essential agents for the treatment of intestinal nematode infections listed by the WHO include pyrantel, levamisole* and piperazine* , in addition to mebendazole and albendazole. Moreover, they recommend metrifonate* and oxamniquine* , in addition to praziquantel, for the treatment of schistosomes.

Useful Drug Combinations

Apart from monotherapy, various drug combinations have been suggested to be useful in the treatment of parasitic worm infections in particular situations.

IMPORTANT
You must kill off Candida from throughout your system to get well, not just from the intestinal tract. All of the fungicides listed in this site will kill yeast both systemically and in your intestines.

Cimetidine Increases Drug Concentrations

The combined administration of cimetidine and mebendazole to patients with hydatid cysts has been reported to result in greater serum concentrations and therapeutic effects of mebendazole than when mebendazole was used alone. In addition, a recent report on the use of cimetidine in combination with albendazole for the treatment of cystic echinococcosis also found that concentrations and therapeutic effects of albendazole were significantly higher in patients receiving combination therapy than in those receiving albendazole alone.

More Than One Infection

Simultaneous administration of praziquantel and a benzimidazole has been suggested as a simple and cheap means of delivering treatment against all 3 major geohelminths and the schistosomes.

Results from a multi-center, double-blind trial have shown that the efficacy of concomitant albendazole and praziquantel therapy was indistinguishable from the efficacy of each drug alone, and that the frequency and severity of adverse effects were also unaffected.

Treatment During Pregnancy

The management of parasitic worm infections during pregnancy is not an uncommon situation. However, there are some unsolved problems in relation to the use of anthelmintics in pregnancy. One of the most important is the issue of treating hookworm infections in pregnant women, since they are at particularly high risk of developing iron-deficiency anemia, especially in areas where nutritional anemia is endemic.

Mebendazole

Although mebendazole has been reported to be teratogenic in rats, only 1 human malformation was recorded in a retrospective study of 112 pregnancies. In Sri Lanka, where anemia in pregnancy is a major problem, and hookworm is endemic in many parts of the country, it has been national policy since 1994 to treat all pregnant women with a single course of mebendazole at the first antenatal visit after completion of the first trimester.

Albendazole

Since albendazole is absorbed at a greater rate than mebendazole, it is possible that it could be associated with more adverse effects.

However, teratogenicity was not reported among 10 cases of women who were exposed accidentally to high doses of albendazole (for systemic infection) during the first trimester and followed-up to term.

Diethylcarbamazine and Ivermectin

Diethylcarbamazine has been very widely used for the treatment of human filariasis for several decades now, and ivermectin has been widely used in community-based mass chemotherapy programs.

There are no reports of teratogenicity in humans in association with the use of either drug. In the mouse, however, ivermectin has been associated with cleft palate and occasional unexplained maternal deaths, despite its safety in the rat and rabbit. As a result, it is not recommended for use during pregnancy.

Praziquantel

Praziquantel has not been found to be teratogenic in animals, but there are no satisfactory recorded studies during human pregnancy.

Drug Resistance to Be Avoided

As yet there is no confirmed report of anthelmintic drug resistance in a soil-transmitted nematode infection in humans. However, resistance to benzimidazoles, levamisole, and, to a lesser extent, avermectins, are commonly reported in the veterinary literature. Thus, there is understandable concern that this problem may threaten the use of anthelmintic drugs for the control of soil-transmitted nematodes in humans.

Chemotherapy should be used in such a way that the emergence of drug resistance is delayed or circumvented, while health benefits continue to accrue. Factors that can act against the development of drug resistance include.

- treatment of only a proportion of the population in an infected community (e.g. targeting school children), which will ensure that some nematodes remain in the community and that the genes of these survivors will dilute those of the nematodes experiencing selection pressure
- giving treatment at intervals greater than those of the nematode's generation time
- changing the drug of choice for a particular control program.

At the same time, development of a protocol for the detection of suspected drug resistance, e.g. fecal egg count reduction tests, would be prudent.

Hygiene Is Crucial

Helminthic infection is readily passed on through contact; therefore, rigorous hygiene measures should be employed. Ideally, the infected person and all family/community members should wash their hands thoroughly prior to preparing, handling or eating food. Fingernails should be kept short and scrubbed with a nailbrush. Children with intestinal worms should wear underpants under pyjamas to prevent the transmission of eggs to their fingers if they scratch during sleep. Finally, infected patients should wash in the morning to remove any eggs laid overnight.

Tables

Table 1. Comparative efficacy of the 5 most widely used anthelmintics in the treatment of parasitic worm infections

	Mebendazole	Albendazole	Diethylcarbamazine	Ivermectin	Praziquantel
Nematode (round/thread/pinworm) infections					
Ascariasis	++	++	-	++	-
Trichuriasis	++	+	-	±	-
Hookworm infections	+	++	-	-	-
Strongyloidiasis	±	+	-	++	-
Enterobiasis	++	++	-	+	-
Trichinellosis	±	±	-	-	-
Intestinal capillariasis	+	+	-	-	-
Cutaneous larva migrans	-	+	-	-	-
Visceral larva migrans	+	+	+	-	-
Lymphatic filariasis	-	-	++	++	-
Onchocerciasis	-	-	(++)	++	-
Loiasis	-	-	(++)	++	-
Dracunculiasis	-	-	-	-	-
Cestode (tapeworm) and trematode (flukeworm) infections					
Taeniasis	±	+	?	?	++
Hymenolepis nana infection	-	-	?	?	++
Cysticercosis	±	+	?	?	+
Echinococcosis	+	+	?	?	±
Schistosoma mansoni infection	±	-	?	?	++
S. haematobium infection	±	-	?	?	++
S. japonicum infection	-	-	?	?	++
Fascioliasis	-	-	?	?	±
Fasciolopsiasis	-	-	?	?	++
Clonorchiasis	-	±	?	?	+
Opisthorchiasis	-	±	?	?	+
Paragonimiasis	-	-	?	?	++

Symbols: ++ = highly effective; + = moderately effective; ± = minimally effective; - = not effective/not used for this condition; (++) = parasiticidal but associated with severe adverse reactions; ? = information not available.

Table 2. Differential Features: Comparison of the 5 most widely used anthelmintics in the treatment of parasitic worm infections

Drug	Mebendazole	Albendazole	Diethylcarbamazine	Ivermectin	Praziquantel

Class	Benzimidazole	Benzimidazole	Piperazine derivative	Macrocyclic lactone (avermectin)	Pyrazinoquinoline
Indications (see table 1 for more detailed spectrum)	Drug of choice for threadworm; also roundworm, whipworm, hookworm infections	Adjunct to surgery in hydatid cysts caused by Echinococcus granulosus or E. multilocularis, or primary treatment if surgery not available; strongyloidiasis	Microfilariae and adult worms of Loa loa, Wuchereria bancrofti, Brugia malayi	Drug of choice for onchocerciasis	Drug of choice for schistosomes. Highly effective in most tapeworma and flukeworm infections
Age	Adults and children >2 yearsb	Adults and children >2 years	All ages	All ages	All ages
Usual oral dosage (UD)	100 mg twice daily for 3 days or 500 mg single dose	800 mg/day in divided doses for 28 days, followed by 14 drug-free days per cyclec	Gradually increase over 3 days from 1 to 6 mg/kg/day in divided doses; maintain for 21 days	150 µg/kg single dosed	40 mg/kg in divided doses 4-6 hours apart
Specific dosages	E. vermicularis: 100 mg single dose (repeat 2-4 times at 7- to 14-day intervals if needed); C. philippinensis: 20- to 30-day course; E. granulosus: </=50 mg/kg/day for 3-4 weeks	A. lumbricoides: 400mg single dose ; E. granulosis: UD, up to 3 treatment cycles; adjunct in surgical treatment of hydatid cysts: pre- and/or post-surgery, UD, repeat once			S. japonicum: 60 mg/kg in 3 divided doses
Tolerability	GI disturbances, allergic reactions, raised liver enzyme levels, alopecia, reversible bone marrow depression (more frequent with high-dose therapy). High-dose therapy requires blood and liver monitoring	GI disturbances, headache, dizziness, changes in liver enzyme levels; rarely reversible alopecia; rash, fever, blood disorders; allergic shock if cyst leakage occurs; convulsions and meningism in cerebral disease	Mild headache, general weakness, joint pains, anorexia, nausea and vomiting; febrile reaction (in heavy infections), and small risk of encephalopathy (in heavy L. loa infection); inpatient supervision required; renal excretion in chronic renal disease	Dose-dependent fever, itching, dizziness, edema, mild Mazotti reaction, minimal ocular inflammation in patients with eye involvement, postural hypotension	Dose-dependent mild to moderate and transient dizziness, headache, lassitude, limb pain, abdominal distress, bloody diarrhea
Contraindications	Pregnancye, breast-feeding	Pregnancyf, breast-feeding	Pregnancy	Pregnancyf	Pregnancy

bNot recommended for children <2 years.
cProlonged treatment may be required for the treatment of E. multilocularis.
dRetreat at 6- to 12-month intervals until the adult worms die.
eWHO recommends that mebendazole not be administered during the first trimester; however, the manufacturers have reported that the incidence of malformations and spontaneous abortions is not greater than that observed in the general population.
fNot recommended during the first trimester.
Abbreviations and symbol: GI = gastrointestinal; NA = not available; = substantially reduced.

Source: World Health Organization

FungusFocus objective: Information on symptoms, medical diagnosis, treatment, and cure of fungus infections and yeast infections, especially systemic, chronic, or recurrent fungal infection and yeast infection caused by Candida albicans intestinal yeast overgrowth (Candidiasis). For treatments addressing the symptoms of Candida albicans intestinal yeast infection. In men and women for addressing underlying causes of fungus and yeast-related disorders including oral (mouth) yeast infection (thrush), vaginal yeast infection (vaginitis) and male yeast infection (jock itch). For treatment and supportive therapy of intestinal disorders commonly associated with Candida albicans yeast overgrowth (Candidiasis) including Irritable Bowel Syndrome (IBS), leaky gut syndrome, intestinal parasite infections (parasites), and intestinal bacterial infections. For symptoms analysis, questionnaires, and diagnoses by lab tests. For antifungal prescription drugs and fungicidal home remedy through natural, homeopathic, herbal, and botanical medicines and supplements.

FungusFocus does not practice medicine. The information herein is intended to help you with greater awareness. If you are ill and need treatment, seek out a qualified healthcare professional. Please see our Legal page for our disclaimer.

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