Giardia

Class – M.Sc. Microbiology
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Giardia is a macroscopic parasite, a flagellated protozoan (unicellular and eukaryotic) that causes the diarrheal illness known as giardiasis.

Giardia (also known as *Giardia intestinalis*, *Giardia lamblia*, or *Giardia duodenalis*) is found on surfaces or in soil, food, or water that has been contaminated with feces from infected humans or animals.

Giardia lamblia is a common cause of diarrhea in humans and other mammals throughout the world.

Giardia is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it tolerant to chlorine disinfection.

While the parasite can be spread in different ways, water (drinking water and recreational water) is the most common mode of transmission.

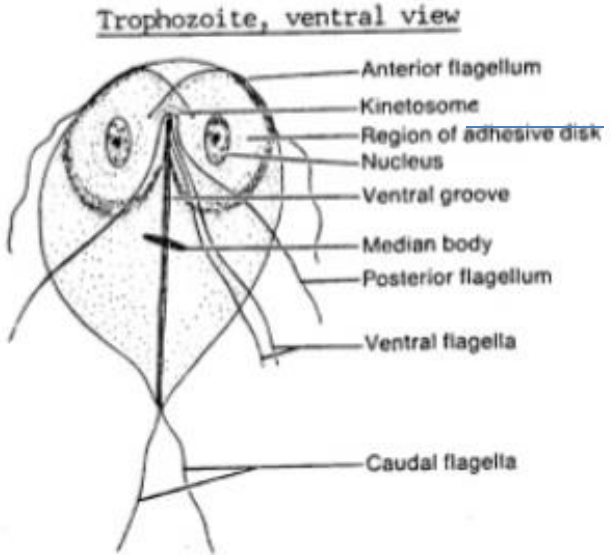
Geographical distribution: worldwide; found in the soil, water or surfaces contaminated with feces of infected human/animal.

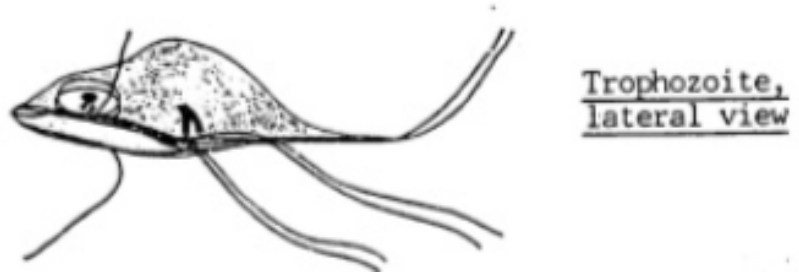
Habitat: **Duodenum and upper part of jejunum** of human.

Morphology

It exists in two forms: Trophozoite and Cyst

Trophozoite

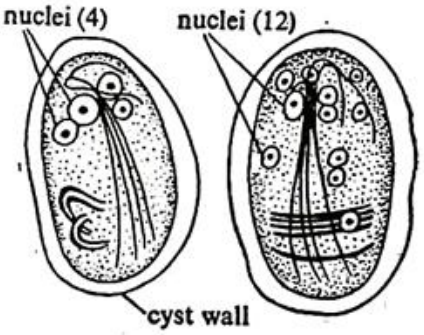




The trophozoites measure 9-20 micrometer by 6-20 micrometer. The body is pear shaped, with a broad anterior and a pointed posterior end. The body is flattened dorso- ventrally and is bilaterally symmetrical with organelles occurring in pairs. The dorsal (upper side or back of an animal) surface is convex and ventral side is concave. Trophozoites are binucleated having two nuclei with prominent nucleoli (looks like a face). The protoplasm in the oval body is clear. No structures identifiable as mitochondria, smooth endoplasmic reticulum or Golgi-complex have been identified in this stage. The ventral (underside of an animal or plant; abdominal) surface at its anterior end bears a bean-shaped sucking disc or adhesive disk which helps them adhere to surface of intestinal cells. The ventral surface has two median bodies or parabasal bodies (cytoplasmic bodies closely associated with the kinetoplast of certain flagellates) of unknown function just below the adhesive discs. The body bears 8 flagella: two posterior, two anterior, two ventral and two caudal (caudal means (near the tail or the posterior part of the body). Axostyles (sheet of microtubules found in certain protists) are paired.

Cyst

The cysts are oval in shape. They measure 8-14 micron by 6-10 micron. They contain 4-16 nuclei and these nuclei may remain clustered at one end or lie in pairs at opposite poles. The flagella are disintegrated and their remains may be visible sometimes. They also contain axostyles, parabasal bodies and fibril.



Each cyst gives rise to two trophozoites during ***excystation*** in the intestinal tract.

Mode of reproduction: *Giardia* reproduce asexually by longitudinal binary fission.

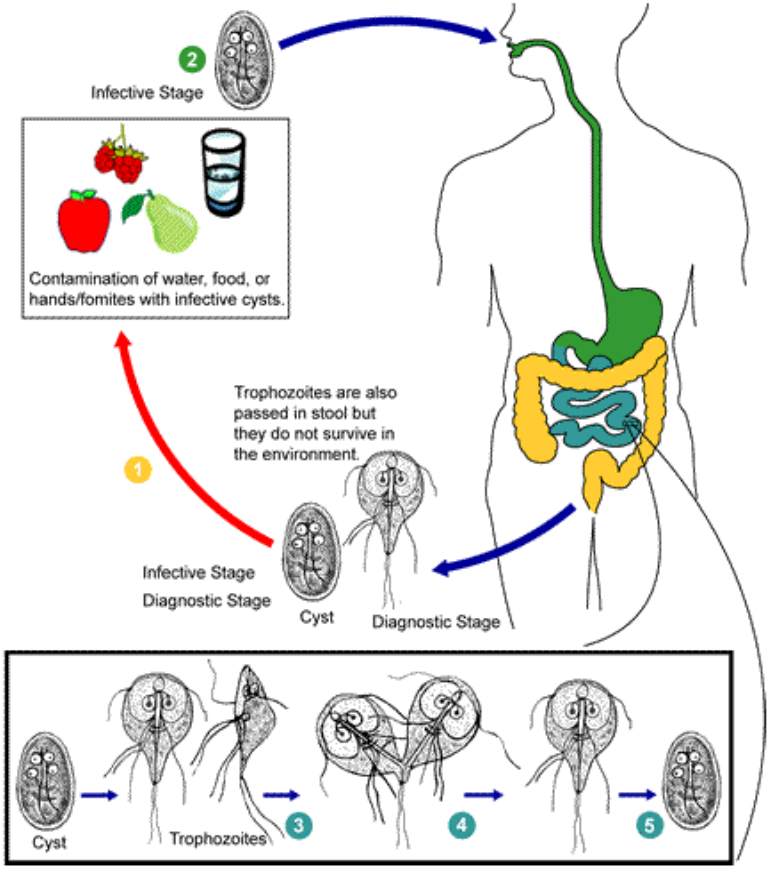
Life Cycle:

1. Giardia cysts are the infective stage of *G. intestinalis*. As few as 10 cysts can cause infection. These cysts are ingested by consuming contaminated food or water, or fecal-orally. They can survive outside the body for several months, and are also relatively resistant to chlorination, UV exposure and freezing.

2. When cysts are ingested, the low pH of the stomach acid produces ***excystation***, in which the activated flagella break through the cyst wall. This occurs in the small intestine, specifically the duodenum. Excystation releases trophozoites, with each cyst producing two trophozoites.

3. Within the small intestine, the trophozoites reproduce asexually and either float free or are attached to the mucosa of the lumen by **a ventral sucking disk.**

4. Some trophozoites then encyst in the small intestine. Encystation occurs most likely as a result of exposure to bile salts and fatty acids, and a more alkaline environment. Both cysts and trophozoites are then passed in the feces, and are infectious immediately or shortly afterward. Person-to-person transmission is possible. Animals can also be infected with *Giardia*.



Both cysts and trophozoites can be found in the feces. The cyst is the stage found most commonly in non-diarrheal feces and the trophozoites are found in the diarrheal stools.