



Hookworm Infection

What is hookworm?

Hookworm is an intestinal parasite of humans that causes mild diarrhea and abdominal pain. Heavy infection with hookworm can create serious health problems for newborns, children, pregnant women, and persons who are malnourished. Hookworm infections occur mostly in tropical and subtropical climates. In 2002, the estimated number of person infected with hookworm was 1.3 billion.



Where are hookworms commonly found?

The geographic distributions of the hookworm species that are intestinal parasites in humans, *Ancylostoma duodenale* (an-cy-CLO-sto-ma doe-AH-den-al) and *Necator americanus* (ne-KAY-tor am-er-i-CON-us), are worldwide in areas with warm, moist climates, and widely overlapping. *Necator americanus* was widespread in the Southeastern United States early in the 20th century. The Rockefeller Sanitary Commission was founded in response, and hookworm infection in this area was well controlled.

Hookworm eggs are not infective; they release larvae in soil that have the ability to penetrate the skin. Hookworm infection is transmitted primarily by skin being in contact with soil (for example, by walking barefoot) but can also be transmitted through the ingestion of larvae.



How do I get a hookworm infection?

You can become infected by direct contact with contaminated soil, generally through walking barefoot, or accidentally swallowing contaminated soil.

Hookworms have a complex life cycle that begins and ends in the small intestine. Adult female worms produce thousands of eggs, which are excreted in stool. Hookworm eggs are not themselves infective. However, if they reach soil (for example, when infected persons defecate on the ground or when "night soil" is used to fertilize crops) and if the soil conditions are favorable (warm, moist, and shaded), the eggs hatch into larvae. The barely visible larvae penetrate the skin (often through bare feet), are carried to the lungs, go through the respiratory tract to the mouth, are swallowed, and eventually reach the small intestine. This journey takes about a week. In the small intestine, the larvae develop into half-inch-long worms, attach themselves to the intestinal wall, and suck blood.

Who is at risk?

People who have direct contact with soil that contains human feces in areas where hookworm is common are at high risk of infection. Children --because they play in dirt and often go barefoot-- are at high risk, although the prevalence of hookworm infection in endemic countries continues to rise into young adulthood. Since transmission of hookworm infection requires development of the larvae in soil, hookworm is not spread person to person. Contact among children in institutional or child care settings should not increase the risk of infection.

What are the symptoms of hookworm?

Itching and a rash at the site of where skin touched soil and is usually the first sign of infection. These symptoms occur when the larvae penetrate the skin. While a light infection may cause no symptoms, heavy infection can cause anemia, abdominal pain, diarrhea, loss of appetite, and weight loss. Heavy, chronic infections can cause stunted growth and mental development.

Can a hookworm infection cause any serious health problems?

Yes. The most serious results of hookworm infection are the development of anemia and protein deficiency caused by blood loss. When children are continuously infected by many worms, the loss of iron and protein can retard growth and mental development, sometimes irreversibly. Hookworm infection can also cause tiredness, and difficulty breathing with exertion. Severe disease can cause congestive heart failure.

What should I do if I think I have a hookworm infection?

Visit your health care provider. Infection is diagnosed by identifying hookworm eggs in a stool sample.

What is the treatment for hookworm?

Hookworm infections are generally treated for 1-3 days with medication prescribed by your health care provider. The drugs are effective and appear to have few side effects. Your health care provider may decide to repeat a stool exam after treatment. Iron supplements may be prescribed if you have anemia.

How can I prevent hookworm?

Do not walk barefoot or contact the soil with bare hands in areas where hookworm is common or where there may be fecal contamination of the soil.



More Information:

1. Brooker S, Bethony J, Hotez PJ. Human hookworm infection in the 21st century. *Adv Parasitol.* 2004;58:197-288.
2. Bethony J, Bookor S, Albonico M, Geiger Sm, Loukas A, Diement D, Hotez PJ. Soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm. *Lancet.* 2006;367:1521-32.
3. Hotez PJ. Hookworm infections. In: Guerrant RL, Walker DH, Weller PF, editors. *Principles, pathogens & practice.* 2nd ed. Philadelphia: Elsevier; 2006. p. 1265-73.
4. Hotez PJ, Pritchard DI. Hookworm infection. *Sci Am.* 1995 June;68-74.
5. Maguire JH. Intestinal nematodes (roundworms). In: Mandell GL, Bennett JE, Dolin R, editors. *Principles and practice of infectious diseases.* 6th ed. Philadelphia: Elsevier; 2005. p. 3260-3266.

This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider. If you have any questions about the disease described above or think that you may have a parasitic infection, consult a health care provider.