

## **Common Helminth Infections**

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### **Pinworms**

Pinworms (*Enterobius vermicularis*) represent the most common helminth (parasitic worm) infection in North America and are extremely common in children. Transmission of pinworms is via the fecal-oral route and is attributed to ingestion of eggs by biting nails, thumb sucking, inadequate hand washing, and even inhalation of airborne eggs. Infestation can also occur from contaminated linens, clothing, or bathroom fixtures. After ingestion, the eggs hatch in the duodenum and develop into adults in 1-2 months in the cecum. The adult pinworms are white, 2-13mm long, and can live for up to 13 weeks in the GI tract. At night the female pinworms migrate to the perianal area to lay eggs which often results in extreme itching and often reinfection due to scratching combined with a lack of hand washing. The migration of the worms at night can also result in infection of the female genitourinary tract which can produce vulvovaginitis and post menopausal bleeding. The eggs can remain viable for up to 20 days in a moist environment. In addition, some of the eggs can hatch on the anus and migrate back into the GI tract resulting in a recurring infection if no treatment is exercised. It is often the case that several family members become infected with pinworms.

Normally, it takes a period of weeks to months of infection before symptoms become present and one third of individuals will be asymptomatic. The most common symptom is extreme itching in the perianal region which usually occurs at night. It is not uncommon for a secondary infection to occur due to skin irritation due to vigorous scratching. Other less common symptoms include anorexia, abdominal pain, irritability, restlessness, insomnia, dysuria, enuresis, vulvovaginitis, and vaginal discharge. There may also be a link between appendicitis and pinworm infections.

The diagnosis of an Enterobiasis infection is made by applying a clear adhesive tape to the perianal region and examining the specimen under the microscope to look for eggs or adult worms. It is quite rare to see eggs or mature pinworms in feces or urine. The treatment of choice for pinworm infections is Pyrante Pamoate (Combantrin) in a single dose of 125mg/25lbs (11mg/kg). Other treatment options include Mebendazole and Ivermectin. In order to overcome a pinworm infection, prevent recurrence, and prevent passing on infection it is important to practice vigilant hand washing, trim fingernails, and wash any potentially infected clothing and linens.

Currently, the liquid form of Pyrante Pamoate is not available in Canada. For young children who cannot swallow the tablets, a suspension can be compounded by a pharmacist by crushing tablets and using OraBlend or simple syrup as a vehicle. As it may be difficult to get an exact dose using part of the tablet, a better option would be to compound a stock suspension and give a fraction to the child. This should be used as a last resort as there is little information with regards to stability, settling, caking, and

resuspension. The suspension should be discarded after 14 days although one dose should only be required so this should not be an issue.

## **Tapeworms**

Tapeworms (Cestodes) are much less common in North America than pinworms but are very common in other parts of the world such as Latin America, Sub Saharan Africa, India, China, and Southeast Asia. Tapeworms are flat, ribbon like nematodes that are often passed in short segments. Tapeworm infection is usually caused by eating raw or undercooked meat. Tapeworm infections are relatively benign as they only attach to the small intestine and extract nutrients rather than actively damaging the body. The symptoms of tapeworm infections are usually mild and are often only noticed if a section is passed. Also, it is not uncommon for movement to be felt in the undergarments due to a motile tapeworm. The most common symptoms include GI irritation and nutritional deficiencies. There are four types of human tapeworms: the dwarf tapeworm (*Hymenolepis nana*), the beef tapeworm (*taenia saginata*), the pork tapeworm (*taenia solium*), and the fish tapeworm (*diphyllobothrium latum*).

The pork tapeworm is 2-3 m long on average and can live up to five years and is the most dangerous tapeworm due to the fact that it can cause neurocysticercosis. This is a life threatening condition which is the leading cause of acquired epilepsy worldwide. Humans can contract a pork tapeworm infection only via consuming undercooked pork. The beef tapeworm infects approximately 60 million people worldwide and is a relatively large worm which grows up to 8 m long although is 2-5 m long on average. A beef tapeworm infection occurs by eating viable larvae found in undercooked or raw beef. The dwarf tapeworm is 1-5 cm long and is the most commonly seen tapeworm infection with approximately 75 million people being affected worldwide. The dwarf tapeworm is unique as it does not require an intermediate host so infection can occur via ingestion of eggs among other routes. In addition, the dwarf tapeworm may have a zoonotic vector via fleas. The fish tapeworm is 3-10 m long and one of the less common tapeworms infecting only 9 million people worldwide, with a higher prevalence in Japan and South America. Fish tapeworms are transmitted via consumption of raw fish. Deep freezing of the fish before consumption and proper cooking methods can eliminate the chance of infection.

Immunodiagnostic tests are available to confirm a diagnosis of a tapeworm infection. Treatment of tapeworm infection is extremely effective with Praziquantel (5mg/kg single oral dose) or Niclosamide (2g oral dose). It is often recommended that a purge be carried out approximately 2 hours after taking an antihelminthic to recover the intact tapeworm. Also, it is recommended that the entire family be treated in order to break the infection chain. In addition, tapeworm infections via pets can occur but this is very rarely seen (usually via canines). Tapeworms are mostly found in under developed regions where proper agricultural and sewage treatment practices are not being undertaken. If proper hygienic and food preparation methods are practiced, the risk of contracting a tapeworm infection is very low.

## **Whipworms**

Whipworms (*Trichuris trichiuria*) are round, short worms (2-5 cm long), and curved in a whip like shape. Adult whipworms make their home in the soil after an infected animal defecates outside causing eggs to be released into the environment. Whipworms can be acquired by consuming fruits and vegetables that

have not been properly washed and also by placing hands or fingers that are contaminated with soil in the mouth. Whipworms are mainly found in the tropics and can result in light or heavy infections. In light infections, no symptoms are noticeable. In a heavy infection, frequent painful passage of stool occurs that contains a mixture of water, mucous and blood. This can result in rectal prolapse and growth retardation in children. Diagnosis of a whipworm infection is made by checking a stool sample for whipworm eggs. Albendazole and Mebendazole are effective treatments for whipworm infections. Whipworm infection is very common affecting 600-800 million people worldwide.

### **Roundworms**

Roundworms (*Ascaris lumbricoides*) represent another type of soil transmitted helminth and are estimated to affect 0.8-1.2 billion people worldwide. They can grow up to six inches in length and appear very similar to earthworms. Usually, infections go unnoticed until an adult worm has been passed. In rare cases when symptoms are seen they usually involve abdominal discomfort and sometimes intestinal blockage. Roundworm infections are transmitted the same way as whipworm infections and are also treated in a similar manner. Proper hand washing and food preparation techniques can eliminate the chances of contracting a roundworm infection. Roundworm infections are most commonly seen in warm, moist climates.

### **Hookworms**

Hookworms, another commonly seen helminthic infection, are estimated to infect between 576 and 740 million people worldwide. Hookworms are another example of a soil transmitted helminth. They live in the small intestine and are transmitted to the soil when a person defecates outside. The eggs then hatch in the soil into larvae that have the ability to penetrate human skin. Most hookworms are acquired by walking barefoot on contaminated soil. The first signs of infection are a localized rash and itching at the site of penetration on the skin. In the majority of hookworm infections, symptoms are not seen, but some GI irritation can be seen along with anemia in more serious cases. Diagnosis of a hookworm infection is made by microscopically analyzing a stool sample for the presence of eggs. Treatment of a hookworm infection is effective with Albendazole and Mebendazole.

### **References**

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