Amoebiasis

Microbiology III

Introduction

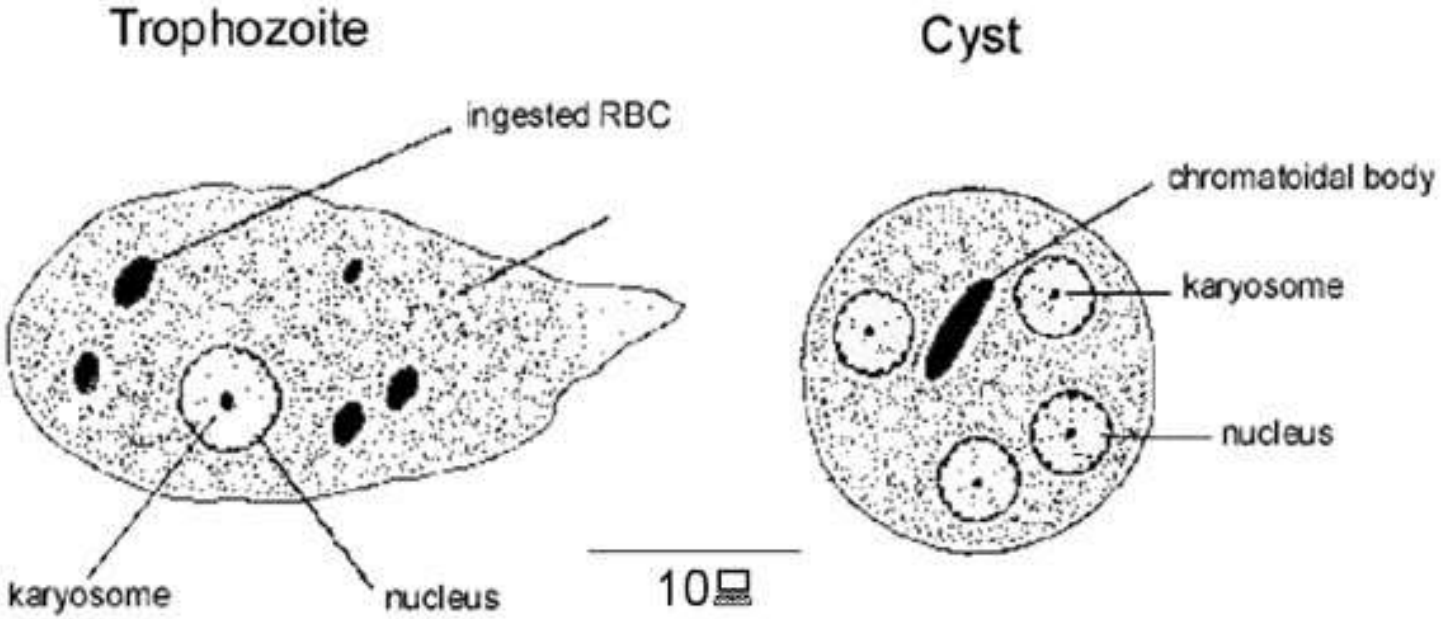
- Amoebiasis is a common infection of the human gastro-intestinal tract.
- The term "amoebiasis" has been defined by WHO as the condition of harboring the protozoan parasite *Entamoeba histolytica* with or without' clinical manifestations.
- It is a potentially lethal disease. It carries substantial morbidity and mortality.
- It has a world-wide distribution. It is a major health problem in the whole of China, Africa, South East and West Asia and Latin America, especially Mexico.

- The symptomatic disease occurs in less than 10 per cent of infected individuals.
- The symptomatic group has been further subdivided into intestinal and extra intestinal amoebiasis.
- Only a small percentage of those having intestinal infection will develop invasive amoebiasis.
- The intestinal disease varies from mild abdominal discomfort and diarrhoea to acute fulminating dysentery.
- Extraintestinal amoebiasis includes involvement of liver (liver abscess), lungs, brain, spleen, skin, etc.

Causative agent

- Amoebiasis is caused by the pathogenic strains of ***Entamoeba histolytica***.
- Recent studies have shown that *E. Histolytica* can be differentiated into at least 18 zymodemes
- Isoenzyme electrophoretic mobility analysis identified seven potentially pathogenic and 11 non-pathogenic zymodems
- *E. histolytica* exists in two forms – vegetative (**trophozoite)** and cystic forms.
- Trophozoites live in the colon where they multiply and encyst.
- The cysts are excreted in stool.
- Ingested cysts release trophozoites which colonize the large intestine.

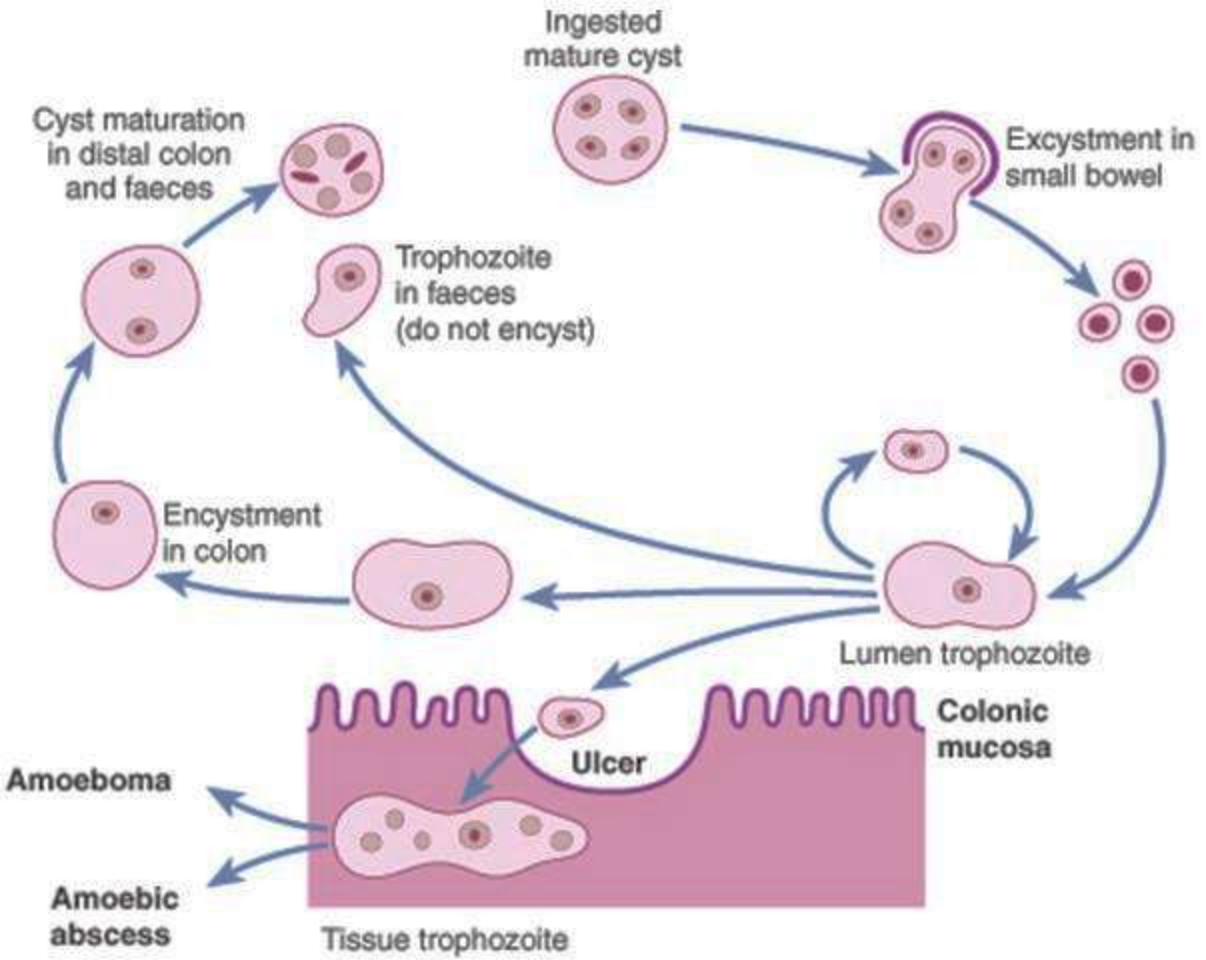
Entamoeba histolytica



Pathogenesis

- Infective dose can be a single **cyst**
- Some trophozoites invade the bowel and cause ulceration, mainly in the caecum and ascending colon, then in the rectum and sigmoid.
- Some may enter a vein and reach the liver and other organs.
- The trophozoites are short-lived outside the human body, they are not important in the transmission of the disease.
- In contrast the **cysts** are infective to man and remain viable and infective for several days in faeces, water, sewage and soil in the presence of wetness and low temperature.
- The cysts are not affected by chlorine in the amounts normally used in water purification, but they are readily killed if dried, heated (to about 55°C) or frozen

AMOEBIASIS



RESERVOIR OF INFECTION:

- Man is the only reservoir of infection.
- The immediate source of infection is the faeces containing the cysts.
- Most individuals infected with *E. histolytica* remain symptom free and are healthy carriers of the parasite.
- The carriers can discharge up to 1.5×10^7 cysts daily.
- The greatest risk is associated with carriers engaged in the preparation and handling of food.

PERIOD OF COMMUNICABILITY:

- As long as cysts are excreted, the period may be several years, if cases are unrecognized and untreated.

Host factors:

- Amoebiasis may occur at any age.
- No gender or racial differences
- Severe if children, old, pregnant women
- Amoebiasis is frequently a household infection. When an individual in a family is infected, others in the family may also be affected.

Several factors contribute to influence infection:

- Stress
- Malnutrition
- Alcoholism
- Corticosteroid therapy
- Immunodeficiency
- Alteration of Bacterial flora

Risk factors:

- People in developing countries that have poor sanitary conditions
- Immigrants from developing countries
- Travellers to developing countries
- People who live in institutions that have poor sanitary conditions
- HIV-positive patients
- Homosexuals

Host immune response:

- Specific anti-amoebic antibodies are produced when tissue invasion takes place.
- There is strong evidence that cell mediated immunity plays an important part in controlling the recurrence of invasive amoebiasis.

Environmental factors:

- Amoebiasis is more closely related to poor sanitation and socio-economic status than to climate.
- The use of night soil for agricultural purposes favours the spread of the disease.
- In countries with marked wet-dry seasons, infection rates are higher during rains.
- Epidemic outbreaks are usually associated with sewage seepage into the water supply

Mode of transmission:

Faecal-oral route :

- Contaminated water and food
- Vegetables, especially those eaten raw, from fields irrigated with sewage polluted water .
- Direct hand to mouth
- Epidemic water-borne infections can occur if there is heavy contamination of drinking water supply.

Vectors:

- such as flies, cockroaches and rodents are capable of carrying cysts and contaminating food and drink.

Incubation period:

- About 2 to 4 weeks or longer.
- Three days in severe infection; several months in subacute and chronic form.

Clinical features:

- Asymptomatic carriers (non invasive form):
- 90% without symptoms
- Does not damage lumen

Invasive forms:

- Amoebic colitis
- Flask shaped ulcers superficial or deep
- abdominal pain, diarrhoea, blood, fever
- Tenesmus, peri-anal ulcers

Fulminant colitis - <0.5%

- Severely ill with high fever
- Intestinal bleeding
- Perforation
- Paralytic ileus

Amoeboma:

- Inflammatory thickening of intestinal wall
- Palpable mass with trophozoites

Extra-intestinal:

1. Amoebic liver abcess

- via portal system
- 5% of invasive disease
- 10 times more common in men

2. Pleuropulmonary

- direct spread from liver abcess
- haematogenous spread

3. Brain

- abrupt onset & rapid progression
- death in 12-72 hrs

Acute amoebic dysentery

- Slight attack of diarrhea, altered with periods of constipation and often accompanied by tenesmus.
- Diarrhea, watery and foul-smelling stools often containing blood-streaked mucus.
- Nausea, abdominal distension, and tenderness in the right iliac region over the colon.

Chronic amoebic dysentery

- Attack of dysentery lasting for several days, usually succeeded by constipation.
- Tenesmus.
- Anorexia, weight loss and weakness.
- Liver may be enlarged.
- The stools at first are semi-fluid but soon become watery, blood, and mucoid.
- On sigmoidoscopy, scattered ulceration with yellowish and erythematous border.

Diagnosis :

- Stool examination.
- Demonstration of trophozoites containing red cells is diagnostic.
- They are most readily seen in fresh mucus passed per rectum.
- The absence of pus cells in the stool may be helpful in the differential diagnosis with shigellosis.
- Serological tests are often negative in intestinal amoebiasis, but if positive, they provide a clue to extraintestinal amoebiasis.
- Indirect haemagglutination test (IHA)is regarded as the most sensitive serological test.
- Other techniques include counter immunoelectrophoresis (CIE) and ELISA technique .

Treatment :

- Symptomatic cases :
- At the health centre level, symptomatic cases can be treated effectively with metronidazole orally
- and the clinical response in 48 hours may confirm the suspected diagnosis.
- The dose is 30 mg/kg of body weight/day, divided into 3 doses after meals, for 8-10 days.
- Tinidazole can be used instead of metronidazole.

PREVENTION AND CONTROL

1. Primary prevention

- The measures aimed to prevent contamination of water,
- food, vegetables and fruits with human faeces.

Sanitation :

- Safe disposal of human excreta and elementary sanitary practice of washing hands after defecation and before eating is a crucial factor in the prevention and control of amoebiasis.

Water supply:

- The cysts are not killed by chlorine in amounts used for water disinfection.
- Sand filters are quite effective in removing amoebic cysts.
- Therefore water filtration and boiling are more effective than chemical treatment of water against amoebiasis.

Food hygiene:

- Uncooked vegetables and fruits can be disinfected with aqueous solution of acetic acid (5-10 per cent) or full strength vinegar.
- In most instances, thorough washing with detergents in running water will remove amoebic cysts from fruits and vegetables.
- Since food handlers are major transmitters of amoebiasis, they should be periodically examined, treated and educated in food hygiene practices such as hand-washing

Secondary prevention:

- Early diagnosis & Treatment
- At present there is no acceptable chemoprophylaxis for amoebiasis.
- Mass examination and treatment cannot be considered a solution for the control of amoebiasis.