

DETERMINATION OF PREVALENCE RATE OF *ENTAMOEBIA HISTOLYTICA* AMONG CHILDREN DIAGNOSED WITH ACUTE DIARRHEA IN KANO, NIGERIA

JAAFAR S ADAM¹, MUSA G YAHAYA², FAROUK S NAS³, LURWAN MU'AZU⁴, MUHAMMAD ALI^{5*}

¹Department of Pharmaceutical Technology, School of Technology, Kano State Polytechnics, Nigeria, ²Biology Unit, Ahmadu Bello University, School of Basic and Remedial Studies Funtua, Nigeria, ³Department of Biological Sciences, Bayero University Kano, Nigeria, ⁴Department of Biological Sciences, Federal University, Gusau, Nigeria, ⁵Department of Microbiology, Federal University, Gusau, Nigeria.
Email: alimuhd4real@gmail.com

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ABSTRACT

Objective: The study was aimed to determine the prevalence of *Entamoeba histolytica* among children diagnosed with acute diarrhea in Kura General Hospital Kano, from February to August 2017.

Methods: A total of 236 stools samples were collected from children within the age group of 0–5 years diagnosed with acute diarrhea attending the hospital. The stool samples were examined for *E. histolytica* cysts and trophozoites using direct wet preparation and formol-ether concentration techniques.

Results: The result showed that 23 samples which accounted for 9.75% of the samples were found to be positive for the parasite. Highest incidence of the parasite was found among children within the age category of 4–5 years. The results also indicated that males (56.5%) were more infected than females (43.5%). However, there is no statistical difference in the rate of infection among the sex and age group of the patients at $p < 0.05$.

Conclusion: Maintenance of personal hygiene and improved sanitation of the environment will indeed prevent contamination of food and water sources.

Keywords: *Entamoeba histolytica*, Acute diarrhea, Children, Prevalence.

INTRODUCTION

More than 50% of the world populations are infested with helminthes and protozoans [1]. Most people are asymptomatic to these infections but certain intestinal parasites may cause diarrhea and other related diseases [2]. Amoebiasis is a medical condition due to infection by protozoan parasite called *Entamoeba histolytica*. The organism is considered as the invasive type due to its intestinal tissue dissolving carnivorous potential, thus of medical importance [3]. Intestinal amoebiasis due to *E. histolytica* was ranked third among parasitic protozoan infection leading to death after malaria and schistosomiasis [4]. Transmission of the infection includes unsanitary habits, contamination of food and water by human feces already infected with the parasite as well as direct fecal-oral contact [5]. About 10% of infected individuals show clinical symptoms, which occur with invasive amoebiasis which though over 48 million people annually. Majority of symptomatic patients are presented with amoebic colitis while the rest manifested with extra-intestinal disease, most commonly as liver abscess [6]. The incidence and prevalence of amoebiasis vary in different part of the world [7]. The prevalence is increased in such a way that the newborn is now being reported with the infection [8].

The prevalence of infection caused by *E. histolytica* is very low in industrialized countries (about 1%) and high in tropical countries (about 50–80%) [9]. Clinical presentation of the intestinal infection may include abdominal discomfort, weakness, malaise, and constipation that may alternate with diarrhea, dysentery with the passage of exudates, blood and mucus, as well as colicky abdominal pain [10]. Systemic sign of infection includes fever, rigors, and polymorpho nuclear leukocytes while liver abscess results from infection through the intra-hepatic portal vessels [11]. *E. histolytica* infection is found in over 50% of the patients with acute diarrhea [12–14]. A study conducted in Egypt showed that 57.1% of the general patients with acute diarrheas were positive for the presence of *E. histolytica* [15]. On the other hand, similar

study conducted in Saudi Arabia demonstrated that *E. histolytica* was found to be responsible for only 2.2% of acute diarrheas among children below 5 years of age [16]. The study was aimed to determine the prevalence of *E. histolytica* among children diagnosed with acute diarrhea in Kura General Hospital Kano.

METHODS

Ethical clearance

The ethical approval for the study with reference number MOH/off/797/T.I/52 was obtained from Kano State Ministry of Health through Health Service Management Board Kano based on the consent of Kura General Hospital ethical committee.

Study area

Kura local area council is geographically located in the southern part of the state along Kano – Zaria road with a distance of about 35 km from the state capital. It is located at Latitude 11° 46' 17" N and Longitude 8° 25' 49" E. It covers an area of about 206 km² of land and population of about 144,601 according to 2006 census [17]. Kura Local Government shares common boundaries with Dawakin-kudu (East), Bunkure (South), Garun-Mallam (West), and Madobi Local Government (North) [17]. Kura is a rural communities inhabited by people whose predominant occupation is farming.

Samples collection and examination of *E. histolytica*

A total of 236 stools samples were collected from children (125 males and 111 females) within the age group of 0–5 years diagnosed with acute diarrhea attending Kura General Hospital Kano Hospital from February to August 2017 in clean, dry, and leak proof sterile bottle. The specimens were immediately transported to the Laboratory of Department of Biological Sciences Bayero University, Kano for examination of *E. histolytica* cysts and trophozoites. The stool samples were examined for *E. histolytica* cysts and trophozoites using direct wet

preparation and Formol Ether concentration technique as described by Tanyuksel and Petri. [18].

RESULTS

Age and sex distribution of the participants

The age and sex distribution of the patients is presented in Table 1. The distribution showed that the number of male patients (125) is higher than of the female (111). Patients of age category 4–5 years have the highest frequency with total of 51 subjects, followed by age category 2–3 years (50 subjects) and 3–4 years (49 subjects) while least subject was found among patients of less than a year (39 subjects).

Prevalence of *E. histolytica*

The prevalence of *E. histolytica* with respect to age and sex is presented in Tables 2 and 3. The result showed that age category 4–5 years has the highest prevalence with total of eight subjects which accounted for 3.39%, followed by 2–3 years and 3–4 years 5 subjects each (2.12%), 1–2 years 3 subjects (1.27%), and lowest frequency was found among patients of less than a year 2 (0.85%). With respect to sex, higher incidence was found among males with total of 13 subjects which accounted for 5.51% while female has ten positive samples (4.24%). The result is not statistically significant at $p < 0.05$.

DISCUSSION

The prevalence rate of *E. histolytica* among children age between 0 and 5 years in this study was found to be 9.75%. Several studies on determination of the prevalence of *E. histolytica* were conducted worldwide [19–22]. The result of this study is in conformity with the result of Nyenke *et al.* [23] on prevalence of intestinal amoebiasis in infant and junior school children in Degema General Hospital and environs who found percentage prevalence of 11%. This result also justifies the study of Memon *et al.* [24] who found the percentage of intestinal Amoebiasis in Children as 8.47%. The prevalence of 9.75% in this study is within the prevalence range of 5–15% of all protozoan

infection as a causative agent of acute diarrhea as estimated by the World Health Organization. The result of prevalence rate of *E. histolytica* in the present study is higher than the reported prevalence of 4.2–6.5% of *E. histolytica* infection in Bangladeshi children with diarrhea and also that of a Mexican study that found 8.4% of the samples to be seropositive for *E. histolytica* [25]. In Jordan, 8% of the reported acute gastroenteritis cases are because of *E. histolytica* [13]. However, the result of this study is lower than a similar study from Colombia who reported *E. histolytica* to be responsible for 10% acute diarrhea in children [26]. On the other hand, finding of this study was contrary to that of McIver *et al.* [27] in Australia whose study did not find *E. histolytica* among children diagnosed with acute diarrhea. Several factors were responsible for the prevalence of *E. histolytica* in the present study, such factors include; poor drainage system, low standard of personal hygiene, and unhygienic method of sewage disposal.

Among the age categories in this study the children within age bracket of 4–5 years were highly infected, 8 (3.39%). Higher prevalence among children in this group can be as result uncontrolled wandering around the street and other activities such as swimming. Low prevalence rate among subjects category of <1 year may be attributed to their innate resistance due to production of secretory immunoglobulin A that can minimize the adhesion between *E. histolytica* trophozoites epithelial cells, hence reducing new infection [28]. Findings from this study revealed that male children were more infected (5.51%) than the female ones (4.24%). However, the difference is not statistically significant ($p < 0.05$). This is possible due to the reason that both gender are living in the same community and generally engaged in similar activities such as farming and hence exposed to similar hazard continually.

CONCLUSION

Based on the findings of this study, it is found that the percentage prevalence of *E. histolytica* among children diagnosed with acute diarrhea is 9.75%. According to the study, more males are infected than the female but the result is not significant. Subjects of age category 4–5 years were found to be more infected. Factors such as unhygienic method of sewage disposal, poor drainage system as well as low level of personal hygiene contributed immensely to the distribution and proliferation of *E. histolytica*. It is recommended that creating the awareness for personal hygiene, proper sewage disposal and environmental sanitation should be encouraged.

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AUTHORS' CONTRIBUTION

All the authors have contributed equally in the research.

CONFLICTS OF INTEREST

All authors declared that no conflicts of interest exist.

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Table 1: Age and sex distribution of the participants

Age (year)	Male (n)	Female (n)
<1	20	19
1–2	22	25
2–3	28	22
3–4	25	24
4–5	30	21
Total	125	111

Table 2: Prevalence of *E. histolytica* based on age

Age (year)	No. of samples (n)	Positive samples (n)	Prevalence (%)	p-value
<1	39	2	0.85	0.528557 ^a
1–2	47	3	1.27	
2–3	50	5	2.12	
3–4	49	5	2.12	
4–5	51	8	3.39	
Total	236	23	9.75	

^aChi-square value is 3.1776. The result is statistically not significant at $p < 0.05$.
E. histolytica: *Entamoeba histolytica*

Table 3: Prevalence of *E. histolytica* based on sex

Sex	No. of samples (n)	Positive samples (%)	Prevalence (%)	p-value
Males	125	13 (56.5)	5.51	0.616589 ^a
Females	111	10 (43.5)	4.24	
Total	236	23 (100)	9.75	

^aChi-square value is 0.2507. The result is statistically not significant at $p < 0.05$.
E. histolytica: *Entamoeba histolytica*

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