

Epidemiology of *Entamoeba histolytica* among children in Erbil Province, Kurdistan Region-Iraq

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ABSTRACT:

The current epidemiological study investigated the prevalence of *Entamoeba histolytica* and its relation with residency, sexes, age, economical status, maternal education and studied months, among 200 children, including 117 boys and 83 girls, aging less than 1-12 years, attending the pediatric hospital in Erbil/Kurdistan region-Iraq, between the beginning of November 2010 to the end of March 2011. The rate of infection was 30% (34.69% in urban and 25.49% in rural regions). The higher rates of infection were among girls (33.73%), aged 4-6 years (52.38%), with moderate economical status (34.54%), illiterate mothers (39.24%) and in February-2011 (54.54%).

Keywords:

Entamoeba histolytica, Children, Erbil-Iraq.

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INTRODUCTION

Entamoeba histolytica, a protozoan parasite, occurs worldwide (Kreidl *et al.*, 1999). D. F. Lošch, in Petersburg, Russia, first described this amoeba in 1875 (Roberts *et al.*, 1996). Amebiasis is a parasitic infection caused by the protozoan *Entamoeba histolytica* (Pritt *et al.*, 2008) and it is one etiology of diarrheal disease. Diarrhea is a major contributor to childhood mortality and morbidity in the developing world and it is accounted for a median of 21% of all deaths of children aged under 5 years in these areas and countries (Kosek *et al.*, 2003). Amebiasis is the third most common parasitic cause of death worldwide, surpassed only by malaria and schistosomiasis. On a global basis, amebiasis affects approximately 50 million persons each year, resulting in nearly 100,000 deaths. The prevalence of infection varies between 1% in industrialized countries to between 50% and 80% in tropical countries, where transmission of *E. histolytica* cysts by untreated drinking water is common. Ingestion of food and drink contaminated with *E. histolytica* cysts from human faeces and direct faecal oral contact are the commonest means of infection (Bruckner, 1992).

This parasite has two forms: a motile form, called the trophozoite which inhabits the large intestine of human, and a cyst form, responsible for the person-to-person transmission of infection. The cysts may remain viable for three months but may be destroyed by iodination or hyperchlorination. The incubation period is usually two to four weeks but may be as long as months or years. About 10% of those infected have clinical symptoms. Most (80% to 98%) present with amoebic colitis, with bloody diarrhoea and abdominal pain, the remaining 2% to 20% present with extra-intestinal disease, most commonly as liver abscess (Marshall *et al.*, 1997). The case fatality rates of *E. histolytica* liver abscess are estimated to be between 0.2% to 2% in adults and up to 26% in children. Metronidazole is the drug of choice for treatment of liver abscess and intestinal disease (Kreidl *et al.*, 1999).

There were many studies carried out in Erbil -Iraqi Kurdistan to investigate the intestinal parasites in children, among them: a study performed by (Molan *et al.*, 1989) and 18.6% for infection by *E. histolytica* was recorded among fecal samples of school children aged 6-13 years old of both sexes. While (Salih, 1991) reported the infection rate 3.6% for *E. histolytica*. (Abdullah *et al.*, 1999) collected 249 stool samples from children

below 3 years of age and 39.7% were recorded for *E. histolytica*. Out of 115 collected stool samples from kindergartens children, the infection rate was 1.7% for the studied parasite (Farag, 2000). In a survey, (Ahmed, 2006) revealed that 9.47% was the infection rate for *E. histolytica* among rural primary schoolchildren from different regions in Erbil city, while (Hama, 2007) reported rate of infection 2.33% among children aged 6-12 years old from rural and urban primary schools.

Aims of the present study are to:

1. Investigate the prevalence of *E. histolytica* among children in Erbil governorate.
2. Study the relationship between the infection with *E. histolytica* and residency, sexes, age, economical status and maternal educational level of the children and the seasons of the studied years.
3. Our study, although a small one, in the field of observation of parasitic infestations, whether it be rural or urban, may help others in the prevention and control of intestinal parasitic disease in children worldwide.

MATERIALS AND METHODS

Time and location

The present study was achieved on 200 children, including 117 boys and 83 girls, aging <1-12 years, and they were attended to the rapareen pediatric hospital in Erbil/Kurdistan region-Iraq, between the beginning of November 2010 to the end of March 2011, for detection of the trophozoites and cysts of *Entamoeba histolytica* infection. The children and their parents were interviewed, then informative questionnaire form was organized for each patient including data such as age, sex, residence (urban, rural), education level of the household and the economical status of the families.

Collection of stool samples

The stool samples were collected in sterile containers labeled with names of the patients and brought to the laboratory for macroscopic and microscopic examinations.

Laboratory methods

The stool samples were examined with the naked eye for appearance, color, and the presence of blood. They were then examined microscopically by direct method for presence of *Entamoeba histolytica* trophozoite and cystic stages.

Direct stool examination

The fresh stool samples were examined under the microscope using the saline solution by



adding a small quantity of the selected fresh stool to one or two drops of normal saline (0.9% NaCl) on the slide with an applicator stick and covered with a cover slip Faust *et al.*, (1978).

RESULTS AND DISCUSSION

Epidemiological study

Out of 200 examined stool samples of the children, 98 cases were from urban and 102 from rural areas, only 60 cases were positive for *Entamoeba histolytica* (34 in urban and 26 in rural habitants), the total rate of infection was 30% (34.69% in urban and 25.49% in rural regions) as shown in (Table 1).

Table 1: Prevalence of *Entamoeba histolytica* according to the residency of the patients

Residency	No. Examined	No. +ve	%
Urban	98	34	34.69
Rural	102	26	25.49
Total	200	60	30

The infection rate, in the present study, is much higher than those reported by some other studies in Iraq and Erbil. In Kirkuk, the infection rate of *E. histolytica* among primary schoolchildren was 8.45% Al-Shirifi HMH, (2000) in Mosul, Al-Abbadie, (2001) recorded 11.07% among primary school and kindergartens children, in Sulaimani district Raza HH *et al.*, (2009) reported 4% among pre-school children. While in Erbil, 2.33% and 6.4% were recorded by Hama, (2007) and Faraj AM *et al.*, (2007) respectively. The present result (30%) was lower than that of (Kasssem *et al.*, 2007) in Libya (36.57%).

The findings of this study, including the higher infection rate of *E. histolytica* among children in the urban areas in comparison with that of rural regions 34.69% and 25.49%, are in agreement with the study of (Al-Shammari *et al.*, 2001) who detected higher rates of infection in urban than rural areas, but disagreed with the situation recorded by (Rayan *et al.*, 2010) who reported that significant differences were noted between rural and urban children for *E. histolytica* (4.2% vs. 0%), while (Raza HH *et al.*, 2009) documented that for *E. histolytica*, the rates were close to each other in both sexes. The present result is possibly caused by the greater number of villagers (majority resides in urban area) in our study population.

In general, this variations may be due to

many interacted factors like sanitary service, low education of mothers, improper water supply because *E. histolytica* can be transmitted orally by drinking water and it is one of the environmental contaminants of the water supply (Omar *et al.*, 1995) also absence of regular hygiene toilets, and malnutrition which significantly increases susceptibility to *Entamoeba histolytica* in children (Duggal *et al.*, 2011) In addition to environmental, social and economic factors are also playing a role in this matter (Al-Shammari *et al.*, 2001).

Sexes

Table (2) shows that higher infection rates were recorded among girls than boys (33.73% and 27.35%). The present results are similar to a study performed in Saudi Arabia (Al-Shammari *et al.*, 2001) These results may be because this group of children is more involved in out and indoor activities which might lead to *Entamoeba* transmission.

Table 2: Prevalence of *Entamoeba histolytica* according to the sexes of the patients

Sex	No. Examined	No. +ve	%
Male	117	32	27.35
Female	83	28	33.73
Total	200	60	30

Age groups

Regarding the results of *E. histolytica* infection among different age groups, Table (3) shows that the children less than 1 year old group had a lower rate of infection (19%), and it is consistent with the study conducted in Saudi Arabia (Al-Shammari *et al.*, 2001) This finding perhaps because parents are responsible for their hygiene (Al-Saeed *et al.*, 2006) although not statistically significant, the incidence rates of *E. histolytica* infection were higher in children who were breast-fed less than 12 months (Haque *et al.*, 2003) The infection rate was highest in the illiterate age group (4-6 years) and in the group with educational level of primary school (10-12 years) (52.38% and 50%

Table 3: Prevalence of *Entamoeba histolytica* according to the age groups of the patients

Age (years)	No. Examined	No. +ve	%
<1	121	23	19.00
1-3	45	20	44.44
4-6	21	11	52.38
7-9	11	5	45.45
10-12	2	1	50
Total	200	60	30

respectively), which may be attributed to defecation practices because these groups of children are fully independent in toilet use and are more involved in both outdoor activities and feeding. In addition to their poor level of education, the prevalence of *E. histolytica* was found to increase with age (Omar *et al.*, 1991) Table 3: Prevalence of *Entamoeba histolytica* according to the age groups of the patients

Economical status

The patients were evaluated according to their socio-economic criteria (Table 4); most of the cases (34.54%) were from moderately developed regions where there is no proper sewage system present. A study (Nematian *et al.*, 2004) showed that a higher family income was related to a lower prevalence of parasitic infection in the children. Both studies (Jarabo *et al.*, 1995) and (Gunduzi *et al.*, 2005) demonstrated that intestinal parasites are more prevalent in school-age children, probably due to the moderate to low socio-economic level and these infections deteriorate the psychological and physical development of the children.

Table 4: Prevalence of *Entamoeba histolytica* according to the Economical status of 200 children patients

Economic Status	No. Examined	No. +ve	%
Bad	25	6	24
Medium	110	38	34.54
Good	65	16	24.61
Total	200	60	30

Maternal education

Table (5) clarifies the prevalence of *E. histolytica* infection according to the maternal educational status of the children and the higher infection rates were among illiterate mothers (39.24%) and who had school education (25.22%) compare to (10%) with college education. This finding is in agreement with findings of studies in other developing nations. For example, (Curtale *et al.*, 1998) found that the knowledge, perception, and behavior of mothers were helpful in designing and implementing an effective community based intestinal parasites control program in Egypt. (Wamani *et al.*, 2004) found that the mother's education was the best predictor of health and nutrition inequalities among children in rural Uganda. Finally, (Nematian *et al.*, 2004) showed that the better the educational level of the mothers, the lower the parasitic infection rate in children in Iran.

Table 5: Prevalence of *Entamoeba histolytica* according to the maternal education status of the patients

Maternal Level	No. Examined	No. +ve	%
Illiterate	79	31	39.24
School	111	28	25.22
University	10	1	10
Total	200	60	30

Studied months

The distribution of *E. histolytica* according to the months of the year is shown in Table (6). Although no samples were collected in the summer months, the rate of *E. histolytica* infection as a proportion of the number of stools examined was lowest in November-2010 (8.53%). Fewer samples were collected in the colder months but the highest infection rate of samples was in February-2011 (54.54%) followed by March (52%), January (27.58%) and December (16.66%). The cysts of *E. histolytica* are rapidly killed by temperatures below 5 °C and above 40 °C Roberts *et al.*, (1996) In Erbil city the temperature in winter is 0 °C or less than 5 °C. Other behavioral factors could be involved, for example, the consumption of drinks with ice, ice cream and raw fruits in ice are associated with *E. histolytica* infection (De Lalla *et al.*, 1992).

Table 6: Prevalence of *Entamoeba histolytica* according to the studied months.

Months	No. Examined	No. +ve	%
November	82	7	8.53
December	6	1	16.66
January	29	8	27.58
February	33	18	54.54
March	50	26	52
Total	200	60	30

According to this study, it is concluded that infection with *Entamoeba histolytica* parasites are frequent in children in Erbil-Iraq. Therefore,

- a. A periodic survey and treatment of this infected age group is useful.
- b. Improvements in the environmental and personal health through public education campaigns, improved sanitation facilities, proper waste and wastewater disposal, control of drinking-water and food safety are highly recommended in Erbil city.
- c. Patients with intestinal parasitosis become an



infection focus for the community. If left untreated, serious complications and even death may occur due to parasitic infections. Therefore, public health care employee as well as the officers of municipality and government should cooperate to improve the survival conditions, and also people should be informed about the signs, symptoms and prevention methods of the parasitic diseases.

- d. In addition, breastfeeding seems to have a strong impact on early childhood development as well as protection against disease.

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