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## A study of Amoebiasis among children in Thi-Qar Province/Iraq

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### Abstract:

determine the prevalence of the Amoebic dysentery among children under the The present study aims to age of five years in Thi-Qar province during the period from October 2022 to August 2023 and to study the effects of some factors such as sex, age, location, source of drinking water and others on the prevalence of the disease. Study was carried out at the Bint Al-Huda Educational Hospital for Women and Children and Mohammed al-Musawi Hospital in Thi-Qar Province, 697 samples of feces were collected from children with diarrhea and examined by direct microscopic examination. The results showed that 100 out of 697 and %14.34 % of children were infected with *Entamoeba* spp. No significant differences ( $p>0.05$ ) were recorded in prevalence of *Entamoeba* spp. according to sex and the infected males %7.46% more than infected females 6.88%. A significant differences ( $p\leq 0.05$ ) were observed in the prevalence of *Entamoeba* spp. according to age groups, the highest infection percent on the age group (48-60 months) 5% and the lowest infection percent on the age group (<12 months) 1.43 %. No significant differences ( $p>0.05$ ) were recorded in prevalence of *Entamoeba* spp. according to months of the year, the high percent 23.33% in June and the lowest percent 10.67% in November. The study recorded significant differences ( $p\leq 0.05$ ) in infection percent according to the location, the percent of infected children living in rural 9.75% more than infected children living in the urban 4.59%. The study recorded significant differences in prevalence of *Entamoeba* spp. according parent educational level. The high percent of infection was recorded in children belonging to parents without educational attainment 6.89%. The results showed that there were no differences ( $p>0.05$ ) in prevalence of *Entamoeba* spp. according to source of drinking water.

**Keywords:** Amoebiasis, Thi-Qar province, Iraq

### Introduction

Intestinal parasites are one of the medical problems of most developing countries (Sayyari *et al.*, 2005). A third of the world's population and at least 50% of those infected are children (Balakrishnan *et al.*, 2022) and Amoebiasis is one of the most important causes of deaths, with malaria, Plasmodium and Schistosoma coming in third degree in annual mortality ratios (Marye *et al.*, 2015; Fallah *et al.*, 2014).

This parasite shows varying degrees of illness, that may be without symptoms, cause mild diarrhea, or cause severe dysentery (Oliveira, 2022). The highest prevalence rates of Amoebiasis according to World Health Organization (WHO) found in developing countries, especially in the Indian subcontinent, parts of Central America and South America, and tropical regions in Africa. About 10% of the world's population were infected with Amoebiasis and around 90% of those infected are without symptoms, while 10% are developing into invasive amoebic disease (Yimam and invasire., 2016). Several species of *Entamoeba* are present in human intestinals: *E. histolytica*, *E. dispar*, *E. moshkovskii*, *E. coli* and *E. hirtmanni* except *E. gingivalis*, which was the only species found on oral cavity (Bonner *et al.*, 2014). *E. histolytica* is parasitic, while *E. coli* is commensal, and none of them are mutualism (Saha *et al.*, 2015). The *E. histolytica* is the only pathogenic species that causes pathogenic changes in host, while the other non-pathogenic species (Gomes *et al.*, 2014), The *E. histolytica* parasite invasive various tissues and organs in the human body, such as the intestine, which represents the most common organ of infection, causing amoebic dysentery. It also infects the liver, causing hepatic abscess, as well as the brain and pancreas, causing what is called extra-intestinal Amoebiasis. (Siddiqua, 2016). The non-pathogenic species parasitic *E. dispar* and *E. Moshkovskii* It's more common and identical in morphology with *E. histolytica*. The incidence of Amoebiasis disease is high in tropical and subtropical areas and is due to low levels of sanitation and socio-economic conditions. (Behnia *et al.*, 2008).

## **:Materials and Methods**

### **:Samples collection**

About 697 samples were collected from children under five years of age, who suffer from diarrhea and complain of abdominal pain in the Bint Al-Huda Educational Hospital for Women and Children and Mohammed al-Musawi Hospital in Thi-Qar Province for the period of October 2022- August 2023. All information's as sample number, date, patient name, sex, age, location of housing, source of drinking water were recorded.

### **Diagnosis of Amoebiasis:**

#### **Direct microscopic examination:**

#### **Direct Smear Method:**

Small amount of feces sample (1gm) mixed with a drop of the Normal saline 0.9% on sterile slide and covered with slide cover then examined microscopically under 10X and then under a superpower (40X) and (100X) within 15 minutes. The trophozoites are diagnosed based on their morphology properties, the active amoebic movement and the presence of phagocytosed red blood cells within the food vacuoles, while the cystic stages characterized with oval shape and four nuclei that characteristically have centrally-located karyosomes and fine, uniformly distributed peripheral chromatin (Taylor and Llewelyn., 2010).

#### **Lugol's Iodine:**

A drop of Lugol's Iodine solution and a small amount of feces sample (1 g) was placed and mixed then cover slide was placed and examined under the force of ( X40) (Dennehy, 2019).

### Sedimentation Method:

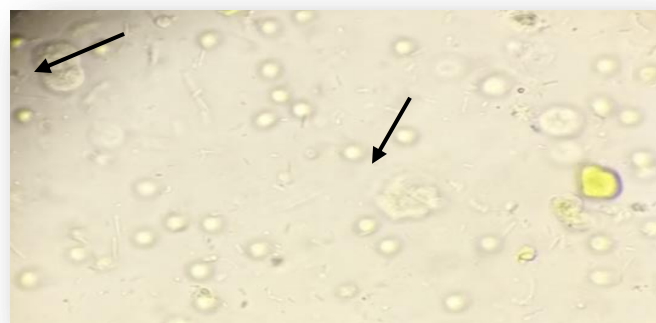
The feces are mixed with a mount of water and filtered through a piece of gauze to remove the large material, this process repeated several times until the sample appears in a clear color, then a part of the sediment was examined under microscope (Melendez-Lopez et al., 2007).

### Statistical analysis:

The results of current study were statistically analysed based on the Chi-Square (X<sup>2</sup>) Box-Test under p.value <0.05 using SPSS-Software.

### Results:

The results of current study showed that 100 out of 697 (14.34%) were infected with *Entamoeba* spp. by microscopic examination (figures 1, 2).



(Figure 1) Cyst (A) and Trophozoite (B) of *Entamoeba* spp. under light microscope (X100).

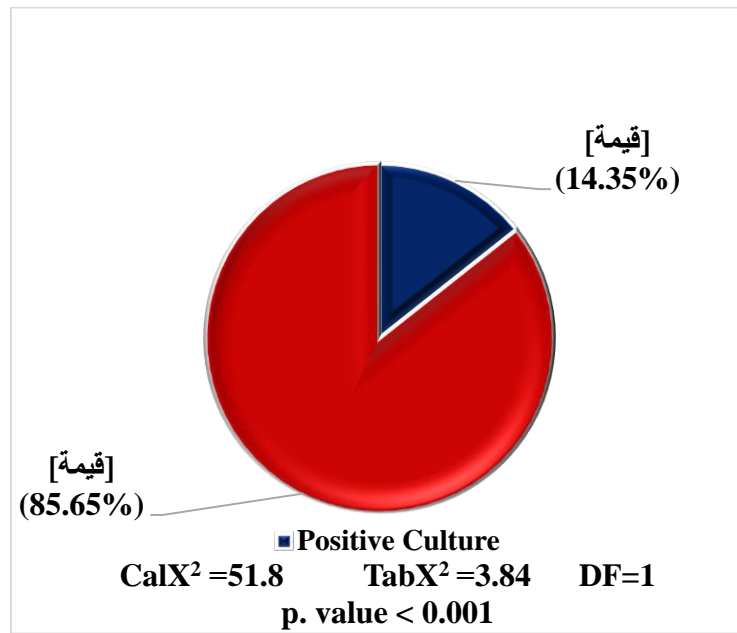


Figure 2: Total infection percent of *Entamoeba* spp. by microscopic examination.

No significant differences ( $p > 0.05$ ) were recorded in the prevalence *Entamoeba* spp. according to sex and the infected males %7.46% more than infected females 6.88%. (Table, 1).

Table 1: The prevalence *Entamoeba* spp. according to sex.

Sex	No. examined samples	No. positive samples	%
Males	٤٨٥	٥٢	٧,٤٦
Females	٢١٢	٤٨	٦,٨٨
Total	٦٩٧	١٠٠	١٤,٣٤

$$x^2 = 5.103 \quad \alpha = 3.84 \quad df = 1 \quad p = 0.024$$

A significant differences ( $p \leq 0.05$ ) were recorded in the prevalence *Entamoeba* spp. according to age groups, the highest infection percent on the age group (48-60 months) 5% and the lowest infection percent on the age group (<12 months) 1.43 %. (Table, 2).

Table 2: The prevalence *Entamoeba* spp. according to age groups.

Age (months)	No. examined samples	No. positive samples	%
12<	190	10	1,43
12-23	162	16	2,30
24-30	130	20	2,87
36-47	108	18	2,08
48-70	97	36	5,16
Total	697	100	14,34

$$x^2=42.69 \quad \alpha=9.49 \quad df=4 \quad p < 0.001$$

In current study no significant differences ( $p>0.05$ ) were recorded in prevalence of *Entamoeba* spp. according to months of the year, the high percent of infection 23.33% in June and the lowest percent of infection 10.67% in November. (Table, 3).

Table 3: The prevalence *Entamoeba* spp. according to months of yaer.

Months	No. examined samples	No. positive samples	%
October	220	20	11,11
November	70	8	10,67
December	30	0	16,67
January 2023	20	3	12
February	40	10	22,22
March	30	6	17,14
April	37	0	13,01
May	23	4	17,34
June	30	7	23,33
July	96	17	17,7
August	79	10	13,16
Total	697	100	14,34

$$x^2=12.77 \quad \alpha=18.31 \quad df=10 \quad p= 0.237$$

The study recorded significant differences ( $p \leq 0.05$ ) in the prevalence of *Entamoeba* spp. according to the location, the percent of infected children living in rural 9.75% more than infected children living in the urban 4.59%. (Table, 4).

Table (4): The prevalence *Entamoeba* spp. according to location.

Location	No. examined samples	No. positive samples	%
Rural	٥٨٧	٦٨	٩,٧٥
Urban	١١٠	٣٢	٤,٥٩
the total	٦٩٧	١٠٠	١٤,٣٤

$$x^2 = 8.866 \quad \alpha = 3.84 \quad df = 1 \quad p = 0.003$$

The study recorded significant differences in prevalence of *Entamoeba* spp. according parent educational level. The high percent of infection was recorded in children belonging to parents without educational attainment 6.89%. Table (5).

Table 5: The prevalence *Entamoeba* spp. according to parent educational level.

Educational level	No. examined samples	No. positive samples	%percentage
Without any educational attainment	١٨٥	٤٨	٦,٨٩
primary	١٥٢	١٠	١,٤٣
Medium	١٥٠	٨	١,١٥
Preparatory school	١٣٥	١٢	١,٧٢
University and above	٧٥	٢٢	٣,١٥
Total	٦٩٧	١٠٠	١٤,٣٤

$$x^2 = 40.09 \quad \alpha = 9.49 \quad df = 4 \quad p < 0.001$$

The results showed that there were no differences ( $p > 0.05$ ) in prevalence of *Entamoeba* spp. according to source of drinking water (Table, 6).

Table 6: The prevalence *Entamoeba* spp. according to source of drinking water.

Source of drinking water	No. examined samples	No. positive samples	%percentage
R.O.Water	٥٤٥	٩٢	١٣,١٩
Tap water	١٥٢	٨	١,١٥
<b>Total</b>	<b>٦٩٧</b>	<b>١٠٠</b>	<b>١٤,٣٤</b>

$$x^2 = 7.35 \quad \alpha = 3.84 \quad df = 1 \quad p = 0.007$$

### Discussion:

In current study 697 samples of feces were collected from children with diarrhea and examined by direct microscopic examination. The results showed that 100 out of 697 and %14.34 of children were infected with *Entamoeba* spp. The prevalence of *Entamoeba* spp. in current study differed from the results of some studies in Iraq as Al-Shuaibi *et al.* (2000) study in Baghdad, %28.9, Edward *et al.* (2000) in Basra province %84, Al-Abadi *et al.* (2000) in Thi-Qar province 40%, Al-Naimi *et al.* (2001) in Ninawa province %23%, Salman (2002) in Tikrit city %60, Al-Janabi *et al.* (2002) in in Baghdad %35.3, Al-Mosa (2002) in Hilla city %35.5, Al-Fahdawi *et al.* (2002) in Ramadi General Hospital %25.3, Al-Yassaree (2004). In Erbil province %29.5, Al-Rikabi *et al.* (2006) in Thi-Qar province, 33.3%. Ismail (2006) in Babel province %29.5, Al-Masoudi *et al.* (2006) in Babel province 22.6%, Al-Nasiri *et al.* (2007) in Kirkuk city 25.6%, Al-Mouzan *et al.* (2011) in Thi- Qar province %33.3. While this study recorded a higher prevalence than what was recorded by Al-Moussawi *et al.* (2001) in Karbala province 10.4%, Al-Kubaisi *et al.* (2002) in Hilla city 10.3%, Sultan *et al.* (2005) in Al-Kufa city 10.9%, AL-Saeed *et al.* (2006) in Duduk city 7.1%. The results of the current study was close to some studies as Abdel-Dayem *et al.* (2014) in Baghdad 15.3 %, Zaed (2018) in Thi-Qar province 15.9%, Makawi *et al.* (2020) in Mosul province 16%, Carrero *et al.* (2020) Samawah city 16.2%.

The difference of current study with these studies may be due to the difference in the level of sanitation and personal hygiene, population density, geographical location, climatic conditions, the total number of samples examined, examination methods, examination techniques, the duration of the study, and the age groups of the study population and also due to the difference in regions and the difference in the time period covered by the study.

The similarity is also due to the similarity of the climatic conditions of the country in general, and the spread. The wide spread of this parasite may be due to the direct life cycle and simple transmission through contaminated food and water. consuming approximately 100 cysts of the parasite is sufficient to cause infection, due to the cyst's resistance to the usual chlorination used to sterilize drinking water. The

contamination of drinking water, its low levels, and slow movement, in addition to throwing away contaminated water before it is treated properly and the inefficiency of its sterilization, work to increase the infection with the parasite (Chavez, 2007).

No significant differences ( $p>0.05$ ) were recorded in prevalence of *Entamoeba* spp. according to sex and the infected males %7.46% more than infected females 6.88%. This results were agreed with the results of (Al-Masoudi, 2009; Tasawar *et al.*, 2010) reported that there were no significant differences, while it differ from the results of (Ejaz *et al.*, 2011) which recorded that females are more susceptible to infection than males. Perhaps the lack of differences is due to the similarity of conditions and customs, that lead to the spread of infection between the sexes. They live under the same conditions (Al-Tarfi *et al.*, 2014).

A significant differences ( $p\leq 0.05$ ) were observed in the prevalence of *Entamoeba* spp. according to age groups, the highest infection percent on the age group (48-60 months) 5% and the lowest infection .%percent on the age group (<12 months) 1.43

The results of the current study, in general, agreed with other studies, indicate that age groups under 10 years were the most affected among other groups (Obadiah, 2012). The reason may be attributed to the fact that children at this age are more exposed to different foods and are eager to taste anything and practice the habit of putting their fingers in the mouth. Well-known social habits among children can lead to an increase in infection in this age group (Tasawar *et al.*, 2010), as well as the development of the efficiency of the immune system in children, which is more sensitive to infection with diseases and parasites than adults (Wegayehu *et al.*, 2013).

No significant differences ( $p>0.05$ ) were recorded in prevalence of *Entamoeba* spp. according to months of the year, the high percent 23.33% in June and the lowest percent 10.67% in November. Many studies included the distribution of infections with the amoebic dysentery parasite over the months of the year, including (Al-Navoli *et al.*, 2004) in Mosul province, where the highest prevalence was in June and the lowest in December, (Al-Rikabi *et al.*, 2006) in Thi-Qar

province, which had its highest prevalence in April and lowest in December. Al-Khafaji *et al.* (2011) reported that the highest prevalence was in July 15.3%, while the lowest prevalence was in December 3.1%, Al-Mawzan *et al.* (2011) in Thi-Qar province founded that the highest prevalence in May and the lowest in January. In Diyala the highest prevalence was recorded in January (Al-Navoli *et al.*, 2004).

The study recorded significant differences ( $p\leq 0.05$ ) in infection percent according to the location, the percent of infected children living in rural 9.75% more than infected children living in the urban 4.59%. The reason is perhaps due to the lack of health services provided in those areas, such as sewage networks, potable water, or good health care. It should also be noted that there is a relationship between the location, the economic situation, the nature of breastfeeding, and the water used for drinking, as the poverty factor leads to weak health awareness, lack or deterioration of hygiene, and difficulty obtaining safe drinking water or healthy food, and this leads to weak immunity (Ozer *et al.*, 2013). The current study agreed with the results of a study by (Al-Samarrai *et al.*, 2008) in Samarra, which recorded the existence of significant differences between the rate of parasitic infection according to the location, where the rate of infection in the rural was recorded as %25.21 and in the city as %16.16, while it differed with



what (Hamad and Ramzy., 2012) in Erbil city, and (Al-Ebrahimi *et al.*, 2013) reported that there were no significant differences between infection rates.

The study recorded significant differences in prevalence of *Entamoeba* spp. according parent educational level. The high percent of infection was recorded in children belonging to parents without educational attainment 6.89%. The results of the current study agreed with the results of (Flaih *et al.*, 2021), while they differed with what was indicated by (Mumtaz *et al.*, 2009). The educational level of the parents affects the economic, social and health status of the family members and thus greatly determines the spread of the infection, as uneducated individuals are unable to understand the appropriate methods of personal hygiene and dealing with the environment, and their low level of awareness of how diseases are transmitted, people with higher educational level have the ability to understand the health concepts in their children (Mumtaz *et al.*, 2009). The results showed that there were no differences ( $p>0.05$ ) in prevalence of *Entamoeba* spp. according to source of drinking water. Despite the increase in the number of families who have using RO-Water on the assumption that it is sterile water and better than tap-Water, it has become at the same level of Pollution because it is stored in open-plastic-tanks and containers that are exposed to the presence of pathogens, and street-vendors often do not care about cleanliness. As they use old tanks that are prone to collecting dust, plankton, and pathogens over time, it has also been observed that the cysts of

some parasites, including the *E. histolytica*, are not affected by sterilizers that are added to the water, such as chlorine (Pinilla *et al.*, 2008).

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