Prevalence of Entamoeba histolytica among hospital patients in Soroti, Eastern Uganda

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Prevalence of Entamoeba histolytica among hospital patients in Soroti, Eastern Uganda

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Abstract

Amoebiasis is an infection caused by water borne protozoan parasite Entamoeba histolytica. In Uganda where sanitation infrastructure and health education are not adequate, amoebiasis is still an important health problem. However, there was little or no data on prevalence of this parasite in Uganda. This information was needed for decision making in order to allocate limited public health resources for treatment and prevention of amoebiasis. Currently there is a feasibility of development of amebiasis vaccine, therefore such studies could strengthen the urgency of this innovation. Routine microscopy procedures were used for detection of Entamoeba histolytica among patients presenting with clinical signs associated with amoebiasis in selected health facilities in Soroti, Eastern Uganda. Direct examination of wet stool was done. Of the 301 stool samples examined, 60 (19.93%) were found to be positive for Entamoeba histolytica/dispar. Infection with Entamoeba histolytica/dispar was significantly higher (P<0.05) among males (22.14%) compared to 17.39% among females. The prevalence was significantly higher (P<0.05) in 6-12 years age group (22.4%) than in 13-19 years age group (17.65%). In conclusion amoebiasis was an important health problem in Soroti and probably Uganda as a whole. However since Entamoeba histolytica and E.dispar are morphologically similar, it is recommended that molecular studies characterize them so that true prevalence of pathogenic Entamoeba histolytica can be determined.

Key words: Entamoeba histolytica, prevalence, Soroti, age, sex, microscopy

Introduction

Entamoeba histolytica is an intestinal parasite that causes amoebiasis. Worldwide, this protozoan parasite is estimated to infect 50 million people and cause 40,000 to 100,000 deaths annually, making it the third largest cause of mortality from infection with parasitic protozoa after malaria and schistosomosis. This has resulted into loss of manpower and subsequent economic damage (1, 2, 3). Amoebiasis is one of the neglected tropical diseases (NTDs) that are the most common conditions affecting the poorest 500 million people living in sub-Saharan Africa (SSA), which together produce a burden of disease that may be equivalent to one-half of SSA’s malaria disease burden and more than double that caused by tuberculosis (4). In Uganda where sanitation infrastructure and health education are not adequate, amoebiasis is highly likely a great public health problem.

However, there are little or no data on this very important protozoan infection and yet the burdens of disease figures are an important tool for the allocation of limited public health resources for efforts at treatment and prevention. In addition, with the current feasibility of an amebiasis vaccine the estimates of the prevalence of E. histolytica infection is urgently needed. Most countries in SSA, have reported amoebiasis prevalence of up to 30 % in Nakuru, Kenya; 8.7% in Kilimanjaro Tanzania; 27.2% among Ethiopian School children and prisoners and 18.8% in Coˆ te d’Ivoire (5,6,7,8). In Uganda, a study by Mote et al (9) reported the prevalence 7.4% of Entamoeba histolytica among primary school children in Moyo district, while UPHOLD(10) reported the prevalence of 5% in Nakaseke and Luweero districts.

Materials and methods

The study was done in Soroti district located in the northern part of the Eastern region of Uganda between 1°28N, 33°00E and 2°02N, 33°31E.. The district has a population of 554,900. The district is entirely dominated by savannah grasslands. The rainy season is from March to November, with a marked minimum in June, and marked peaks in April to May and August to October. December and January are the driest months. Temperatures generally record a mean annual maximum temperature of around 31.3°C
and a mean minimum of around 18°C. Its extreme highest temperatures are in the months of February when it records approximately 35°C while the month of December has the lowest temperature (9.6°C).

Cluster probability sampling method was used to collect 301 fresh stool samples from Soroti Regional Referral Hospital and Eloi-Eloi Medicare, Soroti Municipality in Eastern Uganda from October to December; 2010. Forty six point five percent of the samples were from males while the rest were from females. Distribution of faecal samples according to age groups and sex were as shown in Table 1. The samples were got from patients of all ages referred for stool examination by medical officers. The samples were collected in stool collection tubes by the patients and delivered to the medical laboratory technicians for parasitological examination. The specimen bottles collected from the patients were labeled with host name, age and sex. The collected samples were mostly examined when fresh. Some samples were preserved by transferring to the bottles containing 5% formalin. Consent was obtained from all patients

Temporary mounts of fresh fecal samples were made by using two approaches. If the stool was loose, a drop of stool was placed on the slide covered with cover slip and observed under the microscope. Where as if the stool was solid or semi-solid then a drop of lugol’s iodine was placed on the slide, 1mg of stool sample was mixed in it on the slide, covered with the cover slip and examined under the microscope. The results were analyzed using the Chi square test and Ms excel.

Table 1. Distribution of stool samples collected by age and gender

<table>
<thead>
<tr>
<th>Age group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>44</td>
<td>32</td>
<td>76</td>
</tr>
<tr>
<td>6-12</td>
<td>26</td>
<td>19</td>
<td>45</td>
</tr>
<tr>
<td>13-19</td>
<td>14</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>20-34</td>
<td>24</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>35+</td>
<td>32</td>
<td>52</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
<td>140</td>
<td>161</td>
<td>301</td>
</tr>
</tbody>
</table>

Results

Of the 301 human stool samples examined, 60 were found to be positive for *Entamoeba histolytica/dispar* giving an overall prevalence of 19.93% It was shown that *E. histolytica/dispar* was more prevalent in younger age groups (6-12 yrs) compared to older people (35+ yrs). Details were as shown in Table 2.

The differences among age groups were statistically significant (P<0.05)

There was a higher prevalence of *Entamoeba histolytica/dispar* in males (22.14%) compared to females (17.39%) (P<0.05).

Table 2. Microscopic prevalence of *Entamoeba histolytica / dispar* in Soroti by age

<table>
<thead>
<tr>
<th>Age group(years)</th>
<th>No of samples examined</th>
<th>No of positives</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>76</td>
<td>15</td>
<td>19.74</td>
</tr>
<tr>
<td>6-12</td>
<td>45</td>
<td>11</td>
<td>24.44</td>
</tr>
<tr>
<td>13-19</td>
<td>34</td>
<td>06</td>
<td>17.65</td>
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<tr>
<td>20-34</td>
<td>62</td>
<td>12</td>
<td>19.35</td>
</tr>
<tr>
<td>35+</td>
<td>84</td>
<td>16</td>
<td>19.05</td>
</tr>
</tbody>
</table>

Discussion

This study has revealed a high rate of infection with *Entamoeba histolytica/dispar* among humans in Soroti, Eastern Uganda with a prevalence of 19.93% (Table 2). Although the factors causing this high level of infection have not been delineated, it is plausible to suggest that this could be linked to the poor sanitary conditions around the homes of the people. Indeed poor sanitary status has been associated with faecal contamination of drinking water and foods with diarrheal organisms including *Entamoeba* (11, 12, 13). In the study area, sanitary facilities in the many homes were inadequate. The main safe water supply was the deep boreholes which

a significant proportion of them were non-functional for over 5 years and were considered abandoned. As a result, the access rate for safe drinking water in rural sub-counties were as low as 46% (14) leaving many people to drink from sources contaminated by pathogens like *Entamoeba histolytica*. Eighty seven percent of people in Soroti district leave in rural area. In 2003, it was estimated that 4% of the global burden of disease and 1.6 million deaths per year were attributable to unsafe water supply and sanitation (15).

The effects of the 2007 “Teso floods” that devastated Soroti district cannot be under estimated. Many water sources, mainly shallow wells and springs were contaminated by floodwater thus limiting access to clean water. Heavy rain water are known to transport human and animal faecal matter thereby contaminating the ground water with *Cryptosporidium, Giardia* and *E.coli* (16,17). This could arguably apply to *Entamoeba histolytica* also. Flooding has been associated with diarrhoeal diseases outbreaks especially in areas where sanitation facilities were poor (18). In addition, use of ponds, backwaters, and rivers as sources of household or drinking water have been associated with increased prevalence of water-borne pathogens. These water sources are usually highly polluted, especially during the rainy seasons because they are contaminated by rain water runoff containing parasite cysts from animals and human droppings (19). A study by Omar *et al* (20) on the prevalence of intestinal water borne protozoal diseases in Saudi Arabia pointed to the domestic water used as sole point source.

Equally important factor influencing the prevalence of amoebiasis is the high temperature of the locality. Soroti generally records a mean annual maximum temperature of around 31.3°C and a mean minimum of around 18°C. Its extreme highest temperatures are in the months of February when it records approximately 35°C while the month of December the lowest temperature at 9.6°C (21). High temperature has been known to be an independent risk factor responsible for increased rates of diarrhoeal diseases, including salmonellosis and cholera hence probably also for amoebiasis (22). Increasing sea surface temperatures can indirectly influence the viability of enteric pathogens such as *Entamoeba histolytica* by increasing their reservoir’s food supply (23). This could as well apply to Soroti.

Other studies done within Uganda had reported low prevalence rates (9). This could be explained by two factors; either the prevalence in those particular places was really low or the method used to process faecal materials gave seemingly low results. It has previously been reported that a majority of the identifiable motile trophozoites can be destroyed during concentration of the stool samples (9, 24). This study used the method of direct examination of wet stool, a method commonly used in routine clinical identification of *Entamoeba histolytica/dispar*. This could have revealed more *Entamoeba histolytica* and thus the comparatively high prevalence rate in Soroti.

There was a higher prevalence of *Entamoeba histolytica/dispar* infection in younger age groups (6-12 yrs) at 24.44% as compared to older people (35+ yrs) at 19.05%. These findings concur with the reports from previous studies (25). It has been known that children usually have a lower resistance as compared to adults. Many of the crucial defense systems in children were not fully developed making them more sensitive to parasites than adults. Besides, children were more exposed to overcrowded conditions such as early childhood development centers, nurseries, primary schools. Oguntibeju (26) had previously identified poor sanitary conditions in schools as a major factor escalating a high parasitic infections among school children. Soroti municipality suburbs also remain overcrowded due to a history of concentrated camps resulting from prolonged civil conflicts. Children were usually playing in contaminated outdoor environments around waste disposal sites. Besides, children do not take care of their personal hygiene such as washing hands before meals (27). Several studies have shown a reduced risk for intestinal diseases among children who do wash their hands (28, 29, 30). Educational level of the parents was another important factor that has been reported to influence the parasitic infection (27). Arguably this could also be a risk factor in Soroti since illiteracy levels remain low. These factors, together with lack of fecal hygiene in camps certainly cause serious health problems that predispose to *Entamoeba histolytica* infection (31).

There was significantly higher prevalence of *Entamoeba histolytica/dispar* in males compared to females. This was in agreement to earlier observations. Klein (32, 33) explained that males were usually more susceptible than females to infections caused by parasites, fungi, bacteria and viruses because males generally exhibit reduced immune responses and increased intensity of infection compared to females. These differences may be attributed to both physiological and socio-ecological factors. The physiological factors were

essentially hormonal in which sex differences in infection are sought to result from differences in endocrine-immune interactions (32). Sexually mature male vertebrates are often more susceptible to infection and carry higher parasite burdens (34), because sex steroids, specifically androgens in males and estrogens in females, modulate several aspects of host immunity. In addition to affecting host immunity, sex steroid hormones also alter genes and behaviors that influence susceptibility and resistance to infection. On the other hand, socio-ecological factors include differential exposure to pathogens because of sex-specific behavior or morphology (25, 34). Thus, males may be more susceptible to infection than females not only because androgens reduce immuno-competence, but because sex steroid hormones affect disease resistance genes and behaviors that make males more susceptible to infection (32).

In conclusion, amoebiasis has been shown to be an important public health problem in Soroti district, Uganda. However since Entamoeba histolytica and E. dispar were morphologically similar, with the former being pathogenic while the latter not, it was recommended that molecular studies be carried out to establish the true prevalence of Entamoeba histolytica.

References


assistance. Program water and assainissement Vavatenina-Fenerive, Madagascar.


