

University of Tikrit
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Basic Nursing Sciences



Second year 2023/2024

Parasitology

Entamoeba histolytica

By:

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1. *Entamoeba histolytica*

Disease(s): Amoebiasis, amebic dysentery **Major organ(s) affected:** Colon, liver **Transmission mode or vector:** Fecal–oral

Geographical distribution: Worldwide, but more prevalent in tropical and developing countries, the main source of water and food contamination is the symptomatic carrier who passes cysts. The epidemic form is a result of direct person-to-person faecal-oral spread under conditions of poor personal hygiene. Symptomatic amoebiasis is usually sporadic.

Motility is accomplished by extension of pseudopodia (—false footl)

Morphology:-

(a) Trophozoites

Viable trophozoites vary in size from about 10-60µm in diameter. Motility is rapid, progressive, and unidirectional, through pseudopods. The nucleus is characterized by evenly arranged chromatin on the nuclear membrane and the presence of a small, compact, centrally located karyosome. The cytoplasm is usually described as finely granular with few ingested bacteria or debris in vacuoles. In the case of dysentery, however, RBCs may be visible in the cytoplasm, and this feature is diagnostic for *E.histolytica*. Found in colon, tissues, and in fresh diarrheal stool

(b) Cyst

Cyst – this is inactive form that is relatively resistant to unfavorable environmental conditions, Found in the lumen of the colon and passed with non-diarrheal stools , Survives up to 30 days outside human body. The immature cyst has inclusions namely; glycogen mass and chromatoidal bars. Mature cyst is about 10-20 µm and has 4 nuclei , the glycogen completely disappears; the chromatodials may also be absent in the mature cyst. The cyst excysts to trophozoite on passing through stomach

Life cycle:-

E. histolytica exhibits a typical fecal–oral life cycle consisting of infectious cysts passed in the feces and trophozoites which replicate within the large intestine. The infection is acquired through the ingestion of cysts and the risk factors are similar to other diseases transmitted by the fecal–oral route. Contaminated food and water are probably the primary sources of infection. The higher prevalence in areas of lower socioeconomic status is likely due to poor sanitation and a lack of indoor plumbing. However, *E. histolytica* is rarely the cause of travelers' diarrhea and is usually associated with long- term (>1 month) stays in an endemic area. A higher prevalence of *E. histolytica* infection is also observed in institutions, such as mental hospitals, orphanages, and prisons, where crowding and problems with fecal contamination are contributing factors. A high prevalence among male homosexuals has also been noted in several studies. Upon ingestion the cysts pass through the stomach and excyst in the lower portion of the small intestine. Excystation involves a disruption of the cyst wall and the quadrinucleated ameba emerges through the opening. The ameba undergoes a round of nuclear division followed by three successive rounds of cytokinesis (i.e., cell division) to produce eight small uninucleated trophozoites. These trophozoites colonize the large intestine, especially the cecal and sigmoidorectal regions, where they feed on bacteria and cellular debris and undergo repeated rounds of binary fission.

As an alternative to asexual replication trophozoites can also encyst. The factors responsible for the induction of encystation are not known. However, it has been suggested that aggregation of trophozoites in the mucin layer may trigger encystation. Encystation begins with the trophozoites becoming more spherical and the appearance of **chromatoid bodies** in the cytoplasm. Chromatoid bodies are stained elongated structures with round ends and represent the aggregation of ribosomes. Cyst maturation involves two rounds of nuclear replication without cell division and cysts with 1–4 nuclei are found in feces.

Cysts are immediately infective upon excretion with the feces and will be viable for weeks to months depending on environmental

conditions. Both mature and immature cysts may be passed in faeces. Immature cysts can mature in external environments and become infective.

Pathogenesis:-

The pathogenesis associated with *E. histolytica* infection can range from a noninvasive intestinal disease to an invasive disease which can also include an extraintestinal disease. The noninvasive disease is often asymptomatic, but can cause diarrhea or other gastrointestinal symptoms such as abdominal pain or cramps. Most infections will exhibit no overt clinical manifestations and self-resolve in a few months. The noninvasive infection can also persist as a chronic noninvasive disease or progress to an invasive disease in which trophozoites penetrate the intestinal mucosa. This invasive disease can become progressively worse and lead to a more serious disease. The amebas can also metastasize to other organs and produce an extra intestinal amoebiasis.

In the invasive disease, trophozoites kill epithelial cells and invade the colonic epithelium. The early lesion is a small area of necrosis, or ulcer.

The clinical syndrome associated with this stage of the disease is an amebic **colitis** or **dysentery**. Dysentery is characterized by frequent stools containing blood and mucus. The lesions start off as a small ulcer of the mucosal layer. The ameba will spread laterally and downward in the sub mucosa (beneath the epithelium) and kill host cells . These invasive amebas kill and ingest host cells as they are expanding through the submucosa. Thus trophozoites with ingested erythrocytes are often evident in the lesions and these **hematophagous** trophozoites are sometimes found in the dysenteric feces. The trophozoites also replicate at a high rate in the host tissues. However, cyst production decreases during the invasive stage of the infection and cysts are never found in the tissue lesions.

Extra intestinal amoebiasis can also progress to an extra intestinal infection. Dissemination from the primary intestinal lesion is predominantly via the blood stream. Trophozoites entering capillaries in the large intestine can be carried to other organs. The liver is the most commonly affected organ and this is probably due to the direct transport of trophozoites from the large intestine to the liver via the mesenteric blood vessels feeding into the hepatic

portal vein . This provides a more or less direct connection between the large intestine and the liver in that the portal vein drains most of the blood from the cecum and ascending colon. Initially the liver lesions are small necrosis which becomes larger abscesses as they expand. These hepatic abscesses will continue to enlarge as the trophozoites progressively destroy and ingest host cells.

Hematogenous spread of trophozoites to other sites, such as the lungs or brain, is rare, but does occur. The second most common extra intestine asite after the liver is the lungs.

Pulmonary infections generally result from a direct extension of the hepatic lesion across the diaphragm and into the pleura and lungs.

Clinical features:-

Clinical features vary

❖ Intestinal amoebiasis (acute or chronic) :

Acute amoebiasis Characterized by dysentery that is bloody, mucus-containing diarrhea accompanied by lower abdominal discomfort, Fever ,Abdominal pain . Chronic amoebiasis Onset of symptoms is gradual with episodes of diarrhea, abdominal cramps , nausea, vomiting , an urgent desire to defecate, weight loss

❖ Amebic abscess – liver most common

The most common extra intestinal infection occurs in the liver leading to amebic hepatitis, The liver is primarily involved, because trophozoites in the blood are removed from the blood by the portal veins. . The right lobe is most commonly involved, thus pain in the right upper-quadrant, weight loss, fever and tender enlarged liver. Abscess may penetrate the diaphragm and trophozoite may invade the lungs.

❖ Brain abscess

❖ Lung abscess

Laboratory diagnosis:-

In intestinal amoebiasis:

- Examination of a fresh dysenteric faecal specimen or rectal

scraping for trophozoite stage. (Motile amoebae containing red cells are diagnostic of amoebic dysentery).

- Examination of formed or semiformed faeces for cyst stage. (Cysts indicate infection with either a pathogenic *E.histolytica* or non-pathogenic *E.coli*.)
- Biopsies can also be examined microscopically for trophozoites.
- Serology is especially useful for the diagnosis of extra intestinal amoebiasis.

Treatment:-

Iodoquinol or paromomycin is used to treat asymptomatic infections and metronidazole is used for symptomatic and chronic amoebiasis, including extra-intestinal disease

Prevention and Control:-

Since transmission takes place via fecal oral route, control measure is

1. Personal hygiene and proper sewage disposal
2. Proper treatment of drinking water
3. Carriers should not be allowed to work as food handlers
4. Prohibit the use of human feces as fertilizers