Giardia and Beavers

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For Art's educational Giardia and Beavers video go to: https://youtu.be/XbXcoE9Nl-0.

The World Health Organization suspects that 200 million people are infected every year.

https://www.safewater.org/fact-sheets-1/2017/1/23/giardia

Even though someone may be asymptomatic when infected with Giardia they can still act as a host or carrier for the pathogen and are still capable of infecting others within their family of household.

Giardia may be found in food, water, soil or on surfaces that have been contaminated by the feces of an animal or human that is infected. Ingesting food or water contaminated from sewage probably causes most infections.

Surface waters under the influence of agricultural, farming, or residential activity usually have high pathogen levels, with seasonal variation being observed. Wells are at risk of being contaminated if they: have not been properly installed, have cracks in the casing, are not properly located or are too shallow.

https://vet.uga.edu/scwds

Wilderness areas can be heavily contaminated due to improper disposal of human feces. Furthermore, genetic studies have shown that domestic dogs, cats, cattle, and sheep are also capable hosts of Giardia similar to that of human origin.

Although most people associate Giardia lamblia intestinal infection with beavers, the protozoa is commonly found in most waterways in North America and occurs in a percentage of most wild and domestic animals and humans across the globe

For most cases of illness, the source of the infection cannot be identified, and thus data from national case reports cannot be used to describe pathogen transmission

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5150856/?fbclid=IwAR3owogfSIdFfPNnM6f-9CqJ8RYOAiPLqZR-8uMmU50rO2WUNtf9mAfgdis

Giardia intestinalis is the leading parasitic aetiology of human enteric infections in the United States, with an estimated 1.2 million cases occurring annually.

Three-quarters of waterborne giardiasis outbreaks (n = 135, 74.6%) were associated with drinking water, followed by recreational water (n = 33, 18.2%) and other water (n = 13, 7.2%). More than two-thirds of all reported drinking water-associated outbreaks (96 outbreaks) occurred during the 19-year period 1971–1989; the remaining 39 outbreaks occurred during the 22-year period 1990–2011

Problems with water treatment, untreated groundwater, and distribution systems were identified most often during drinking water-associated outbreak investigations; problems with water treatment declined after the 1980s.

Most recreational water-associated outbreaks (n = 22, 66.7%) and outbreak cases (n = 9295, 96.5%) were linked to treated recreational water venues (Table 3). Giardia was the only pathogen identified for most of these outbreaks (72.7% for both treated and untreated water), but most cases of illness resulted from outbreaks of multiple aetiologies (93.2% in treated water and 67.9% in untreated water). Of treated recreational water-associated outbreaks, the most common swimming venues were pools (50.0%) and wading pools (36.4%). Most (91.0%) outbreak cases resulted from three waterpark-associated outbreaks; two of these outbreaks, accounting for 8449 (90.9%) of all treated recreational water-associated outbreak cases, were caused by aetiological agents Giardia and Cryptosporidium. Among the untreated recreational water-associated outbreaks, most outbreaks (72.7%) and cases (94.7%) were associated with lakes. Outdoor areas/parks were the most frequent settings of untreated recreational water-associated outbreaks (36.4%), while beaches were the setting of the most resulting cases (67.9%).

For waterborne outbreaks associated with water other than drinking water or recreational water, the most commonly implicated water type was a river/stream, which was linked to six outbreaks (46.2%) and 48.4% of outbreak cases. Two outbreaks (15.4%) were associated with a puddle, canal, or swamp; two outbreaks (15.4%) were associated with wastewater or partially treated wastewater; one outbreak (7.7%) was associated with a spring, and two outbreaks had an unreported water type.

Still, even on days where the water quality is considered acceptable for bathing by bacterial indicator standards, crowded beach waters might contain human pathogens, including Giardia and Cryptosystem, likely because of direct microbial input from bathers and re-suspension of sediment [32, 33].

https://www.epa.gov/sites/production/files/2015-10/documents/giardia-factsheet.pdf
Numerous species of Giardia have been found in a variety of mammals, birds, reptiles, amphibians, and fishes. Giardia has also been detected in beaver, muskrats, wading birds, voles, mice, shrews, gerbils, rats, deer, native marsupials, Australian brush-tail possums, ringed seals, and llamas. There is no general agreement on the criteria to define species, host specificity, body size and shape. Internal structures, biochemical, molecular, and genetic techniques have all been used. Scientists and physicians describe the specie(s) responsible for human infections as G. lamblia, G. duodenalis, or G. intestinalis.

The wide occurrence of cysts in humans and animals suggests that soil can be contaminated with Giardia through fecal deposition and sewage disposal practices. Municipal waste waters likely always contain Giardia cysts. Giardia is distributed worldwide in lakes, ponds, rivers, and streams. It is even found in high quality water sources with no municipal wastewater discharges. All surface waters probably contain Giardia, and whether cysts are detected depends largely on the methods used to collect and analyze water samples.

The role of animals in causing human infection is not clear, but evidence suggests that the beaver and possibly the muskrat is a source of infection for humans.

Studies have not found that pets are an importance source of infection.

Poorly maintained wading and swimming pools and heavily used swimming areas at lakes and ponds pose an increased risk, especially if they are used by diaper-age toddlers or other persons prone to fecal accidents.

Since 1971, Giardia has been the most commonly identified pathogen in water borne outbreaks reported in the United States. More than 130 waterborne outbreaks have been-4-reported in 27 states; both residents and travelers have been affected. Outbreak statistics emphasize the need for filtration of surface water, optimization of the filtration process, frequent monitoring of treatment effectiveness, and better protection and treatment for ground water.

https://www.medicalnewstoday.com/articles/167079.php

Giardiasis occurs all over the world, but it is more common in areas with poor sanitation. In developing countries, it can affect 20 to 30 percent of the population at any one time. In some places, it affects 100 percent of the population.

An infant with giardiasis wearing diapers in a swimming pool can contaminate the water. Anybody who swims there is then at risk of becoming infected.

Statistics suggest that some 200 million people in Africa, Asia, and Latin America have Giardia with symptoms, and many others do not know they have it, because they do not have any symptoms.

https://web.stanford.edu/group/parasites/ParaSites2003/Giardia/GIARDIA2.htm

The Giardia microorganism was originally discovered by Antony van Leeuwenhoek. He described the Giardia trophozoite from a sample of his own stool in 1681:
"animalcules a-moving very prettily. . .Their bodies were somewhat longer than broad, and their belly, which was flatlike, furnisht with sundry little paws. . . and albeit they made a quick motion with their paws, yet for all that they made but slow progress"

https://emedicine.medscape.com/article/176718-overview

The organism has been found in as many as 80% of raw water supplies from lakes, streams, and ponds and in as many as 15% of filtered water samples

Although G. intestinalis was the first protozoan parasite described, its role as a pathogenic organism was not recognized until the 1970s, after community outbreaks and after the appearance of the disease in travelers returning from endemic regions. Prior to that time, the organism was thought to be a harmless commensal organism of the intestine.