

Protozoan Infections of the Gastrointestinal Tract

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KEYWORDS

• Protozoan • Infection • Gastrointestinal tract • Parasites

KEY POINTS

- Studies of parasite epidemiology and molecular typing of organisms have contributed to increased recognition of the zoonotic transmission of several species of gut protozoa.
- Diarrheal disease lasting for longer than 14 days in the tropics is likely to be caused by protozoan parasite infection.
- Fecal microscopy is the most readily available means of diagnosis though PCR based testing gives higher yields of parasite diagnosis.
- Treatment with metronidazole and related compounds is effective against giardia and amebiasis but not against cryptosporidium and cyclospora infections.

GIARDIA LAMBLIA

Life Cycle

Infection occurs by ingestion of giardia cysts (**Fig. 1**). The infecting dose is as low as 10 cysts, whereas 100 cysts consistently caused infection.¹ In vitro exposure to pH 2.2 and then pH 8.0 is necessary² for excystation. Protein kinase A is important for excystation and motility.^{3,4} Trophozoites (**Fig. 2**) divide asexually every 8 hours,⁵ with peak populations at 14 days in mouse infections.⁶ Encystation involves selective gene activation^{7,8} induced by altered concentrations of bile, cholesterol, and lactic acid.

Distribution

Giardiasis occurs worldwide as determined by opportunities for fecal-oral transmission of cysts in food and water. The malfunction of water treatment and the ineffective disposal of feces provide opportunities for giardia transmission.

Transmission

Infection is caused by the ingestion of cysts in contaminated food and water, through licking fingers or hands contaminated with cysts from the earth, and in the course of sexual activity when cysts adherent to perianal skin are ingested via fingers or tongue. Levels of chlorination in swimming pools do not inactivate cysts.⁹

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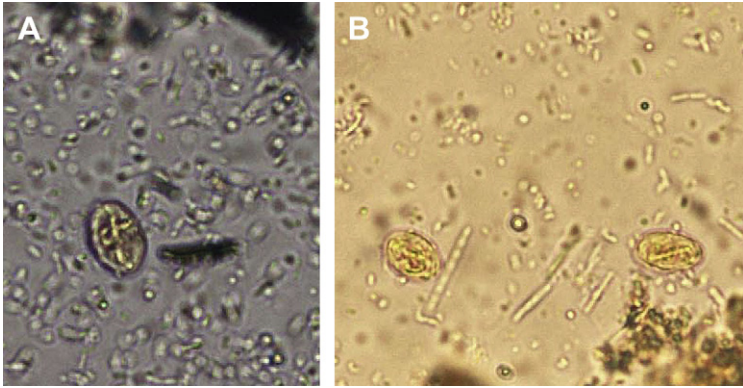


Fig. 1. Cyst of *Giardia lamblia* ([A] unstained, [B] iodine, original magnification $\times 400$). (Copyright Monika Manser; with permission.)

Epidemiology

Giardiasis is most common among the pediatric age group in the tropics, with peak infection rates at age 6 years of age, with subsequent decline caused by acquired immunity or reduced exposure. Infection occurs at any age among those from nonendemic areas. Outbreaks have occurred in preschool nurseries.

Giardiasis is a zoonotic disease. Beavers trapped around a surface water source implicated in the Camas, Washington outbreak¹⁰ excreted cysts. Hikers were infected from spring water they drank above human dwellings.¹¹ *Giardia* infection in dogs, cats, and birds had molecular typing identical with human infections. Eight assemblages (genotypes), A to H, are recognized, only A & B cause disease in humans.¹² Nucleotide sequence data differences meriting separate species status were found in 2 human isolates from different assemblages.¹³

Clinical

Giardia causes a range of severity of upset: from severe diarrhea with malabsorption to mild diarrhea with normal absorption. The incubation period is 8 days¹⁴ (median). Acute infections cause the sudden onset of watery diarrhea with yellow foul-smelling stools and foul-smelling flatus, abdominal distension, and occasionally

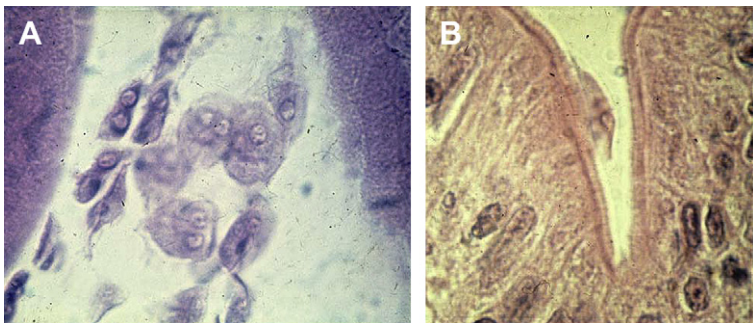


Fig. 2. (A) *Giardia* trophozoites in the intervillous space in jejunum, (B) a *giardia* trophozoite on the microvillous border of the jejunum (hematoxylin-eosin, original magnification $\times 400$).

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