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Entamoeba Coli as a Potent Phagocytic Microorganism

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General Objectives: To know the phagocytic activity of Entamoeba coli against microorganisms.

Specific Objectives: To know the phagocytic activity of Entamoeba coli against microorganisms that inhabit the intestinal tract.

Methodology: The study based on data collected from previous studies.

Result: Entamoeba coli phagocytosed bacterial flora of the gut, fungi of Sphaerita species and even Giardia lamblia trophozoites.

Conclusion: Entamoeba coli is a potent phagocytic microorganism that engulf other microorganisms which may compete it in nutrients.

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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.

I. INTRODUCTION

Entamoeba coli are a protozoan endocommense, 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).

a) Geographical Distribution

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

b) Life Cycle

Entamoeba coli are a monogenetic organism. Three distinct morphological forms exist during 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

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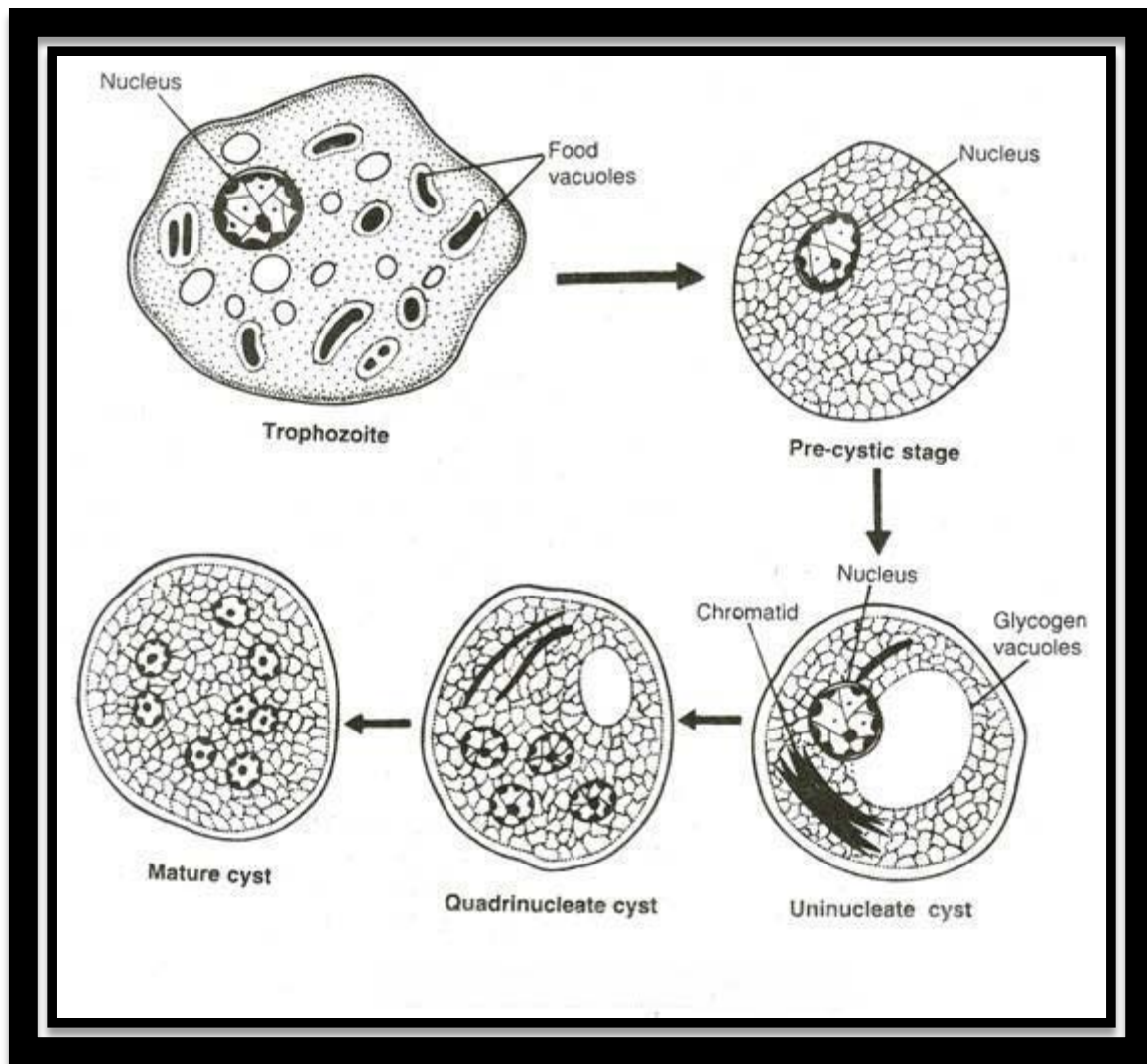


Figure 1: Stage of Life of Entamoeba Coil.

Trophozoite changes into spherical uninucleate precystic stage. The precystic stage size ranges from 15 to 45 μ 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 ovoid with size ranging from 10 to 33 μ m 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 of 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 %.

c) Mode of Infection

Infection to the new host occurs by consuming contaminated food and drinks. The infective stage cysts are carried from faeces 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.

d) 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.

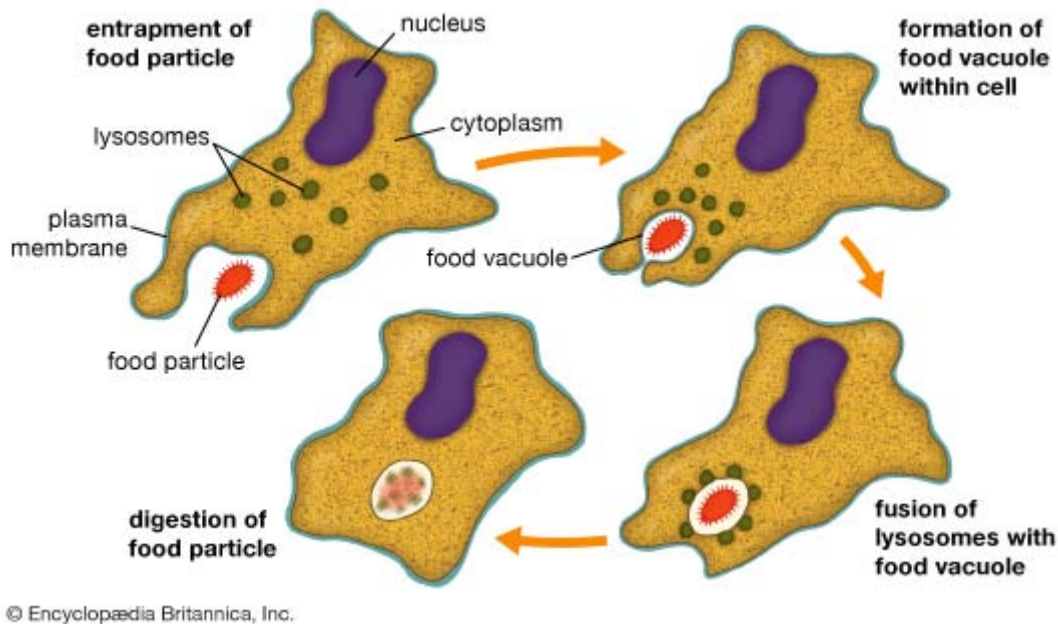
In this way it is believed to exist as non-pathogenic endo-commensal. However, Dey (1974) observed that a large population of *E. coli* inside the gut lumen may cause dyspepsia, hyperacidity, gastritis and indigestion.⁽¹⁾

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 *Sphaerita* species and even other protozoan parasite such as *Giardia lamblia* trophozoite.⁽²⁾

e) Phagocytosis

Is a process by which certain living cells called phagocytes ingest or engulf other cells or particles. The phagocyte may be a free-living one-celled organism, such as an amoeba, or one of the body cells, such as a white blood cell. In some forms of animal life, such as amoebas and sponges, phagocytosis is a means of feeding. In higher animals phagocytosis is chiefly a defensive reaction against infection and invasion of the body by foreign substances (antigens).

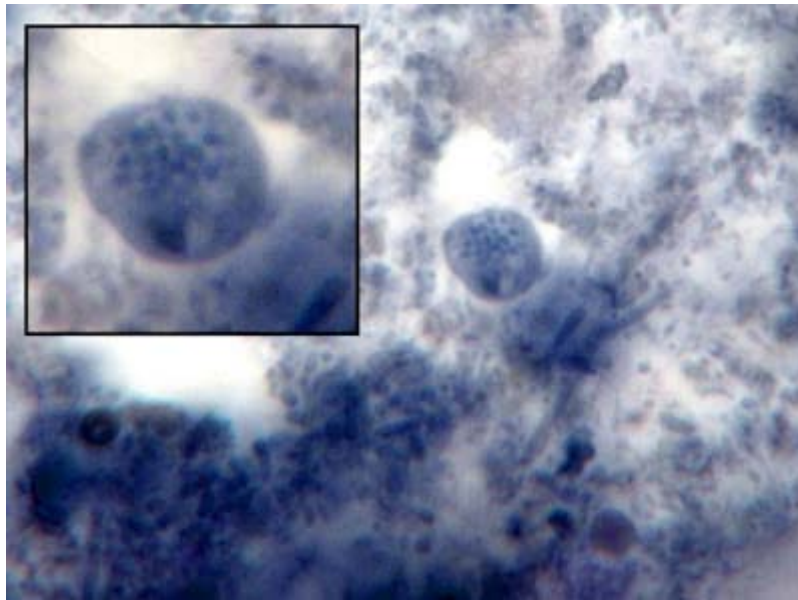


f) Early Observation

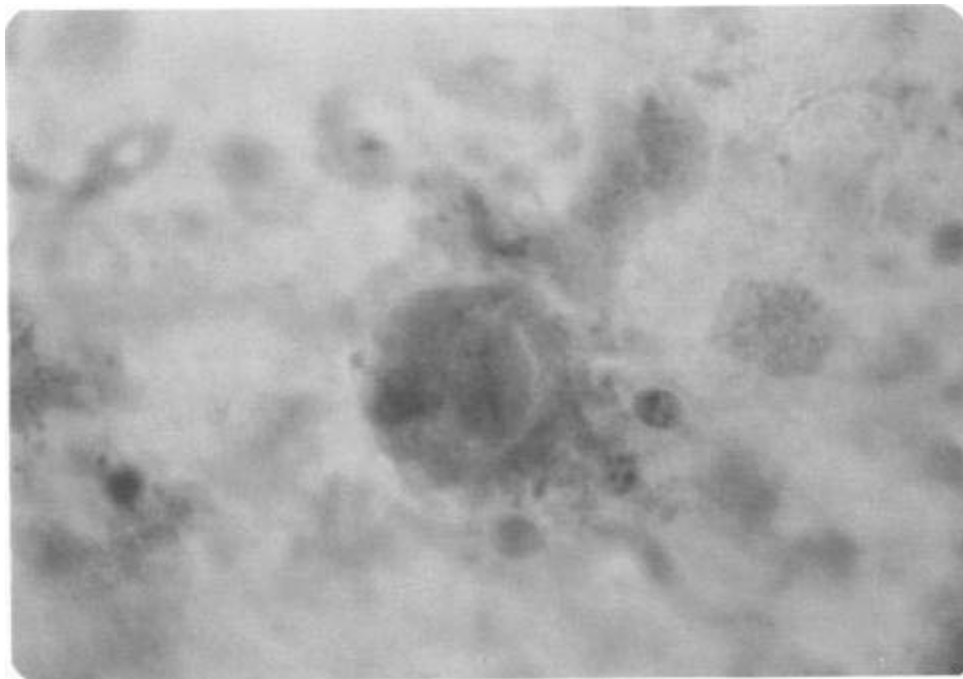
The presence of foreign particles within cells was first described in the 1860s by pathologist Kranid Slavjansky. In the 1880s Russian-born zoologist and microbiologist Élie Metchnikoff introduced the term *phagocyte* in reference to immune cells that engulf and destroy foreign bodies such as bacteria. Metchnikoff also recognized that phagocytes play a major role in the immune response, a discovery that earned him a share of the 1908 Nobel Prize for Physiology or Medicine.⁽³⁾

Some protozoan parasites can themselves be parasitized. A hyper-parasite! The genus *Sphaerita* is considered to be a lower fungus and some species are capable of invading the cytoplasm of some amoeboid parasites. Another parasite of parasites is *Nucleophaga* species which invades the nucleus. *Sphaerita*, (sometimes called *Polyphaga* spp.) appear as tightly packed clusters within the cytoplasm and measure approximately 0.5 μm to 1.0 μm .

The parasite shown below is possibly an *Entamoeba coli*, however the nucleus is not visible as it is out of the plane of focus. *Sphaerita* appears as the small dots within the cytoplasm.⁽⁴⁾



Microscopic examination of a permanently stained fecal preparation revealed the unusual inclusion of a *Giardia lamblia* cyst within the cytoplasm of an *Entamoeba coli* trophozoite. ⁽⁵⁾



g) Rationale

Entamoeba coli till now regarded as nonpathogenic amoeba although their potent phagocytic activity that enable it to engulf other organisms whom compete it in nutrients and shelter.

h) Objectives

General Objectives: To know the phagocytic activity of *Entamoeba coli* against microorganisms.

Specific Objectives: To know the phagocytic activity of *Entamoeba coli* against microorganisms that inhabit the intestinal tract.

II. MATERIAL AND METHOD

Study Design: Observational study, data collected from previous studies.

III. RESULTS

From previous studies we knew that *Entamoeba coli* engulf certain microorganism and parasitized by others. And that showed potent phagocytic activity of *Entamoeba coli*.

IV. DISCUSSION

There is adequate agreement with others studies except that said *Entamoeba coli* is parasitized by *Sphaerita* species we suggested that *Entamoeba coli* phagocytosed that Fungal species as a part of their competition in nutrients and shelter.

V. CONCLUSION

Entamoeba coli had a potent phagocytic activity that enable it to engulf other competitive microorganisms.

VI. RECOMMENDATIONS

Another studies are required to know more about that potent phagocytic activity of *Entamoeba coli*.

ACKNOWLEDGEMENT

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