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Prevalence of *Entamoeba histolytica* among Children attending Healthcare Centres at Amran Governorate, Yemen

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Abstract:

The prevalence of *Entamoeba histolytica* parasite is considered as a big challenge that interrupts the public health. The lack of hygienic practices, treated water, and health education due to the high level of poverty are the major factors associated with the prevalence of amoebiasis disease in Yemen. Consequently, this study aimed to find the prevalence of *E. histolytica* among children attending the healthcare centres of Amran Governorate, Yemen. A total of 271 specimens were chosen from infected children aged between 1-14 years attending healthcare centres in the period between January to June 2019. The collected specimens were examined by direct microscopical examination, saline sedimentation, and formalin-ether concentration. The results showed that 166 (61.25%) specimens were positive for *E. histolytica* while 105 (38.75%) specimens were negative. The highest prevalence of amoebiasis was 85 (62.04%) recorded among children from rural areas compared to 81(60.45%) children from urban areas. In the urban area, it was found that the overall rates of infection between males (57.14%) and females (58.21%) were similar. Also, a higher prevalence rate (81.25%) was recorded among males aged between 8 to 14 years. The number of infected age groups was equal in both gender in the rural area. The results based on gender revealed 53.1% of infected children were male and 46.99% were female. The associated factors with the highest prevalence of *E. histolytica* infection were recorded among parents of children with the illiterate status of education, children drinking water from the uncovered water source, and the children who did not wash hands after defecation. Different strategies that include health education programs, treatment of the drinking water, personal hygienic practices, and increased community awareness about infection transmission warrant to enhance the control of intestinal parasitism and morbidity caused by *E. histolytica* parasite.

Keywords: Amoebiasis, Amran Governorate, *Entamoeba histolytica*, Prevalence, Yemen.

INTRODUCTION

Amoebiasis is a disease in the intestinal of humans caused by *Entamoeba histolytica* that affect nearly 500 million cases globally and responsible between 40 to 110 thousand deaths each year (Pham Duc *et al.*, 2011; Simon-Oke and Ogunleye, 2015).

The highest incidence and distribution of *E. histolytica* parasite is strictly due to low economic status, lack of hygiene practices, scant sanitation of the environment, insufficient health system, and inadequate awareness about the life cycle patterns and transmission mechanisms of this parasite (Adeyeba and Akinlabi, 2002; Callixte *et al.*, 2019).

E. histolytica that cause intestinal diseases are frequently asymptomatic. The symptomatic cases by infected with *E. histolytica* representing dysentery with fever, chills, and diarrhea with blood or mucoid irregular with periods of constipation which lead cause severe amoebic dysentery (Lauren, 2004).

Several reports documented the distribution and frequency of *E. histolytica* infection in Yemen. In a survey by Raja *et al.*, (2000) found that the prevalent *E. histolytica/dispar* was 14% reported in the rural areas of the Ibb governorate. Also, 303 samples were collected from workers working in 58 restaurants in Sana'a City and observed that the high prevalence of *E. histolytica/dispar* was 48.9% (Al-Shibani and Alhamad, 2009).

Some studies in Yemen have been focused on prevalent *E. histolytica* among children. It was found that 42.3% and 36.8%, respectively, were recorded among children in the lowland and highland areas (Kopeck *et al.*, 1992). Also, in Sana'a city, Azazy and Raja'a (2003) found that 11.7% of 9,014 children attending the pediatric health center were infected with *E. histolytica/dispar*.

Similarly, Al-Haddad and Baswaid (2010) documented that the prevalence of *E. histolytica*

was 16.8% among children in Hadramowat governorate. It thus appears that the *E. histolytica* rate varies from governorate to governorate, and even among different parts and different populations of the same governorate. The *E. histolytica* prevalence rates of Amran have not been adequately documented. Therefore, the present study was intended to estimate the prevalence of *E. histolytica* among infected children attending presenting the healthcare centers of Amran Governorate, Yemen.

MATERIALS AND METHODS

Study Area

The study was carried out in the Amran governorate at the medical laboratory at 22 May hospital in Amran City, Yemen, during the period from January to June 2019.

Sample Collection and Examination

Two hundred seventy-one (271) specimens were sampled from infected children who were suspected with amebiasis aged between 1-14 years who attending health care centers at Amran governorate, Yemen. Information such as age, sex, residence, and variables factors such as educational level of parents, source of drinking water, and hand washing after defecation were obtained from suspected cases. A clean plastic bottle (labeled faecal) was given to each infected child and instructed about the specimen collection. Then, the collected specimens were immediately transmitted to the laboratory for processing and examined by using three methods of routine examination of stool: wet preparation, saline centrifuged, and formalin/ether concentration (Cheesbrough, 2010).

RESULTS

A total of 271 stool specimens used in this study were collected from children suspected of amoebiasis diseases. 137(50.55%) and 134(49.45%) specimens were sampled from rural and urban areas from the Amran governorate (Figure 1).

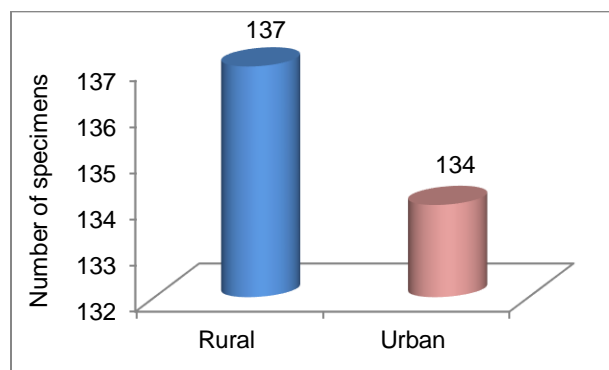


Fig. 1. The distribution of specimens according to location.

Out of the 271 stool specimens examined, 166 (61.25%) specimens were found to be positive for *E. histolytica* and 105 specimens (38.75%) were recorded negative (Figure 2).

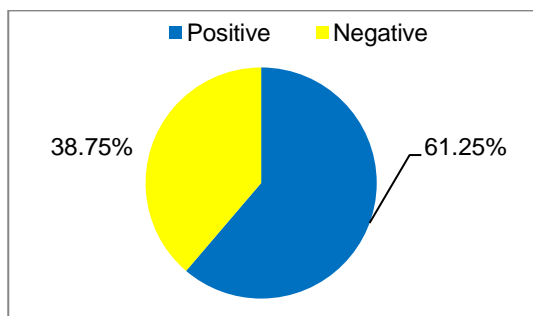


Fig. 2. Percent of children infected with *E. histolytica*.

The distribution and prevalence results of intestinal amoebiasis according to residence showed that from the 166 patients infected, it was recorded that the highest prevalence of amoebiasis was among patients from rural areas 85 (62.04%) compared to patients from urban areas 81(60.45%) as shown in Figure (3).

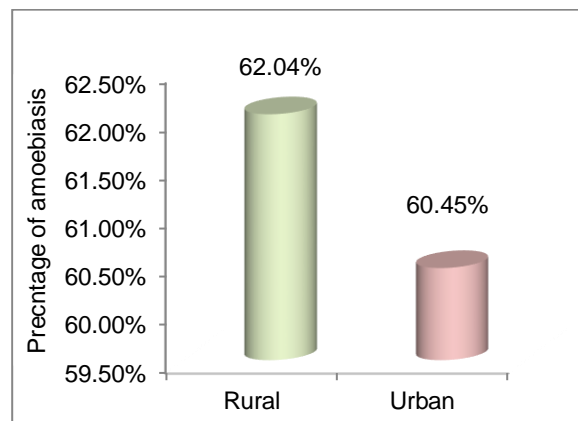


Fig. 3. Distribution percentage of amoebiasis based on residence.

The occurrence of *E. histolytica* according to sex revealed that the 88 (60.27%) of children males were infected with *E. histolytica* and also 78(60.94%) of examined children females were infected as listed on Table (1).

Table (2) showed the distribution of *E. histolytica* infection between the cases according to age group and gender in an urban area. It was found that the overall rates of infection between males (57.14%) and females (58.21%) were not different. The different rate of infection was recorded between age group in male. It was found that the highest rate of infection was (81.25%) reported on group aged 8-14 years in male.

The present work showed that the distribution of *E. histolytica* between the cases based on age group and gender in rural are listed in Table (3). The numbers of infected age

group were equal in both male and female children.

Table (4) showed the *E. histolytica* prevalence according to variables studies. It was found the highest infection among parents of children with the illiterate status of education and lowest those with an upper secondary

educational qualification. Also, the prevalence of *E. histolytica* infection based on the source of drinking water was 77.78% recorded in dams' water and 54.12% in children drinking from well water. Besides, it was found that the children did not wash their hands after defecation was the highest exposed to *E. histolytica* infection with 65.28%.

Table 1. *E. histolytica* prevalence based on sex.

Resident	Male			Female		
	No. of Samples	Positive (%)	Negative (%)	No. of Samples	Positive (%)	Negative (%)
Urban	70	42 (60)	28 (40)	67	39 (58.20)	28 (41.80)
Rural	76	46 (60.53)	30 (39.47)	61	39 (63.94)	22 (36.06)
Total	146	88 (60.27)	58 (39.73)	128	78 (60.94)	50 (39.06)

Table 2. Distribution of infected patients based on gender and age in the urban area.

Age	Male		Female	
	Sample number	Positive (%)	Sample number	Positive (%)
1-7	38	16 (42.10)	35	23(65.71)
8-14	32	26 (81.25)	32	16(50)
Total	70	42 (57.14)	67	39 (58.21)

Table 3. Distribution of *E. histolytica* infection according to gender and age in the rural area.

Age	Male		Female	
	Sample number	Positive (%)	Sample number	Positive (%)
1-7	37	20 (54.05)	28	18 (64.28)
8-14	39	26 (66.66)	33	21(63.63)
Total	76	46 (60.53)	61	39 (63.93)

Table 4. *E. histolytica* Frequency according to variables studied.

Variables		No. of sample	Number positive	Infection rate%
Educational level of parents	Illiterate	54	39	72.22
	Primary	105	70	66.67
	Secondary	70	38	54.28
	Upper secondary	42	24	45.23
Source of drinking water	Well	170	92	54.12
	Pools	56	40	71.29
	Stream	27	20	74.1
	Dams	18	14	77.78
Hand washing after defecation	Always or often	110	49	44.54
	Never or occasionally	161	105	65.28

DISCUSSION

Several studies conducted in Yemen were documented that *E. histolytica* was the most predominant parasite observed (Alwabr and Al-Moayed, 2016; Alsubaie *et al.*, 2016; Qasem *et al.*, 2020). A total of 271 stool specimens were sampled from children suspected of amoebiasis diseases from the Amran governorate. 137(50.55%) and 134(49.45%) specimens were collected from rural and urban areas, respectively.

In the current, the results showed that 166 (63.33%) of 271 examined samples were recorded a positive for *E. histolytica*. This finding is in agreement with the studies reported from different regions of Yemen including Mahweet governorate (64%) (Alwabr and Al-Moayed, 2016), Ibb city (61.7%) (Qasem *et al.*, 2020), and Sana'a city (48.8%) (Al-Shibani and Alhamad, 2009). Conversely, the low frequency was registered in Yemen; 20.6% in Taiz city (AL-Harazi, 2016) and 17.1% in Sana'a (Alyousefi *et al.*, 2011).

The results of the present work observed that the *E. histolytica* prevalent in relevant to residence area were 85(62.04%) and 81(60.45%), respectively, recorded in rural and urban areas. These findings are similar to those of Alyousefi *et al.* (2011) in Sana'a, who reported that the protozoan infection was 28.4% in urban and 37.6 % in the rural area.

A similar observation was reported by Al-Haddad and Baswaid (2010) observed that the 101 samples (16.83%) of examined children in the Hadhramout governorate were infected with *E. histolytica*. 48 samples of the rural area and 53 samples from the urbane area. In a different study by Al-Mekhlafi *et al.* (2016) noticed that the frequency rate of *E. histolytica* among schoolchildren in the rural area of Sana'a was 21.5%. On the other hand, AL-Harazi (2016) observed that the infection rate of the parasite was 72.2% in urban and 27.8% in a rural area in Taiz city.

The results based on gender revealed that 53.1% of the examined males were infected with *E. histolytica* and 46.99% were female. This result has been supported by the previous investigation conducted in Yemen. Qasem *et al.* (2020) observed that 36.2% and 63.8% of children infected were male and female, respectively. Also, Alwabr and Al-Moayed (2016) recorded that 51.67% of infected children were males while 48.33% were females in Al-Mahweet. In Sana'a, Azazy and Raja'a (2003) documented that 160(55.36%) samples of infected children with *E. histolytica* were male and 129 (44.64%) was female.

In this study, it was detected that there was no significant difference in infection rate by *E. histolytica* between the examined children of both sexes concluding that both male and female children have the same susceptibility to *E. histolytica* infection. Different factors that contribute to the prevalence of *E. histolytica* infection in the Amran governorate such as education of parents, source of drinking water, and hand washing after defecation were determined in this investigation. It was observed in this work that the most prevalence of infection was between the parents of children with a low educational level.

Similar research documented by Abdel-Magied and Elahwel (2006) observed the statistically significant higher prevalence rates of *E. histolytica* between children with uneducated parents than those with educated parents in the Sirt city of Libya. The educational statue of the parents is considered as a significant factor that has been reported to influence the parasitic infection (Nematian *et al.*, 2004).

However, this study revealed that the highest prevalence of *E. histolytica* infection between children consuming water from the uncovered water such as dams and rivers. This finding is in agreement with the earlier reports conducted in Yemen that documented the most prevalence of *E. histolytica* was reported in children drinking from untreated water sources

(Alyousefi *et al.*, 2011; AL-Harazi, 2016; Alwabr and Al-Moayed, 2016).

Moreover, the use of pools, dams, and streams as sources of drinking water for a family especially in the rural area has been associated with increased prevalence of water-borne pathogens. These sources of water are usually highly contaminated by water containing infective stage (cyst) from different types of wastes such as human and animal feces, particularly during the rainy seasons (Dawet *et al.*, 2012). In 2003, WHO reported that 4% of the global burden of disease and 1.6 million deaths annually were contributed to unsafe water supply and sanitation (WHO, 2003).

The current work indicated that the children did not wash their hands after defecation was the highest exposed to *E. histolytica* infection. This result agrees with the studies carried out by AL-Harazi (2016) and Qasem *et al.* (2020).

It has been well reported, in developing countries that the contaminated hands play an important role in the fecal-oral transmission and washing hands before eating or after evacuation have been reckoned as a secondary barrier (Anuar *et al.*, 2012).

CONCLUSION

It can be concluded that the high prevalence of *E. histolytica* infection in the study area denotes high levels of pollution in the environment and consider potential health consequences. Many factors that including unsafe sources of water, low practicing handwashing after defecation, poor sanitary conditions, and lack of community awareness about the infection of the parasites contributed to the transmission of intestinal protozoa and exposure of the children to *E. histolytica* infections. Therefore, there are great efforts need for appropriate health education, deworming intervention, and increase community

awareness regarding the transmission and prevention of amoebiasis.

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CONFLICT OF INTEREST

There is no conflict of interest.

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