

What's Buggin' You, Giardiasis?

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During the past 15 years, giardiasis has become recognized as one of the most commonly identified intestinal parasitic waterborne diseases in humans in the United States (“Viruses, Bacteria and Parasites in the Digestive Tract,” 2011). The Center of Disease Control (CDC) estimates that there are upwards of 2.5 million cases annually (“Prevalence of Giardiasis,” 2011). According to *ScienceDaily*, the estimated annual costs for giardia-related infections are \$16-\$63 million (“Waterborne Diseases Could Cost Over \$500 Million Annually in US,” 2010). First discovered in 1681 by Antoine van Leeuwenhoek in his own stool (“History of Giardia,” 2011), the Environmental Protection Agency’s (EPA) water treatment now requires surface water to be disinfected and filtered so that 99.9 percent of giardia is removed (“Basic Information about Pathogens and Indicators in Drinking Water,” 2011). The environmental impact of giardiasis infections will continue to be a significant problem if we do not disinfect our water properly, practice good hygiene, and take notice of the serious effects of the disease.

Giardia is a microscopic parasite, found on surfaces or in soil, food, or contaminated water that contains feces from infected humans or animals. A parasite is an organism that feeds off another to survive. The life cycle of giardia consists of two stages: cyst and trophozoite. The cysts are approximately 7-10 μm in length and have an oval shape. The cysts are environmentally resistant and responsible for disease transmission. Cysts can remain viable for several months in cool, moist conditions and have been detected in natural surface waters. The cysts are able to survive standard concentrations of chlorine used in water purification systems. Infection occurs by the ingestion of cysts. The trophozoite stage is responsible for producing the clinical disease giardiasis in humans. The trophozoites are 12-15 μm in length

and have a teardrop shape. The trophozoites settle in the small intestine and attach to the mucosa by a ventral sucking disk. The trophozoites then multiply by longitudinal binary fission. As the trophozoites move toward the colon, they retreat into the cyst stage, known as encystation. The new cysts are excreted in the feces (“The Giardia Lamblia Organism,” 2011).

The giardiasis infection is transmitted from drinking water or using ice made from water sources where giardia parasites may live, for example, untreated or improperly treated water from lakes, streams, or wells. Giardiasis can be spread from eating uncooked foods that contain the giardia organism. The giardia organism can encounter the human body when bathroom handles, changing tables, diaper pails, or toys that contain feces from an infected person or animal is touched. If a human swallows water while swimming or playing in lakes, springs, ponds, streams, and rivers where giardia may live, he can become infected (“Giardiasis Frequently Asked Questions,” 2011).

In the United States, giardia infection is the most common intestinal parasitic disease-affecting humans. Giardiasis is an intestinal disorder characterized by abdominal discomfort, diarrhea, nausea or vomiting and dehydration. Some less common symptoms include itchy skin, hives, swelling of the eye and joints. The signs and symptoms of giardiasis normally begin one to three weeks after becoming infected. The symptoms of giardiasis may last two to six weeks, but they can last longer (“Disease,” 2011). The standard diagnostic test for detecting giardiasis is a stool microscopy in which three specimens of stool are needed. The giardia-specific stool antigen tests have a faster, more sensitive diagnostic capability that requires only one single stool specimen (“Giardiasis Diagnosis,” 2011). The standard treatment for giardiasis consists of antibiotic therapy. Metronidazole is the most commonly prescribed antibiotic for

this condition with a cure rate of 85-90% (Mukherjee, 2011). Tinidazole is another antibiotic that can be indicated for the treatment of giardiasis with a cure rate for of 90%. Nitazoxanide is another antibiotic designated for giardiasis treatment with a cure rate of 85% (“Giardiasis Treatment,” 2011).

Not one person, nation, or country is immune to giardiasis. Some individuals are more likely to become infected than others are, for example, children in childcare settings, in particular those still in diapers. People who have close contact with caring for those currently sick with giardiasis and individuals who live in the same household have a greater chance of infection. Backpackers, hikers, and campers who drink unsafe water or who do not practice good hygiene also have an increased risk of infection. Individuals who engage in oral-anal sexual contact have an amplified threat of infection as well (“Epidemiology and Risk Factors,” 2011).

Giardia prevention starts with practicing good hygiene. Wash your hands with soap and clean, running water for at least 20 seconds and make sure to scrub the back of your hands, between your fingers, and under your fingernails. Always wash your hands before, during, and after food preparation and before eating. Continue hand washing before and after caring for someone who is sick and before and after treating a cut or wound. Definitely wash your hands after using the toilet and after changing diapers or cleaning up a child who has used the toilet. Continue hand washing after blowing your nose, coughing, or sneezing. Continue hand washing after touching an animal or animal waste and after touching garbage. When at recreational water venues, pools, beaches, and fountains, protect others by not swimming if you have diarrhea. Wash children thoroughly with soap and water after they use the bathroom, or after

their diapers are changed, and before they enter the water. Take children on frequent bathroom breaks, check their diapers often, and change their diapers in the bathroom, not by the water. When cleaning up animal feces, minimize contact by wearing disposable gloves, and always wash hands when finished. After gardening, wash your hands even if you wore gloves. If the safety of drinking water is in doubt, or you are in a place with poor sanitation or lack of water treatment systems, do one of the following: drink bottled water or disinfect tap water by boiling it for one minute. Avoid eating food that may be contaminated when traveling in places with poor food and water treatment. Prevent contact and contamination with feces during sex by using a condom during oral-anal sex and by washing your hands right after handling a used condom, and after touching the anus or rectal area ("Prevention & Control," 2011).

In the United States, we have not eradicated this waterborne disease, and we need to comprehend its burden. Giardiasis is a nationally notifiable disease, and this means that health care providers and laboratories that diagnose cases of giardiasis are required to report those cases to their local or state health departments, which in turn reports the cases to the CDC. The key to controlling this waterborne disease is making water filtration a more effective treatment. Waterborne outbreaks occur when one or more barriers are neglected, and there is a continuing need for improving these barriers and monitoring their effectiveness, especially in terms of operation, water treatment, and water distribution.

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