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Study of Risk Factors for *Entamoeba Histolytica* in Preschool Children: A Questionnaire Survey

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Abstract

Amebiasis is a parasitic infection of the intestines caused by a protozoa *Entamoeba histolytica* (*E. histolytica*) that mainly leads to diarrhea. A study was conducted to determine the prevalence of risk factors for *Entamoeba histolytica* infection. A study was carried out to assess the occurrence of risk factors for *Entamoeba histolytica* infection among children in the western region of Libya. A total of 55 children, 27 male and 28 female, with an average age of 2 and 5 years, were included in this study. Their mothers were interviewed using a structured questionnaire survey. The majority (61.82%) consumed water that originated from treated water, and most, (81.82%) consumed washed fruits before eating. All respondents consumed Well-cooked meat, washed their hands before eating (70.91%), while in contact with soil (87.27%), washed their hands after entering the bathroom (90.91%), and did nail trimming (85.45%). The majority of mothers had some knowledge about *E. histolytica* but little knowledge of the transmission mechanism. Understanding these risk factors can aid in reducing and preventing *E. histolytica* infection. More health education is required for the study to increase awareness of Entamoeba risk factors.

Keywords: Amebiasis, *Entamoeba Histolytica*, Pre-School Children, Risk Factors.

INTRODUCTION

Amebiasis is a parasitic disease of the gastrointestinal tract caused by an anaerobic parasitic protozoan *Entamoeba histolytica* (Rawat et al., 2020) that is widespread, especially in tropical regions and most frequently in inadequate hygiene (Peterson et al., 2011). It infects humans and other primates alike (Schuster & Visvesvara, 2004), causing amebiasis in developing countries. It infects about 50 million people worldwide (Haque & Petri Jr, 2006; Rawat et al., 2020).

The high prevalence can be seen in Africa, Mexico, India, and some parts of Central and South America. The infection is increased by poor sanitary conditions, inadequate water, sanitation, and hygiene. Texas and California have significantly higher rates of amebiasis in the US, and Asia (Gunther et al., 2011). It is also recognized that *E. histolytica* is a newly discovered sexually transmissible pathogen (Escolà-Vergé et al., 2017). According to previous studies, co-

infection with HIV raises the chance of acquiring *E. histolytica*. Prior research reveals the possibility of infection with *E. histolytica* if a person is also infected with HIV (Hung et al., 2008).

Humans become infected by eating contaminated raw vegetables, any food or drink containing the cyst of *E. histolytica* and by indirect transmission fecal-oral route (Haque et al., 2003). After ingestion, only mature cysts resist the stomach acidity and pass into the small intestines, where an excystation occurs. Infections can be either asymptomatic or symptomatic infections, which include ulceration of the wall of the large intestine and amoebic dysentery (intestinal amebiasis). Passage of trophozoites via the portal blood may occur and lead to amoebic liver abscesses and lung abscesses (extra-intestinal amebiasis). As a result secondary bacterial infection may occur. Bloody diarrhea, weight loss, exhaustion, and stomach pain are some symptoms (Kow-Tong et al., 2001). Diagnosis is established directly by microscopic examination for cysts and trophozoite in the patient's fresh and preserved stool specimens, smears acquired through protoscopy, and drawout of abscesses and other tissue specimens. Microscopy is another laboratory technique used for diagnosis (Walsh, 1986), culture (Clark & Diamond, 2002), serological testing (Ohnishi & Murata, 1997), antibody titers (Gathiram & Jackson, 1987; Jackson et al., 1985; Ravdin et al., 1990), and polymerase chain reaction (PCR) assay (Fotedar et al., 2007). Amebiasis can be effectively treated with several interventions, such as medication, surgery, and preventative measures. The preferred medication for treating amebiasis is nitroimidazole derivatives (metronidazole or tinidazole) (Farthing, 2006).

The prevalence of *E. histolytica* in Libya has been reported in various studies, highlighting its public health significance in the region. Studies have reported varying prevalence rates. For instance, a study conducted in 2014 reported that the prevalence of *E. histolytica* in primary schools in Zawia was 3.1% (Mergani et al., 2014), 3%–4% of *E. histolytica* was found in school children in Tripoli (Kasssem et al., 2007), 6.6% in Derna District (Sadaga & Kassem, 2007), 15.7% in Benghazi (El-Boulaqi et al., 1980), and 36.57% among children and neonates in Sirt (Kasssem et al., 2007). 3.1% of *E. histolytica* was found in primary school children in Zawia (Elsaid et al., 2014).

The prevalence was slightly higher, 11.8% among children in Zliten, as reported by (Ali et al., 2005). In Khoms, the prevalence of *E. histolytica* is 12.1% among school-aged children and adults (El Ammari & Nair, 2015), while in Brak, Wadi Al Shati, it is 9.5% among adults and children (Mergani et al., 2014).

The study objective was to determine the occurrence of risk factors for *Entamoeba histolytica* infection among children at Qobat Alsakhra, Alqodes, and Alnajah preschools in the western region of Libya.

MATERIALS AND METHODS

The study participants were 55 (27 male and 28 female) aged between 2 and 5. The present study was conducted from March to May 2023 in three pre-schools, children in the western region of Libya. A cross-sectional study was undertaken at Qobat Alsakhra, Alqodes, and Alnajah preschools.

A structured questionnaire was created and conducted confidentially to each mother participant, who provided the following details: age, sex, residence, educational level of mothers, average income, washing hands after defecation, washing hands before eating, nail trimming, consumption of raw or undercooked meat, source of water, consumption of unwashed fruits, and contact with soil (WHO, 2012). After all questionnaire responses were entered into Microsoft Excel®

2007 (Microsoft Corporation, USA), SPSS Version 21 (SPSS, Inc., Chicago, IL, USA) was used to perform descriptive analysis, while qualitative variables were estimated and displayed as frequencies and percentages. The data containing quantitative variables were expressed as the mean +/- standard deviation (+/- s.d.) and range.

RESULTS

A total of fifty-five (55) children aged from 2 to 5 years were involved in the study. The results showed that 41.82% (23/55) of respondents were from Sabratha, 54.55% (30/55) from Surman, and 3.62% (2/55) from Dahman. The educational level of their mothers showed that 69.09% (38/55) had a bachelor's degree; in contrast, 1.82% (1/55) had a low degree. The results also showed that (54.55%) 30/55 of the respondents had a moderate average income, while the majority had no average income above 1500 d 100% (0/55). Several risk factors for *E. histolytica* were investigated in the survey, and the analysis of data showed that the majority of them, 90.91% (50/55) washed their hands after entering the bathroom. The results also showed that 85.45% (47/55) of respondents trimmed their nails.

The data collected showed 70.91% (39/55) washed their hands before eating and 29.09% (16/55) did not wash their hands. All of them (100%) consumed thoroughly cooked meat (Table 1). The results also showed that 81.82% (45/55) of respondents washed fruits and vegetables before eating them, and 18.18% (10/55) consumed them without washing them.

Regarding contact with soil, results revealed that 87.27% (48/55) of respondents were in contact with soil. All results are shown in Table 1.

About 61.82% (34/55) of respondents drink treated water, 23.64% (13/55) consume mineral water, and 14.55% (8/55) drink from water wells, and all do not consume tap water 0% (0/55) (table 2).

Table (1). Frequency of washing hands after entering the bathroom, nail trimming, hand washing before eating, cooked meats, and washing fruits before eating: (sample size=55)

washing hands after entering the bathroom	Frequency	Percent (%)
Yes	50	90.91%
No	5	9.09%
Nail trimming		
Yes	87	85.45%
No	8	14.55%
Hand washing before eating		
Yes	39	70.91%
No	16	29.09%
Cooked meats		
Well-cooked	55	100%
Half cooked	0	0%
Washing fruits before eating		
Yes	45	81.82%
No	10	18.18%
Contact with soil		
Yes	84	87.27%
No	7	12.73%

Table. (2) Frequency of water sources

Water sources	Frequency	Percentage (%)
Treated water	34	61.82%
Taps water	0	%0
Mineral water	13	23.64%
Wells water	8	14.55%
Total	55	%100

DISCUSSION

Amebiasis is an infection with the intestinal protozoa *E. histolytica*. Children contract the infection by consuming contaminated food or water that contains infectious stages (cysts). Through contaminated food or water supplies, the infection can spread swiftly to other individuals through infected stool. Most of the time, the infection is asymptomatic, but sometimes, if the disease progresses and the parasite invades the lining of the large intestine, bloody diarrhea, abdominal pain, cramping, nausea, and loss of appetite may occur.

This investigation aimed to discover the previous risk factors among preschool children in the western region of Libya using a questionnaire survey. The current study demonstrated that the highest average income (69.09%) was found among mothers who have bachelor's degrees (WHO, 2011). This was because the percentage of mothers' education was simple and reflected their average monthly income. (Hasan et al., 2023) found that low income and education levels are significant factors in the spread of *E. histolytica* among people. The higher the level of awareness and education, the higher the average monthly income.

The lowest rate (9.09%) does not wash their hands after entering the bathroom, mostly in children at the age of 4-5 years, where the transmission of the disease is more common by contaminated hands (Pham Duc et al., 2011) compared to (90.91%) under 2 years of age of children who are still under the care of their mothers.

The study also showed that the majority (70.91%) washed their hands before eating; this result may be due to the health awareness among most mothers. (Rinne et al., 2005) identified contaminated hands as a risk factor for amebiasis infection in children.

Nail trimming due to the high level of education decreases the possibility of transmission of Entamoeba infection. Mostly 85.45% of children trim their nails regularly, where long nails play an important role in the transmission of some infections. Based on the results, we can note that most Libyans have a high level of health awareness about meat consumption, where 100% of the total consumed is thoroughly cooked meat. A previous study revealed that meat and vegetable food products had high levels of intestinal parasite infestation (Nyarango et al., 2008).

The transmission of Entamoeba infection in children also occurs through eating contaminated vegetables and fruits, where (81.82%) of mothers wash or peel vegetables very well to prevent infection and maintain their children's health.

According to a study, vegetables' high intestinal parasite content may be a common way for Entamoeba infections to spread (Nyarango et al., 2008). (87.27%) of the children are in contact with soil due to their susceptibility to dehydration, *E. histolytica* cysts are unlikely to survive in soil for longer than ten days (Feachem, 1983).

Our study's findings also indicated that treated water was the most widely used (61.82%), which is considered safe for drinking. Also, 0% of them consumed tap water, and therefore household water sources are one of the potential risks of waterborne infection for humans. This agrees with a study by (Hasan et al., 2023). Additionally, the study showed that 70% of resulting negative respondents were washing their hands after entering the bathroom or washing their hands before eating, 30% of resulting positives were in contact with soil, and about water sources, 61.8% of respondents consumed treated water, and 14.55% consumed wells, and 23.64% used mineral water.

CONCLUSION

The prevalence of *E. histolytica* in children remains a significant public health concern, particularly in developing regions. Studies indicate that children, especially those in poor sanitary conditions, are at higher risk of infection due to factors such as inadequate access to clean water, poor hygiene practices, and malnutrition. Efforts to reduce the prevalence should focus on improving sanitation, promoting hygiene education, and ensuring access to clean water. Surveillance and research are crucial for understanding transmission dynamics and developing effective interventions. Addressing these factors can significantly decrease the burden of *E. histolytica* in pediatric populations and improve overall child health outcomes.

RECOMMENDATIONS

Additional research is recommended to determine the prevalence of *E. histolytica* among children, and further investigations using modern and more sensitive techniques such as PCR are needed. In addition, according to the study, public health education is essential to increasing knowledge of *E. histolytica* infection.

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ETHICS

The study obtained ethical approval from the directors of preschools.

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