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ENTAMOEBA COLI INFECTION AS A RISK FACTOR FOR CARDIOVASULAR DISEASES

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ABSTRACT
Background: Entamoeba coli is intestinal protozoan amoeba which is regarded tell now as commensal amoeba although their adverse symptoms that they may cause in certain patients. **Objectives:** General objectives to know the pathological effect induced by Entamoeba coli infection **Specific objectives** to know the effect of Entamoeba coli in cardiovascular system. **Methodology**: stool specimen was diagnosed through wet mount, then blood was collected from 2 patients infected with Entamoeba coli and plasma from both patient was used to estimate potassium, phosphorus, and cholesterol and low density lipoprotein levels. **Result**: low level of potassium, phosphorus, high level of cholesterol and low density lipoprotein was detected in both patients. **Conclusion**: Entamoeba coli infection decreased level of potassium, phosphorus and increased level of cholesterol, low density lipoprotein in patient's plasma and that may increase the risk of cardiovascular diseases.

KEYWORD: Entamoeba coli.

INTRODUCTION
Entamoeba coli are a protozoan endocommensel, inhabiting the lumen of the large intestine of man. There is no reliable evidence that it produces disease in human beings but few workers have reported ingestion of red blood cells by the organism. E. coli was discovered in India by Lewis in 1870 however its detail description was given by Grassi (1879).

Geographical distribution
It is cosmopolitan in distribution and has been stated to occur in about 50% of human population.

Life cycle
Entamoeba coli are a monogenetic organism. Three distinct morphological forms exist airing the life cycle- Trophozoite, Pre-cystic stage and Cystic stage.

Trophozoite of E. coli is about 20 to 30 in diameter with a range from 10 to 50. Trophozoite is unicellular. The cytoplasm is differentiated into outer narrow ectoplasm which is not so prominent and inner granular, vacuolated endoplasm containing bacteria and debris inside food vacuoles. A single nucleus lies inside the endoplasm. The nucleus is a ring like structure with thick nuclear membrane lined with irregularly distributed masses of chromatin and a large, irregular, eccentric karyosome.

Fine linin threads extend between nuclear membrane and karyosome. Trophozoite bears one too many pseudopodia which are short, blunt and granular Movement is sluggish and usually not directional. The parasite feeds upon bacteria, vegetable cells and other faecal debris present in the large intestine. Dobell (1938) reported that it may ingest R.B.C., occasionally. The trophozoite reproduces by binary fission.

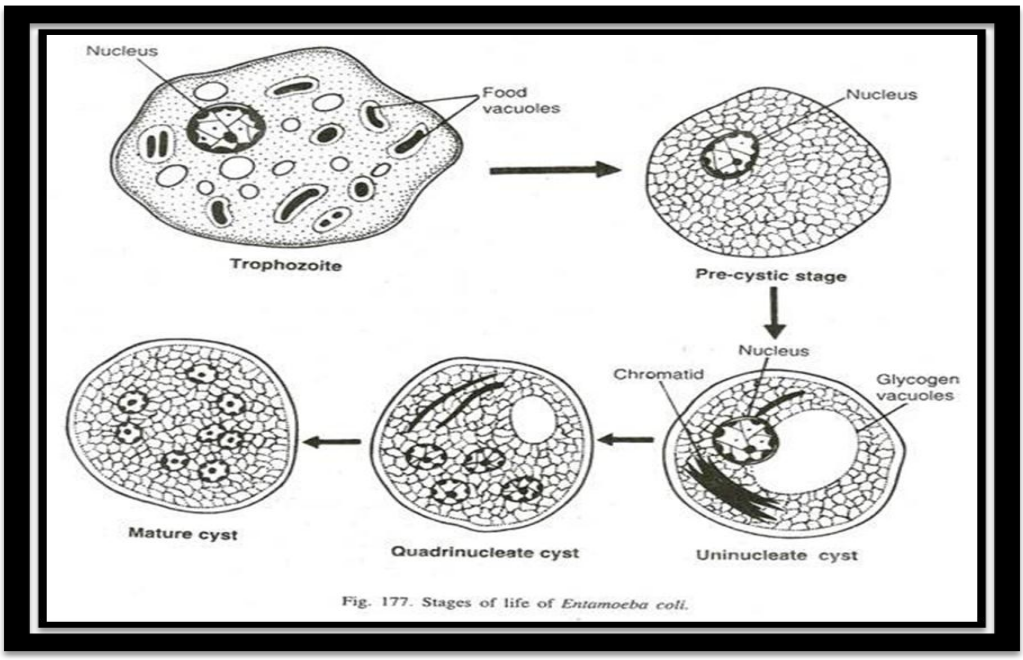


Fig. 177. Stages of life of *Entamoeba coli*.

Trophozoite changes into spherical uninucleate precystic stage. The precystic stage size ranges from 15 to 45 ц in diameter. It is similar to trophozoite stage, except that it is non feeding stage and hence food inclusions are not found in the endoplasm. Precystic stage changes into cystic stage.

The cysts are spherical or avoid with size ranging from 10 to 33 µm in diameter. The cyst wall is thick. Immature cyst may have one-two or four nuclei with eccentric karyosome .Occasionally, the cyst may bear 16 or even 32 nuclei. Glycogen vacuoles and chromatid bodies are seen in the endoplasm up to binucleate stage after that they are consumed. Matured cyst is the infective stage. Cyst formed in the large intestine is discharged out o the host's body through faeces. The cysts survive for 3-4 months outside the body of the host and are relatively more resistant to desiccation as compared to those of E. histolytica. The survive rate of the cyst is about 46 %.

Mode of Infection

Infection to the new host occurs by consuming contaminated food and drinks. The infective stage cysts are carried from faces to the food items through insects and rodents. In the small intestine of the new host excystation occurs during which a single multinucleate amoeba comes out through the cyst wall. Multinucleate amoeba divide into as many immature amoebas as there are nuclei in the cyst.

The young amoeba moves down to reach the caecum where they multiply in number and become trophozoites.

Pathology

E. coli lives inside the lumen of the large intestine in man. They never enter into the mucosa or sub-mucosa layers or other tissues of the intestine. There is no reliable evidence that it ever produces intestinal lesion, although it has been reported that E. coli occasionally ingest red blood cells.

In this way it is believed to exist as non-pathogemc endo-commensal. However, Dey (1974) observed that a large population of E. coli inside the gut lumen may cause dyspepsia, hyperacidity, gastritis and indigestion.[1]

Entamoeba coli feed on bacterial flora in GIT then it makes disturbance in bacterial flora functions.

Entamoeba coli has potent phagocytic activity through which it phagocytosed bacterial flora, fungi such as Sapherita species and even other protozoan parasite such as Giardia lamblia trophozoite.[2]

Functions of bacterial flora in the GIT

- The largest bacteria ecosystem in the human body is in the large intestine, where it plays a variety of important roles.
- The large intestine absorbs some of the products formed by the bacteria that inhabit this region, such as short-chain fatty acids that are metabolized from undigested polysaccharides (fiber).
- Other bacterial products of undigested polysaccharide fermentation include gas (flatus), which consists primarily of nitrogen and carbon dioxide.
- These bacteria also produce large amounts of vitamins, especially vitamin K and biotin (a B vitamin), for absorption into the blood.[3]

The intestinal microflora is a complex ecosystem containing over 400 bacterial species. Anaerobes outnumber facultative anaerobes. The flora is sparse in the stomach and upper intestine, but luxuriant in the lower bowel. Bacteria occur both in the lumen and

attached to the mucosa, but do not normally penetrate the bowel wall.

Intestinal bacteria are a crucial component of the enterohepatic circulation in which metabolites that are conjugated in the liver and excreted in the bile are deconjugated in the intestine by bacterial enzymes, then absorbed across the mucosa and returned to the liver in the portal circulation. Many drugs and endogenous compounds undergo enterohepatic circulation. Antibiotics that suppress the flora can alter the fecal excretion and hence the blood levels of these compounds. The flora also plays a role in fiber digestion and synthesizes certain vitamins.

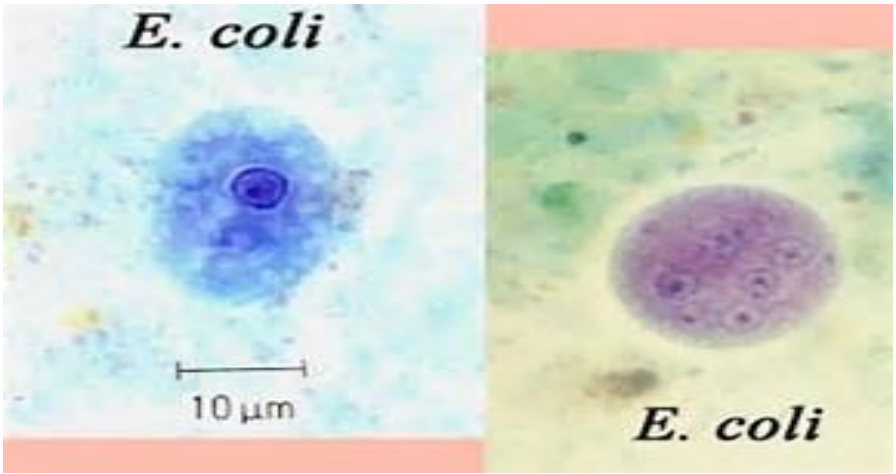
The intestinal microflora may prevent infection by interfering with pathogens. The flora includes low populations of potentially pathogenic organisms such as Clostridium difficile. Antibiotics that upset the balance of the normal flora can favor both infection by exogenous pathogens and overgrowth by endogenous pathogens.

Enzymes produced by intestinal bacteria are important in the metabolism of several vitamins. The intestinal microflora synthesizes vitamin K, which is a necessary cofactor in the production of prothrombin and other blood clotting factors. Treatment with antibiotics, particularly in individuals eating a diet low in vitamin K, can result in low plasma prothrombin levels and a tendency to bleed. Intestinal bacteria also synthesize biotin, vitamin B_{12}, folic acid, and thiamine.
The intestinal flora is capable of fermenting indigestible carbohydrates (dietary fiber) to short-chain fatty acids such as acetate, propionate, and butyrate. The major source of such fermentable carbohydrate in the human colon is plant cell wall polysaccharides such as pectins, cellulose, and hemicellulose. The acids produced from these fiber substrates by bacteria can be an important energy source for the host.

Some people are deficient in intestinal lactase, the mucosal enzyme responsible for hydrolyzing the disaccharide lactose in milk. In these individuals, lactose is not adequately digested and absorbed in the intestine. Lactose that reaches the large bowel undergoes vigorous bacterial fermentation. The result can be distention, flatus, and diarrhea.

Like other complex ecosystems, the intestinal microflora is relatively stable over time, maintaining roughly constant numbers and types of bacteria in each area of the bowel. The stability of normal flora both discourages infection by exogenous pathogens and prevents overgrowth of potentially pathogenic members. New organisms that enter the system in contaminated food or water generally are suppressed by the established flora. This suppression is related to production by members of the resident flora of antimicrobial substances such as bacteriocins or short-chain fatty acids, which inhibit the growth of alien microorganisms. Antibiotics that kill off part of the intestinal flora can upset its balance and may open the door to infection or pathologic overgrowth.[4]

Diagnosis
Stool specimen is diagnosed mostly by wet mount technique to visualize cyst or trophozoite stage of Entamoeba coli.



Rationale
Entamoeba coli tell now regarded as nonpathogenic amoeba although their potent phagocytic activity that enable it to engulf other organisms whom compete it in nutrients and they already perform many useful activities inside gastrointestinal tract and the disturbance of this homeostasis may lead to serious complications one of which is cardiovascular diseases.

Objectives
General objective
To know the pathological effect induced by Entamoeba coli infection in cardiovascular system.
Specific objectives
To know the effect of Entamoeba coli in electrolytes level especially potassium, phosphorus and lipids level, certainly cholesterol, low density lipoprotein levels.

MATERIAL AND METHOD

Study design: case report study.

Study area: soba university hospital.

Study population: patients admitted to soba university hospital.

Sample size: 2 specimens from adults male and female.

Ethical consideration: patients informed about the test and gave consent verbally.

Inclusion criteria: stool specimen contain Entamoeba coli.

Exclusion criteria: normal stool or stool containing other intestinal parasite.

Clinical specimens

Stool & heparinized blood samples

Diagnostic methods

- Wet mount for fresh fecal specimens
- Plasma was analyzed by full automated *Cobas integra 400 plus*

RESULTS

From 2 stool specimens containing Entamoeba coli we found that low level of potassium, phosphorus and high level of cholesterol, high level of low density lipoprotein in blood specimens from both patients.

DISCUSSION

Due to their activity affecting others microbial flora which perform many beneficial metabolic, Entamoeba coli may alter the body homeostasis and causing disturbance in electrolytes mainly potassium, phosphorus and lipids levels especially cholesterol and low density lipoprotein.

CONCLUSION

Entamoeba coli had a real pathogenic activity which may affect cardiovascular system through decreasing level of potassium, phosphorus and increasing the level of cholesterol, low density lipoprotein.

RECOMMENDATIONS

Another studies are required with large sample size and another parameters should be measured among patients infected with Entamoeba coli mainly vitamin K level.

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