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[Home](#) > [Medical Reference](#) > [Complementary Medicine](#)

## Roundworms

### Introduction:

Roundworms, or nematodes, are parasites that can infect people. They usually live in the intestines. There are different species of worms that can cause infection, and worms can range in length from 1 millimeter to 1 meter. Most often, eggs or larvae live in the soil and get into the body when a person gets them on his or her hands and then transfers them to the mouth. Some can also get into the body through the skin.

Like other parasitic diseases, roundworm infections are more common in warm, tropical climates. Ascariasis is the most common roundworm infection, and affects as many as 1 billion people worldwide.

### Signs and Symptoms:

The signs and symptoms of roundworm infection include:

#### Ascariasis

- Cough
- Shortness of breath
- Abdominal pain
- Nausea and diarrhea
- Blood in the stool
- Weight loss
- Fatigue
- Presence of worm in vomit or stool

#### Guinea worm disease

Symptoms start about one year after infection. When the adult worm is ready to lay eggs, it comes out through the skin. A blister develops, usually on the legs of feet, and becomes an open wound. When the wound is submerged in water, the tip of the worm emerges to lay its eggs. Symptoms include pain and swelling at the site of the wound.

#### Hookworm

Often no symptoms are present. Or they may include:

- Itchy rash
- Cough
- Wheezing
- Difficulty breathing
- Abdominal pain
- Weight loss
- Diarrhea
- Loss of appetite

#### Loiasis

- Watery or itchy eyes
- Blurred vision
- Some people may see the worm move across the eyes

#### Lymphatic filariasis

- Swelling and scarring, especially of the legs and groin
- Infections

### River blindness

- Itchy rash
- Sores on the skin
- Swollen lymph nodes
- Skin turns white (loss of pigmentation)
- Loss of vision

### Threadworm

- Itch where the worm enters the skin (similar to a bug bite)
- Nausea and diarrhea
- Fever
- Blood in the stool
- Dry cough or coughing up blood
- Difficulty breathing

### Trichinosis

- Diarrhea
- Abdominal pain
- High fever
- Muscle pain
- Sensitivity to light (photosensitivity)
- Headache
- Pink eye (conjunctivitis)

### Whipworm

- Abdominal pain
- Diarrhea (sometimes bloody)
- Anemia

### Causes:

According to the National Institute of Allergy and Infectious Diseases, many roundworm parasitic diseases are caused by poor sanitation and hygiene. Most roundworms or their eggs are found in the dirt and can be picked up on the hands and transferred to the mouth. Or they can get into the body through the skin. Different species of roundworms cause different infections.

The various roundworm infections include:

- **Ascariasis:** People become infected when they eat food or drink that contains the eggs of the roundworm *Ascaris lumbricoides*. That can happen when people eat food grown in soil that has been mixed with human feces. Once in the body, the larvae enter the lungs and then the throat, where they are coughed up and swallowed. Once they are swallowed, larvae enter the intestines and become adults. They can produce eggs for a year or more.
- **Guinea worm disease (dracunculosis):** People can become infected with Guinea worm disease when they drink contaminated water. Larvae grow into adults in the intestines, where they can grow to be 3 feet long. Then the adult moves to another area of the body (usually the legs) and emerges through a painful blister. The tip of the worm comes out through the skin to lay its eggs whenever the skin is immersed in water. This type of roundworm infects 10 - 40 million people annually worldwide, mostly in the Indian subcontinent, West and Central Africa, and some Middle Eastern countries.
- **Hookworm (ancylostomiasis):** A hookworm infection occurs when larvae come into contact with human skin through contaminated soil or feces. They penetrate the skin, making their way through the lungs to the small intestine, where they latch on and grow into adults, laying more eggs. They feed off the blood of the infected person, which can lead to anemia. Children are especially vulnerable to this kind of infection. These roundworms infect about 25% of the world's population.
- **Loiasis:** Loiasis is an infection caused by the roundworm *Loa loa*. Like river blindness, loiasis is spread by day-biting flies. An estimated 3 - 13 million people in equatorial Africa have been infected with *Loa loa*.
- **Lymphatic filariasis:** A lymphatic filariasis infection occurs when a person is bitten by a mosquito containing the roundworms *Wucheria bancrofti*, *Brugia malayi*, or *Brugia timori*. Over 6 - 12 months, adult worms mature and live in human lymph vessels and nodes. Eggs are released and circulate through the blood. About 90 million people worldwide have been infected with these roundworms.
- **Pinworm (enterobiasis):** A pinworm infection occurs when a person consumes food or drink contaminated

with feces containing the worm. The eggs hatch in the small intestine, and adult worms ultimately live in the large intestine. The pregnant female worms move to the anus and deposit large numbers of eggs in the skin around that area. Pinworm, which is commonly spread in day care centers, schools, and camps, affects as many as 1/3 of all American children.

- **River blindness (onchocerciasis):** River blindness is an infection of the eyes caused by the roundworm *Onchocerca volvulus*. River blindness is spread by day-biting flies, and is the leading cause of blindness worldwide. It affects about 20 million people, mostly in Africa.
- **Threadworm (strongyloidiasis):** Threadworm usually occurs when someone walks barefoot on contaminated soil, and larvae get into the skin. Inside the body, they move to the lymph nodes and then to the lungs and throat. When the person coughs, the larvae are swallowed and move to the intestines. There they grow into adults and produce eggs. About half of the population of some African countries has been infected with threadworm.
- **Trichinosis (trichiniasis):** Trichinosis is an infection caused by the roundworm *Trichinella spiralis*. These larvae live in pigs and other wild carnivores, such as bears. People can get infected when they eat meat (particularly pork) that is undercooked. The larvae mature in the small intestine and move to muscle cells where they can live for months or years.
- **Visceral larva migrans, or VLM (toxocariasis):** VLM is an infection caused by the roundworms *Toxocara canis*, *Toxocara cati*, or *Baylisascaris procyonis*. These parasites usually infect dogs, cats, and raccoons, respectively. People can get infected by ingesting soil contaminated by animal feces. While the larvae do not grow to be adults in people, they penetrate the intestinal wall and move to various parts of the body, particularly the lungs and liver.
- **Whipworm (trichuriasis):** A whipworm infection occurs when a person eats food contaminated with soil containing eggs of the worm. After eggs are eaten, larvae hatch and attach themselves to the large intestine.

### Risk Factors:

The risk factors for roundworm infection include:

- Living in or visiting a warm, tropical climate
- Poor sanitation
- Poor personal hygiene
- Crowded conditions, such as day care or institutional settings
- Weakened immune system
- Malnutrition
- Eating undercooked meat
- Eating dirt or clay -- children tend to become infected this way
- Contact with animal feces
- Multiple insect bites

### Diagnosis:

Diagnosing roundworm infection involves finding out which worm is causing the infection. If you have lived in or visited an area known to have these parasites, your doctor may suspect an infection. If a worm passes through your mouth or rectum, take it to your doctor so it can be identified. Other steps in diagnosis may include:

- Physical exam
- Stool and urine samples -- identify microorganisms in the stool and urine
- Blood tests -- find infection in the blood
- Muscle or skin biopsy -- find infections that affect the muscle or skin
- Ultrasound -- reveals worms in lymph nodes
- X-ray -- show large worms in abdominal region
- Tape test -- used particularly for pinworm infections. A doctor applies sticky tape to the skin around the anal region, removes the tape, and then examines it under a microscope for pinworm.

### Preventive Care:

It is easier to prevent roundworms than to cure them. The steps to preventing roundworm infection include:

- Practice good personal hygiene -- wash hands and avoid contact with fecal matter.
- Don't eat uncooked or unwashed fruits and vegetables.
- Stay away from mosquito or fly-infested areas; don't drink unfiltered water; and don't touch the soil in areas where roundworm infections are common.
- Wear protective clothing, and use insect repellent.
- Cook or freeze meat thoroughly.

- Keep children away from pet feces.
- Ask a veterinarian about deworming pets.
- Public health measures include improving general sanitation, especially sewage disposal, and reducing mosquito and fly populations.

### **Treatment:**

Medications that kill parasites are the primary treatment for roundworm infections. The medication prescribed depends on which roundworm infects the person. Surgery may sometimes be needed, but is not always readily available in areas where roundworm infections are common. Roundworm infections can cause inflammation in the intestines and make it hard for your body to absorb essential nutrients, including vitamins A and B6. Some scientists think that vitamin A deficiencies increase the risk of parasitic infections. So some researchers believe that vitamin A supplements may help prevent or reduce symptoms of roundworm infections.

### **Medications**

Antiparasitic drugs and other medications used to treat roundworm infections and certain complications include:

- Ascariasis -- Mebendazole (Vermox), pyrantel (Pin-Rid or Antiminth), albendazole (Albenza)
- Hookworm -- Mebendazole (Vermox), albendazole (Albenza)
- Loiasis -- Diethylcarbamazine (Hetrazan), ivermectin (Stromectol)
- Lymphatic filariasis -- Albendazole (Albenza), diethylcarbamazine (Hetrazan)
- River blindness -- Ivermectin (Stromectol)
- Threadworm -- Ivermectin (Stromectol), thiabendazole (Mintezol), albendazole (Albenza)
- Trichinosis -- Albendazole (Albenza), mebendazole (Vermox)
- Whipworm -- Mebendazole (Vermox), albendazole (Albenza)

Other medications:

- Prednisone -- for severe VLM and at certain times in cases of trichinosis
- Oral iron -- if anemia is present
- Analgesics, anti-inflammatories, antihistamines, and antibiotics -- for relief of symptoms or to treat bacterial infection

See "Warnings and Precautions" for certain medications that someone with roundworm infection should avoid.

### **Surgery and Other Procedures**

Guinea worms should be removed surgically, but surgery not be available in many areas where infection is common. Surgery may be needed in other cases when the roundworm infection causes obstructions in the intestines or other organs. Treatment to reduce soft tissue swelling from lymphatic filariasis may include bandaging, physical therapy, careful skin care, as well as draining fluids.

### **Nutrition and Dietary Supplements**

Many people who are infected with roundworms are malnourished, so getting enough nutrients for overall health may help in preventing and treating roundworm infection. A comprehensive treatment plan for roundworm infections may include a range of complementary and alternative therapies. Ask your doctor about the best ways to incorporate these therapies into your overall treatment plan. Always tell your health care provider about the herbs and supplements you are using or considering using.

Following these nutritional tips for general health may lower the chances of becoming infected with roundworms and support a healthy body if infected:

- Eat bitter and spicy foods, such as those containing turmeric (curries), cayenne peppers, green chilies, olives, figs, garlic, and ginger.
- Drink warm teas that contain spices such as cardamom, clove and cinnamon.
- Eat more dark leafy greens (such as spinach and kale) and sea vegetables.
- Eat antioxidant foods, including fruits (such as blueberries, cherries, and tomatoes) and vegetables (such as squash and bell peppers).
- Avoid refined foods, such as white breads, pastas, and especially sugar.
- Eat fewer meats, and more cold-water fish, tofu (soy, if no allergy) or beans for protein. Stay away from pork and other meats from carnivorous animals.
- Use healthy oils in foods, such as olive oil or vegetable oil.
- Avoid caffeine, alcohol, and tobacco.
- Drink 6 - 8 glasses of filtered water daily.

- Exercise at least 30 minutes daily, five days a week.
- Take a multivitamin daily, containing the antioxidant vitamins A, C, E, the B-complex vitamins, and trace minerals such as magnesium, calcium, zinc, and selenium.

## Herbs

Herbs are generally a safe way to strengthen and tone the body's systems. As with any therapy, you should work with your health care provider to get your problem diagnosed before starting any treatment. You may use herbs dried extracts (capsules, powders, teas), glycerites (glycerine extracts), or tinctures (alcohol extracts). Unless otherwise indicated, you should make teas with 1 tsp. herb per cup of hot water. Steep covered 5 - 10 minutes for leaf or flowers, and 10 - 20 minutes for roots. Drink 2 - 4 cups per day. You may use tinctures alone or in combination as noted.

Although there are no scientific studies that show any herbs help treat roundworm infections, the following herb may help overall health:

- Green tea (*Camellia sinensis*) may help boost the immune system. Prepare a tea from the leaf of this herb and drink 1 - 2 cups, one to three times daily. Caffeine-free products are available.
- Olive leaf (*Olea europaea*) standardized extract, 250 - 500 mg one to three times daily, may help boost the immune system. Olive leaf may lower blood pressure and blood sugar. Ask your doctor before taking it if you take medications for high blood pressure or diabetes.
- Turmeric (*Curcuma longa*) standardized extract, 300 mg three times a day, appears to kill parasites in test tubes and animal studies, although there is no evidence of that yet in human studies. Turmeric may increase the risk of bleeding. Ask your doctor before taking turmeric if you also take blood thinners such as aspirin or warfarin (Coumadin).
- Garlic (*Allium sativum*), standardized extract, 400 mg two to three times daily, has been shown to kill parasites in test tubes and animals, but there is no evidence yet whether it works in humans. Garlic may increase the risk of bleeding. Ask your doctor before taking garlic if you also take blood thinners such as aspirin or warfarin (Coumadin).
- Wormwood (*Artemisia absinthium*), black walnut (*Juglans nigra*), and clove (*Syzygium aromaticum*) are often used in combination herbal formulas for parasitic infections. Many products on the market combine these herbs so take as directed by your health care provider. Be sure to ask your doctor before taking wormwood if you have stomach ulcers. Pregnant women should not take wormwood. Wormwood may interact with some anti-seizure medications.

## Other Considerations:

### Pregnancy

Most antiparasitic drugs used to treat roundworm infection should not be used during pregnancy.

### Warnings and Precautions

Ivermectin, a medication sometimes used to treat roundworm infections, should not be given to nursing mothers, the severely ill, children under 5 years old, or those weighing less than 15 kg (6.8 lb).

### Prognosis and Complications

There are several possible complications associated with roundworm infections. They include:

- Intestinal obstruction, caused by the roundworm itself
- Inflammation of the intestines or gall bladder
- Kidney disease
- Pus accumulation in the liver
- Inflammation of the pancreas
- Appendicitis
- Peritonitis, inflammation of the sac surrounding the abdomen
- Encephalopathy, a brain disorder
- Cardiomyopathy, a disease of the heart muscle
- Malnutrition
- Abnormal growth of the skin and surrounding soft tissue
- Blindness (from onchocerciasis)

Some roundworm infections can last a long time, and there are many possible complications. People living in areas where roundworm infections are common may become infected more than once. Fortunately, most roundworm infections can be treated with antiparasitic medications. For example, the prognosis in cases of ascariasis and

pinworm is generally excellent.

### Alternative Names:

Ascariasis; Guinea worm disease; Hookworm; Loiasis; Lymphatic filariasis; Parasitic infection - roundworms; Pinworm; River blindness; Threadworm; Trichinosis; Visceral larva migrans; Whipworm

- Reviewed last on: 9/12/2010
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### Supporting Research

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