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Original Article

Study of the prevalence of the parasite Entamoeba histolytica in the Zawia – Libya

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Abstract:

The parasite Entamoeba histolytica is widespread worldwide, and it is increasingly prevalent in poor countries, causing amoebic dysentery. The parasite is transmitted to humans, by eating or drinking water contaminated with the parasite. It spreads to all ages and both sexes. The parasite has two stages, the Trophozoite stage and the cystic stage. The youngest patient was 10 months old and the oldest was 80 years old. The Rate of parasite infestation is 34%. For children under the age of 15 years, the infestation rate was 53%, while the percentage was 24% for those whose ages ranged between 15-30 years, while the percentage was 5.5% for those whose ages ranged between 30-45 years; while the percentage Was 18% for those who were they are over 45 years old. The infection rate in males only was 37% and in females, only the rate was 31%. There are no differences between the averages of infection during the study months (1-8) Months.

Keywords: *Entamoeba histolytica*, human, parasite, Infestation

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Introduction:

Amebiasis is a protozoal infection caused by Entamoeba histolytica. The most common clinical presentations of the disease are amebic colitis and amebic liver abscess. Before molecular tests allowed distinction between Entamoeba species, the estimations of the worldwide burden of amoebiasis indicated that approximately 500 million people were infected by E. histolytica, and 10% of these individuals had invasive amoebiasis. Moreover, it was estimated that 100,000 patients per year died due to the clinical complications of the disease. The genus Entamoeba contains many species of which Entamoeba histolytica, Entamoeba dispar, Entamoeba coli, Entamoeba hartmanni, and to a much lesser extent Entamoeba moshkovskii and Entamoeba polecki, are found in the human intestinal tract (1).

Entamoeba histolytica is a unicellular, parasite protozoon of humans. It moves by a jelly-like tongue-like protrusion of the cytoplasm "pseudopodium" Infections by this parasite lead to distinct clinical manifestations, including diarrhea, mild

abdominal pain, and loss of appetite, fatigue, dysentery, and hepatic liver abscess (2).

It is the second leading cause of death from parasitic intestinal disease worldwide, following cryptosporidiosis. The exact extent of morbidity and mortality is currently a point of contention. Yearly estimates suggest that it infects approximately 50 million people worldwide and kills 40,000–100000 people approximately. In fact, amebiasis was responsible for 55,500 deaths worldwide in 2010. Worldwide the Infection occurs, with a higher prevalence in countries of low socioeconomic status and poor public health (3).

The cyst will start differentiating into trophozoites upon its passage through the stomach and small intestine as shown in Figure 1. Then, once in the colon, the trophozoites bind to enterocytes, colonize the colon, and survived. For unknown reasons, the invasion process into the tissues starts when the trophozoites residing in the colon disrupt the gut barrier. These events need parasite adhesion to human cells, carried out by a set of proteins called virulence factors at the trophozoite surface. Sharif BO et al. Impact of Entamoeba histolytica on the human body Amoebic cysteine can also contribute to trophozoites' ability to suppress a host's immune response by being able to cleave and inactivate anaphylatoxins C3a, C5a, IgA, and IgG. Trophozoites can reach other areas of the body, most commonly the liver, which can cause tissue necrosis and abscess formation (4).Detection Amebiasis is a parasitic disease in humans that which is caused by the parasite Entamoeba histolytica Approximately 10% of the world population is parasitized by Entamoeba histolytica and Entamoeba dispar, ninety per cent of which are asymptomatic infections. However, up to 110,000 estimated deaths, a year are caused by amebiasis (5).

As an enteric parasite that colonizes the human intestinal lumen, Entamoeba histolytica can attack the epithelium. Amoebic dysentery occurs when Entamoeba histolytica trophozoites invade the walls of large intestines and multiply in the mucosa, forming ulcers. The most frequent manifestations of infection are dysentery, colitis, flatulent stomach, weight loss, fatigue, and abdominal pain. A fatal liver abscess is a common outcome of the invasion of the amoeba into tissues. The pathogen secretes histolysin which digests the gut of the infected individual, hence the Latin name, histo (tissue) lytica (destruction) (6).

Infections are mostly related to fecal-oral transmission due to poor hand hygiene, defecation into water sources such as rivers, and being near animals. In developed countries such as the United States, amebiasis infections are rare, accounting for at least five deaths per year, and are commonly seen in individuals exposed to endemic areas, such as immigrants or recent travelers. Amoebic colitis generally affects males and females of all ages equally. There are reports of increased risk of infection from gay or bisexual males due to the risk of fecal-oral contamination through oral and anal sex. Factors that are associated with increased risk for complicated infection and mortality are associated with the following:

pregnancy, corticosteroid treatment, malignancy, malnutrition, and alcoholism. Amoebic liver abscess infections are at least three times more likely to affect middle-aged men between 18 and 50(7).Ingestion of infectious cysts in contaminated water or food leads to excystation in the intestine and each of these cysts produces approximately eight motile trophozoites which colonize the colon of hosts. Where the infection is not self-limiting, amoebic dysentery and liver abscesses can occur. Annually, an estimated 50 million cases of invasive infection occur. World Health Organization (WHO) ranked amebiasis as the third most important parasitic disease with 100,000 deaths occurring annually. Morbidity and mortality are more prevalent in developing countries with the major cause of transmission being poor sanitation, particularly where food and water are involved. More than three billion people, which translates to half of the global population, do not have access to proper sanitation. About 3 million children die each year from diseases associated with poor sanitation worldwide. (8).

Oratory diagnosis of E. histolytica/dispar is primarily based on the finding of a trophozoite or cyst in the stool smears .Now novel approaches to the identification of the two species are based on the Detection of specific antigens and DNA in stool and other clinical samples. Several molecular diagnostic tests, including traditional and real-time polymerase chain reaction (PCR), antibody detection tests like enzyme-linked immunosorbent assay (ELISA), and a variety of antibody assays are commercially available (9).

Infections with Entamoeba spp. can result in either a harmless colonization of the intestine or an invasion of the colon wall and damage of other host tissues such as the liver, lung, and brain (amoebiasis). In most cases, a clinical diagnosis of amoebiasis can be confirmed and usually depends on the visualization of parasites by light microscopy of a wet smear or stained specimens. This procedure is inexpensive and simple, but it has several limitations, such as being incapable of distinguishing between the cysts and trophozoites of the diseasecausing Species Entamoeba histolytica, the nonpathogenic species Entamoeba dispar, and the amphizoic amoeba Entamoeba moshkovskii, which occasionally infects humans. Multiple samples often have to be requested and examined, and the presence of cysts of different species of Entamoeba, Iodamoeba, or Endolimax can make the diagnosis even more difficult.Furthermore, with the reports of sporadic cases of human infection with E. moshkovskii.and the recent finding of a high prevalence and association of E. moshkovskii with E(10).

Infection is usually asymptomatic or has vague clinical symptoms. Early symptoms (in about one month) after ingestion of the cysts; include diarrhea and mild abdominal cramping; (however, the range may be from a few days to years), loss of appetite, fatigue, loss of body weight, flatulence, dysentery, and hepatic liver abscess. If the trophozoites reach the intestinal walls and go through them, they may produce symptoms, and the complications start with a specific organ and lead to severe illness, with main complications such as liver infection, tenderness, lung, liver, and brain abscesses. Toxic megacolon, and rational rectal fistula, also increased the risk of cancer. The fever is related to liver abscess formation

and affects other organs such as the heart, lungs, and brain (meningoencephalitis). Finally, sometimes it leads to death (11).

Common complications spread through blood circulation into the brain, liver, spleen, lungs, and gonads. Here the trophozoites of E. histolytica invade and destroy the tissues causing amoebic abscesses. The liver is the most typical site of E. histolytica in a human being. The affected liver becomes enlarged, congested, and painful to touch. This pathological condition is to as amoebic hepatitis (12).

This condition is diagnosed by taking a complete history and testing stool samples for the presence of E. histolytica cysts. Liver function and Serological tests, Enzyme-linked immunosorbent assay (ELISA), Ultrasound of the liver, CT scan of the liver, and perhaps other organs, and Colonoscopy of the large intestine to search for parasites. Some symptomatic infections may be treated with medications that eliminate the parasite from inside the intestines or other areas of the body infrequently may be needed to remove large abscesses or if certain other complications, such as gastrointestinal bleeding or perforation of the intestinal tract (13).

Metronidazole is the first line of treatment for intestinal amebiasis and amebic liver abscess, followed by a luminal agent. A typical dose of metronidazole is 500 to 750 mg po. 3 times a day for 7 to 10 days in adults. Metronidazole is safe to use in children at a dose of 35 mg/kg to 50 mg/kg per day divided into three doses Luminal Drugs include the following ingredients: paromomycin, diiodohydroxyquine, or diloxanide proate. The dose of paromomycin is 25 mg/kg to 30 mg/kg per day divided into three doses for 7 days, diiodohydroxyquine is 650 mg "c" orally for 20 days, diloxanide proate is 500 mg orally three times a day for 10 days (14)

Research importance

The spread of the parasite Entamoeba histolytica is considered a global spread, and in most countries. This research aims to study the parasite Entamoeba histolytica, and its prevalence among the population living in Zawia, and to study the most important damages it causes, as well as the medical methods and procedures used to combat it.

Methods

Then he took and conducted these analyzes, in cooperation with Zawia Medical Center. Where these samples were taken, collected and analyzed in the year 2021, from January to August. That is, the sampling period was eight months. The sample size is 264 samples of both sexes and of different ages.This data was collected and analyzed statistically, through the famous statistical analysis program, SPSS.

Results

Several important results were obtained, namely:

1. The sample size was 264, where the number of females was 125 and the number of males was 139. The youngest was 10 months old and the oldest was (80) years old, the average age was 23 years, and the standard deviation was 22.2360, and the standard error was 0.02931.The number of people infected with the parasite is (91) infected people, with a percentage of 34%. The highest rate of infection was among samples aged from (0-15) years, at a

rate of 53%, followed by samples ranging in age from (15-30) years, at a rate of 24%, followed by samples aged from 45 years and over, at a rate of 18%, where it was less Infection rate for samples whose ages ranged between (30-45) years, it is 5.5%.

2. In the month of January, the sample size was (18) samples, and the number of individuals infected with the parasite was (8) individuals, as the percentage of infection with the parasite was 40%. In the month of February, the sample size was (13) samples, and the number of individuals infected with the parasite was (5) individuals, as the percentage of infection with the parasite was 15%. In the month of March, the sample size was (34) samples, and the number of individuals infected with the parasite was (13) individuals, where the percentage of infection with the parasite was 41%. In April, the sample size was (58) samples, and the number of individuals infected with the parasite was (22), where the percentage of infection with the parasite was 31%. In May, the size of the sample is (45) samples, and the number of individuals infected with the parasite is (17) individuals, where the percentage of infection with the parasite is 36%.

3. In the month of June, the sample size was (34) samples, and the number of individuals infected with the parasite was (16) individuals, as the percentage of infection with the parasite was 36%. In the month of July, the sample size was (27) samples, and the number of infected individuals was (12) individuals, where the percentage of parasite infection was 44%. In the month of August (8), the sample size was (33) samples, and the number of individuals infected with the parasite was (13), where the percentage of infection with the parasite was 39%.

4. The results showed that the percentage of parasite infection in males only was 37%, while the percentage of infection with the parasite in females was 31%. In the analysis (leven, s test), F = 4.475 was calculated, and its significance level Sig = .035, which is a value less than 0.05, meaning that the variance of the two samples is not equal. And that t = -1.058 and its level of significance Sig = .291, and thus we do not reject the null hypothesis, that is, there are no statistically significant differences between the average infection of the parasite between the sexes.

5. The Wallis-Kruskal (H-Test) test was carried out to see if there were any differences between the mean infection of the parasite in the months of the study (1-8). Whereas from the table we note that the value of Chi squared X2 = 8.493 and the value of Sig. = 0.291, which is greater than 0.05, so we do not reject the hypothesis. That is, there are no differences between the averages of infection, at the study months (1-8) at a significant level of 0.05.

Discussion

The study showed that there is an infection with this parasite for a young child at the age of 10 months, and there is also an infection with this parasite for a patient at the age of 80 years, meaning that the parasite infects all age groups, as long as there is an infection with this parasite, A severe infestation with parasite Entamoeba histolytica was recorded in a four-month-old male infant in Khorramabad, Iran(15).

The infection rate among children whose age was less than 15 years is 53%, meaning that the infection was more than half, and this percentage is large compared to 2.2%

in the Kingdom of Saudi Arabia in Jeddah in 1995-1996, while the infection rate was in Medina. It is 70.5%, which is a high percentage, and the highest rate of infection was for the younger age groups, and the percentage of infection decreases with increasing age (16).

The infection rate in males was 37%, while the percentage in females was 31%, meaning that the percentage in males was higher, but there were no statistically significant differences between the average infections with the parasite between the sexes. Through the infection rates in all months of the study (8 months), it was found that there were no statistically significant differences between the average infections in all eight months of the study.

Conclusion

We have concluded that the Entamoeba histolytica is an infection mostly related to fecal-oral transmission due to poor hand hygiene, defecation into water sources such as rivers, and being near animals. It is the second leading cause of death from parasitic intestinal disease worldwide, and this parasite leads to distinct clinical manifestations, including diarrhea, mild abdominal pain, loss of appetite, fatigue, dysentery, and hepatic liver abscess. During this first step in the human body, the cyst will start differentiating into trophozoites upon its passage through the stomach and small intestine. Then, once in the colon, the trophozoites bind to enterocytes, colonize the colon, and survive. However, ninety percent of people are asymptomatic for this infection, but still, it has many dangerous complications if not treated immediately, such as liver and brain abscesses, Pericarditis, Genitourinary disease, Hepatic vein thrombosis, and Appendicitis. Because prevention is crucial to prevent this contagious disease, such as; personal cleanliness and elementary hygienic conditions should be observed during meals, stopping the fecal contamination of food and water and correcting poor sanitation, avoiding sexual practices involving fecal-oral contact, and avoiding malnutrition and alcohol.

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Recommendations

There are many recommendations, the most important of which are:

1.Drink bottled water and avoid, as much as possible, drinking unhealthy water (such as tap water.
2.Clean the mouth with clean and healthy water, and avoid putting ice in water, juices and food, because it is usually made from plain (untreated) water.
3.You must ensure that the tap water is uncontaminated and healthy in washing fruits and vegetables.
4.Eat well-cooked food, and do not eat undercooked food.
5.Wash hands thoroughly with soap after using the bathroom or after touching animals or garbage.
6.Ensure that drinking water, or that is used for washing or cooking, is free of pollutants.
7.The patient should see a doctor if he has symptoms such as a high temperature (40 degrees Celsius), severe abdominal pain, severe bloody diarrhea, or patients for more than 14 days.

Tables

	Frequency	Percent	Valid Percent	Cumulative Percent

Positive	**9**	**45**	**45**	**45**
Negative	**11**	**55**	**55**	**100**
Total	**20**	**100**	**100**	

Table (1) Parasite infection rate per month (1)

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Positive	**2**	**15**	**15**	**15**
Negative	**11**	**85**	**85**	**100**
Total	**13**	**100**	**100**	

Table (2)Parasite infection rate per month (2)

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Positive	**14**	**41**	**41**	**41**
Negative	**20**	**58**	**58**	**100**
Total	**34**	**100**	**100**	

Table (3)Parasite infection rate per month (3)

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Positive	**18**	**31**	**31**	**31**
Negative	**50**	**69**	**69**	**100**
Total	**58**	**100**	**100**	

Table (4)Parasite infection rate per month (4)

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Positive	**16**	**36**	**36**	**36**
Negative	**29**	**64**	**64**	**100**
Total	**45**	**100**	**100**	

Table (5)Parasite infection rate per month (5)

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Positive	**9**	**45**	**45**	**45**

Negative	11	55	55	100
Total	20	100	100	

Table (6)Parasite infection rate per month (6)

	Frequency	Percent	Valid Percent	Cumulative Percent
Positive	12	44	44	44
Negative	15	56	56	100
Total	27	100	100	

Table (7)Parasite infection rate per month (7)

	Frequency	Percent	Valid Percent	Cumulative Percent
Positive	13	39	39	39
Negative	20	61	61	100
Total	33	100	100	

Table (8)Parasite infection rate per month (8)

	N	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Std. error	Statistic
Old	264	0.10	80	23.4545	0.02931	22.2360
Valid N (listwise)	264					

Table (9) the average age of the sample

	Frequency	Percent	Valid Percent	Cumulative Percent
Positive	91	34.5	34.5	34.5
Negative	173	65.5	65.5	100.00
Total	264	100	100	

Table (10) Shows the percentage of parasite infection

Levene Statistic	df1	df2	Sig
5.837	3	260	0.001

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Table (11)One-Way Anova

Test of homogeneity of variances

Parasite

	Sum is squares	df	Mean square	f	Sig
Between groups	0.793	3	0.264	1.169	0.322
Within groups	58.839	260	0.226		
Total	59.633	263			

Table (12)Anova Parasite

	Frequency	Percent	Valid Percent	Cumulative Percent
Positive	52	37.0	37.0	37.0
Negative	87	63.0	63.0	100.00
Total	139	100.00	100.00	

Table (13)The table shows the percentage of parasite infection in males

	Frequency	Percent	Valid Percent	Cumulative Percent
Positive	39	31	31	31
Negative	86	69	69	100.00
Total	125	100.00	100.00	

Table (14) the table shows the percentage of parasite infection in Females

Sex		N	Mean	Std. Deviation	Std. Error Mean
Parasite	Positive	139	1.6259	0.48564	0.4119
	Negative	125	1.6880	0.46517	0.04161

Table (15) Group statistics

Month	N	Mean Rank
Parasite. .month1	20	118.60
Month2	13	157.69
Month3	34	123.65
Month4	58	137.03
Month5	45	131.07
Month6	34	150.82
Month7	27	119.33
Month8	33	126.00
Total	264	

Table (16) Independent Samples Test

RANX test that shows the relationship between parasite averages in the study Months(1-8)

	Parasite
Chi-Square	8.493
Df	7
Asymp. Sig	.291

Table (17) Test Statisticsa,b a Kruskal Wallis Test b Grouping Variable: Month

Figures

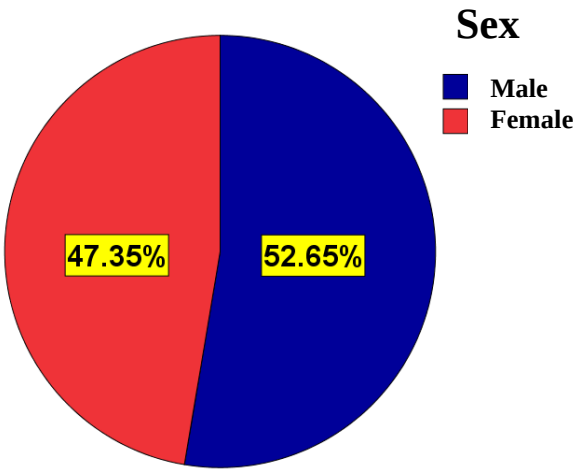

Figure (1) shows the ratio of males and females to the study samples

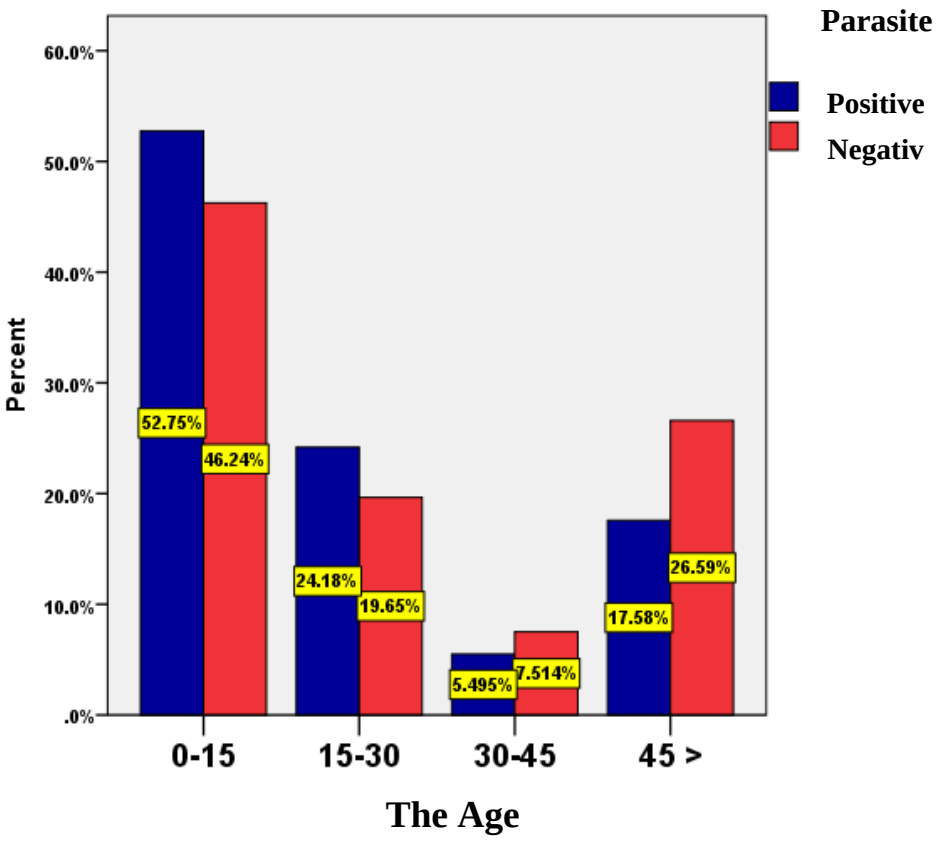

Figure (2) shows the age groups and the percentage of infection for each group

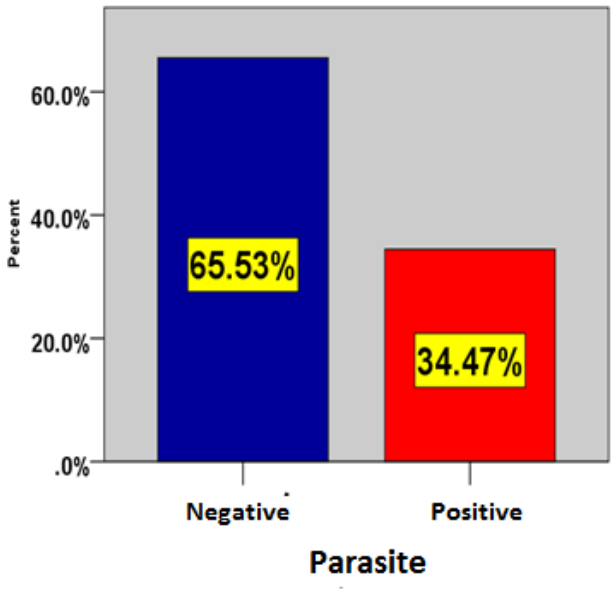

Figure (3) shows the percentage of parasite infection

Figure (4) Trophozoite of Entamoeba histolytica (17).

Figure (5) Cyst of Entamoeba histolytica (18).

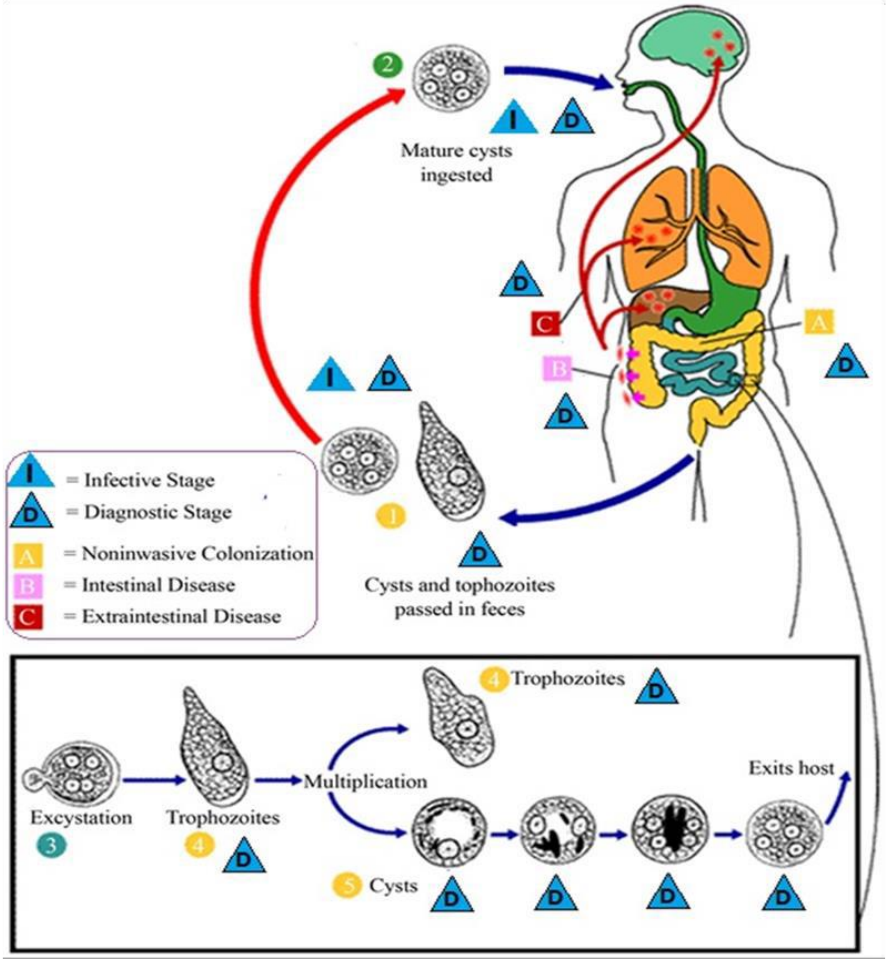

Figure (4) following diagram shows life cycle of Entamoeba Species and its relationship with the host (19).