Pathogenicity:

Factors affecting the severity of infection depends on:

1- Host factors.
2- Parasite factors.
3- Enviromental factors.

The first step in the pathogenicity of *E. histolytica* infection includes colonization of the trophozoites on intestinal mucosa.

Factors affecting colonization of the trophozoites:

1- Infective dose: Number of active trophozoites in contact with intestinal mucosa depend on number of viable mature cysts ingested by the host.
2- Amount of food: Bulky food does not give opportunity for the parasite to be colonize.
3- Hypermotility of bowel (stasis) give less chance for the parasite to become in contact with mucosa, this explains the high rate of colonization in cecal area because of reduced peristalsis.

After establishment of colonies in intestinal mucosa, the trophozoite starts to penetrate intestinal wall.

Factors affecting invasion and destruction of intestinal wall:

1- Motility of the parasite: more active parasite give more chance for penetration. Amoebae enter intestinal mucosa by their pseudopodial movements which cause displacement of the cells.
2- Bacteria: number of bacteria present in the intestine enhanced enterance of amoebae in the wall of intestine.
3- Enzymes: virulence strain of *E. histolytica* has the ability to secret enzymes e.g. cytolytic enzymes which cause lysis of epithelial cells.
Pathologic anatomy of intestinal amoebiasis:

The trophozoites multiply and colonize in glandular crypts of large intestine and adhere to intestinal mucosa which leads to the formation of early lesion.

**Early lesion: Nodular elevation with tiny opening**

Early lesion is a tiny area of necrosis on superficial mucosa with minute entry site and exhibiting a nodular elevation. These lesions separated from one another by intact epithelium.

In older lesion the amoebae assisted by bacteria may break through muscularis mucosa infiltrated to sub-mucosa, extend laterally and leading to the formation of **Flask-shaped ulcer** with narrow mouth and wide base. The cavity of ulcer usually contains yellowish brown necrotic materials consisting of cytolysed cells, mucus and dead amoebae. Living amoebae are found on margins or periphery of ulcer.
Sometime the dissolution of tissues may become so extensive resulting in a tunneled connection which occurs between two or more lesions, which lead to cutting off the blood supply to the overlying layers, the surface sloughs off and this sloughed area is called Dyak's hair slough.

As a result of inflammatory process, fibrous thickening may result due to degenerative proliferation of connective tissues which make the surface of intestine irregular and this shape of intestine surface is called Sea Anemone ulcer. Sometimes invasion of serosa may result by further penetration which leads to perforation of large intestine.
Complications of Intestinal Amoebiais

1- Appendicitis.
2- Perforation.
3- Peritonitis.
3- Amoeboma or amoebic granuloma: a tumor-like mass in the wall of intestine it is firm, nodular inflammatory thickening around an ulcer occurring mostly in cecum and may lead to intestinal obstruction. Amoeboma may be confused with neoplastic growth, tuberculosis or actinomycotic granulomas, but may be diagnosed by biopsy, serology and response to antiamoebic treatment.
4- Extra-intestinal amoebiasis.

Extra – intestinal amoebiasis

Extra – intestinal amoebiasis is secondary to intestinal infection, this may occurs in patients with clinical dysentery and in those with mild infections and only trophozoites are found in infected tissues.

Usually trophozoites are disseminated by blood stream or by direct extension from intestinal lesion or through fistula. The liver is the most frequent involved, although the amoebae may be carried to any organ of the body.

Early amoebic infection in the liver lead to amoebic hepatitis and the patient complain of enlarged tender liver, irregular fever, leucocytosis and disturbances of liver function and occasional jaundice, this may give rise to amoebic liver abscess.
Amoebic liver abscess:

Amoebic liver abscess usually result by direct extension from intestinal ulcer or by hematogenous spread. The early liver abscess is small, oval or rounded mass, usually solitary and occurs in right lobe of the liver. As the lesion increase in size, the center liquefied and the wall thickened and the contents become chocolate-brown in color resembling Ancovy Sauce.

The following three zones may be recognized grossly and under the microscope:

1- An inner necrotic center containing dead liver cells, dead amoebae mixed with bile, fat, and RBC.
2- Median zone of connective tissue strands.
3- Outer zone of living liver cells invading by amoebae.

Amoebic lung abscess:

Pulmonary amoebiasis may usually result from direct extension of hepatic abscess through the diaphragm and less frequently from blood stream. It is usually occurs in right lung.

Amoebic brain abscess:

This infection rarely occurs and it is very difficult to diagnosed. Trophozoites can reach the brain through blood stream and cause amoebic brain abscess and amoebic meningoencephalitis.

Cutaneous amoebiasis:

Cutaneous amoebiasis is a rare reported complication of amoebic infection, it involve abdominal wall as a result of surgical interference of colostomy or amoebic liver abscess aspirate or directly from fistulous tracts that arise from intestinal ulcer or hepatic abscess. Also it involve anal and perianal areas by direct extention of rectal lesion. Genital organs may involved mainly in homosexuals.
Symptomatology

The incubation period *E. histolytica* varies from few days to 3 months or even a year. The clinical symptoms are variable which depend on strain of *E. histolytica*, location of amoebic infection and resistance of the host.

There are two types of infection, symptomatic and asymptomatic. The majority of patients are asymptomatic cyst passing carrires and they are complain of vague abdominal discomfort. Cyst pasing carriers are able to spread the parasite to others through poor hygienic practices.

**Symptomatic infection : 1-Intestinal amoebiasis;**

a- Acute intestinal amoebiasis: present as dysentery (blood, and mucus-containing diarrhea) accompanied by localized abdominal pain, flatulence, 6 – 8 bowel motion per day, anemia loss of weight and low grade fever.

b- Chronic intestinal amoebiasis: with lower-grade symptoms e.g. constipation alternating with diarrhea, anorexia, gas of abdomen, weight loss and fatigue.

**2-Extra-intestinal amoebiasis:**

*It depends of the type of tissue invaded by trophozoites.*

**Amoebic liver abscess:** enlarged tender liver, irregular fever, localized abdominal pain (right upper quadrant), slight elevation of alkaline phosphatase.

**Amoebic lung abscess:** chest pain, tachycardia cough and haemoptesis and signs of pneumonia or lung ca.

**Amoebic brain abscess:** signs of brain tumor or brain hydatid cyst.

**Cutaneous amoebiasis:** it cause skin ulceration and if it complicated by bacterial infection it will lead to dermatitis.