Prevalence of *Entamoeba histolytica*, *Giardia lamblia* and *Entamoeba coli* infection associated with risk factors in Khartoum state-Sudan

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**Introduction**

Intestinal protozoan infections (IPIs) are common among children resulting in considerable malabsorption syndromes, gastrointestinal morbidity and mortality especially in developing countries [1]. Worldwide, have been recognized as one of the most significant causes of illnesses [2].

It is estimated that IPIs result million illnesses with an average prevalence rate of 50% in developed world, and almost in developing countries [3]. It is estimated that *Entamoeba histolytica* (*E. histolytica*), the etiological agent of amoebiasis, kills between 40000 and 100000 people per year hence considered one of the deadliest parasitic infections worldwide [4]. *Cryptosporidium* spp. is primarily affecting immunocompromised patients like HIV/AIDS patients [5]. These infections are ubiquitous and highly prevalent among the poor and socioeconomically deprived communities where overcrowding, poor environmental sanitation and hygiene, low level of education and lack of access to safe water are strong risk factors [6].

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**ABSTRACT**

Background: Intestinal protozoan infections are common among children. Objectives: To determine the prevalence of *Entamoeba histolytica*, *Giardia lamblia* and *Entamoeba coli* infection associated with risk factors in Khartoum state. Methods: This was cross section study conducted in Khartoum state (Om Elhessin center) included 300 individual form different age groups of both male and females, stool samples were collected and analyzed according to the standard methods. Results: The prevalence of *Giardia lamblia* was highest 50% compared with *Entamoeba histolytica* 26% and *Entamoeba coli* 23%, the highest prevalence in age groups 5-15 years i.e., 43%, 15-25 years 32% and above than 25 years 25%, the rate of infection was highest among illiterates 46%, primary education 41% and lowest in secondary education 13%. The results showed that males were 68.4% higher than female which constituted 31.6%.

Conclusion: The overall prevalence of intestinal protozoa (*Entamoeba histolytica*, *Giardia lamblia* and *Entamoeba coli*) in this study 40%, where the infection it highest among age group 5-15years, males were higher than females and the rate of infection is most frequency among illiterates.

**Keywords:**
*Entamoeba histolytica*
*Giardia lamblia*
*Entamoeba coli*
Sudan
Classically, laboratory diagnosis of *Giardia lamblia* (*G. lamblia*) infections is performed by microscopic examination of stool samples. In recent years, direct fluorescent antibody assay and antigen detection by using enzyme-linked immune sorbent assay (ELISA) have been accepted as cost effective alternative diagnostic methods [7]. However PCR-based methods have also showed excellent specificity and sensitivity compared with microscopy as well with antigen detection [2] .

*Entamoeba histolytica* is the cause of amoebic colitis, amoebic dysentery, and amoebic liver abscess, resulting in 100,000 deaths annually [8]. In recent year’s biochemical, immunological and genetic differences between *E. histolytica* and *E. dispar*, which were previously known as pathogenic and nonpathogenic strains of *E. histolytica*, respectively, have resulted in their description as two separate species [1,2]. As the potentially invasive *E. histolytica* is morphologically indistinguishable from the noninvasive *E. histolytica*, microscopy alone cannot provide a definite answer about the presence of *E.histolytica* cysts and/or trophozoits.

**Material and Methods**

**Study design**

It was cross sectional study carried out in Omdurman (Om elhessin center).

**Study area**

This study conducted in Om Elhessin center which located in North West of Omdurman-Sudan

**Inclusion criteria**

This study included individual between age 5-40 years attending as out-patient and in-patient to clinic for confirmation of intestinal protozoa infection based on the presence of signs and symptoms.

**Exclusion criteria**

Patients with history of treatment from intestinal protozoa after one week.

**Table 1.** Shows the prevalence of infection according to different parasites.

<table>
<thead>
<tr>
<th>Type of parasite</th>
<th>Number of positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence of <em>Entamoeba histolytica</em>, <em>Giardia lamblia</em> and <em>Entamoeba coli</em></td>
<td>120</td>
<td>40%</td>
</tr>
<tr>
<td><em>Giardia lamblia</em></td>
<td>60</td>
<td>50%</td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>32</td>
<td>26%</td>
</tr>
<tr>
<td><em>Entamoeba coli</em></td>
<td>28</td>
<td>23%</td>
</tr>
</tbody>
</table>

**Collection of stool samples**

Stool samples containers were given to participants and then given laboratory number for easy identification and analysis. Prior to sample collection, standard procedures were followed which stated right sample and all laboratory precaution to avoid sample contamination.

**Identification of parasite**

Stool samples were processed and analyzed after collection by direct smear .microscopy using normal saline and iodine wet preparation to detect trophozoite and cyst of *E. histolytica*, *Giardia lamblia* and *Entamoeba coli* (*E. coli*).

**Ethical approval**

The ethical approval of the study was obtained from the research committee of Omdurman Islamic university- Faculty of Medical Laboratory Sciences , All experiments were examined and management in Om Elhessin center.

**Results**

A total of 120 individual (40%) had intestinal protozoa infection from various parasites including *G. lamblia* 50% which had most prevalence while *E. coli* was low rate of infection 23% and 26 % *E. histolytica*, Out of 300 individuals from different age groups of both males and females examined, the results showed that the age 5-15 years had the highest rate of infection i.e., 43% , while 32% among those aged 15- 25years and those above 25 years had lower rate of infection i.e., 25%.

The prevalence of infections were highest among males 68.4% than females 31.6%. The illiterates, 46% were most frequent of getting infection than primary education 41%, and the lowest in secondary education.
Table 2. Shows the prevalence of infection between different genders.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>38</td>
<td>31.6%</td>
</tr>
<tr>
<td>Males</td>
<td>82</td>
<td>68.4%</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3. Shows the prevalence of infection among different age groups.

<table>
<thead>
<tr>
<th>Study group</th>
<th>Number of positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group 5-15</td>
<td>52</td>
<td>43%</td>
</tr>
<tr>
<td>Age group 15-25</td>
<td>38</td>
<td>32%</td>
</tr>
<tr>
<td>More than 25</td>
<td>30</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 4. Shows the prevalence of infection according to education level of participants.

<table>
<thead>
<tr>
<th>Education level</th>
<th>Number of positive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No informed education</td>
<td>55</td>
<td>46%</td>
</tr>
<tr>
<td>Primary education</td>
<td>50</td>
<td>41%</td>
</tr>
<tr>
<td>Secondary education</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100%</td>
</tr>
</tbody>
</table>

Discussion

Overall prevalence of *G. lamblia*, *E. histolytica* and *E. coli* among individual aged (5 year to 40 years) in Omdurman (Om Elhessin centre) 40%, which was in agreement with a study done in northwest Nigeria 36% and 35% in Saudia Arabia [9], other studies reported higher rates of infection, in south Africa 64.8%, Pakistan 52% and Ethiopia 83.8% [8,9].

Our study showed a 50% prevalence of *G. lamblia* infections which was not in agreement with the studies reported in Uganda (12%) and 15.4 in Nigeria, that might be due to difference levels of education, socio-economic status and sanitation [6].

The results showed that the prevalence of *E. histolytica*, 26%, was higher than a study done in Uganda 8% among school children [4], this was due to the more exposure to risk factors and poverty community.

The prevalence of infection among age groups 5-15 years (43%) was the highest rates due to lack of awareness about hygiene and low levels of education.

The results showed that the prevalence of infection were higher in males (68.4%) versus females (31.6%). On the other hand a study in Malaysia reported in males (22.0%) and females 73.3%.

The finding of this study indicates that the highest infection rate was in individuals who had no informed education 46%, primary education 41% and secondary education 13%.

Conclusion

The overall prevalence of common intestinal protozoan was 40%, *G. lamblia* were 50% in this study. The highest rate of infection was among those aged 5-15 years 43% and those non educated 46%.

Conflict of interest

None to be declared.

Funding: None.
References


