Prevalence of Entamoeba histolytica and Giardia lamblia infection among patients attending Heet Hospital in Al-Anbar, Iraq

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- Giardia lamblia
- Prevalence

**Abstract**

This study was designed to estimate the spread of *Entamoeba histolytica* and *Giardia lamblia* and study the age, sex and months effect in the infection rate. 398 stool samples (215 males and 183 females) were collected from both children and adults attending to Heet General Hospital, and some of private laboratories affiliated to Heet. The total infection rate was 64.3%. *Entamoeba histolytica* infection rate was higher (56.7%) than *Giardia lamblia* infection (7.5%). Regarding the seasonal effect on the infection rate, *E. histolytica* highest rate was observed in August (14.6%) and the lower rate was in September (9%). And the age-related infections appear to be mostly in ages older than 35 years significantly (26.63%) followed by ages younger than 15 years (16.83%). In comparison, the infection could be considered non gender specific with a shallow elevation in males (29.4%) over the rate in females (27.3%). Regarding *Giardia lamblia*, the prevalence was considered significantly lower. The seasonal related infection considered much greater in May and June (2%) compared to July, August, September (125%, 1.25%, 1%) respectively. With convergent rate of infection retention among different ages or between females (3.2%) and males (4.3%).

**Introduction**

Intestinal parasitic infection is considered one of the most important health problems facing the world [1], it represents one of the common sources of diarrhea distributed worldwide [2].

The prevalence of those parasitic infections correlates mainly with deficient sanitation, water pollution with the sewage, low income, and lack of personal hygiene [3]. Moreover, the distribution rate improved with easier accessing among eligible hosts surrounded with encouraging environmental conditions [4]. They spread in all countries of the world due to poor sanitation [3], the estimated rate of the annual infection with *E. histolytica* represent an estimation of 480 million, among those patients; 36 million patients reached to invasive state
of the disease [5]. It has been observed that there is a direct relationship between intestinal parasite infection and socioeconomic status, this associated mainly with communities who live in thronged places with a contaminated environmental system and impaired health which are vulnerable to more infections than others [6]. Infection with parasites may occur in several ways including direct interaction with both infected patient or vector animal. Rout of ingestion encompass the oral rout by food contamination [7]. *E. histolytica* has life cycle containing two forms: trophozoite (resides in the intestinal lumen) and cyst (capable of surviving in the environment) which would explain its high transmission rate along with high motility abilities [8]. The same would be applicable on *G. lamblia* which has the highly spreading cyst stage and highly pathogenic stage causing severe inflammatory response, leading to intestinal epithelial cell (IEC) damage even without reproducing inside the lumen [9]. The study of intestinal parasites has received great interest from researchers, that found the most common intestinal parasite that causes diarrhea is dysentery amoebiasis and then *Giardia lamblia* [1].

This study was designed to determine the rate of infection with intestinal parasites (*E. histolytica* and *G. lamblia*) and study the age, sex and seasonal effect in the infection rate for patients attending Heet General Hospital, health centers and private laboratories affiliated to Heet District in Al-Anbar.

**Materials and methods**

**Collection of samples**

Three hundred and ninety-eight (183 females and 215 males) stool samples of different ages and both genders were collected for 1/5-30/9/2021 from the patients that arrivals the hospital were suffering from clinical symptoms such as diarrhea or dysentery and other digestive problems and sometimes others did not suspect any pathological symptoms, in dry, clean, sterile plastic boxes with wide nozzles and tight covers to prevent the impact of the sample or dryness or contamination [10].

**Gross examination**

Stool samples were examined phenotypically before being examined with a microscope until they are described or detected according to the amount of stool or their appearance (shape), color and strength, so if they are soft, watery, solid or diarrhea, this may be a guide to the quality and emergency of parasitic organisms that are found in it. In some samples, we may notice that they contain some blood and mucus.

**Microscopic examination**

The direct modus operandi is to put a drop of water solution (normal saline) on the slide and taken appropriate amount of stool with wooden sticks from the sample and mix it with the stool. Putting the cover slide and checking by using the magnification power (10X) and then (40X).

**concentration method**

By using zinc sulfate, (floatation methods), used when the numbers of parasites are low in the stool, routine microscopic examination may be fail or suspect its diagnosis. The method of work was done according to [11].
Statistical Analysis

The data were analyzed using SPSS program (ver. 18) using the Percentage, Mean, SD, and Chi square, at Probability level (0.01 and 0.05).

Results

Infection rate

Among the 398 collected samples, the total infection rate of *E.histolytica* and *Giardia lamblia* was 56.7 % and 7.5 % respectively with significant difference (P≤0.05). Table 1.

<table>
<thead>
<tr>
<th>Table 1: Total infection rate of <em>E.histolytica</em> and <em>Giardia</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Samples Examined</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>398</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

* significant difference P value < 0.05

Infection rate according to age

The high infection rate of *E. histolytica* was recorded in the age group above 35 years old (26.63%) followed by the age group Less than 15 years (16.83%) and 15-35 years (13.31%) with significant difference (P≤0.05). While the high infection rate of *G. lamblia* was recorded in the age group above 35 years old and 15-35 years (2.75%) followed by the age group Less than 15 years (2%) with non-significant difference. Table 2.

<table>
<thead>
<tr>
<th>Table 2: Infection rate of <em>E.histolytica</em> and <em>G. lamblia</em> according to age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Less than 15 years</td>
</tr>
<tr>
<td>15-35 years</td>
</tr>
<tr>
<td>More than 35 years</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

* significant difference P value < 0.05, ** non-significant difference P value > 0.05

Infection rate according to months

According to months the prevalence of *E. histolytica* was highest in August (14.6%) followed by May (11.30%), June (12%), July (9.8%) and September (9%) without significant difference while the highest infection rate of *G. lamblia* was in May and June (2%) followed by July and August (1.25%) and September (1%) with significant difference(P≤0.05). Table (3).

<table>
<thead>
<tr>
<th>Table 3: Infection rate of <em>E.histolytica</em> and <em>Giardia</em> according to months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months</td>
</tr>
<tr>
<td>------------------------------</td>
</tr>
<tr>
<td>May</td>
</tr>
<tr>
<td>June</td>
</tr>
<tr>
<td>July</td>
</tr>
<tr>
<td>August</td>
</tr>
</tbody>
</table>
**Infection rate according to gender**

According to gender the prevalence of *E.histolytica* and Giardia was highest in the males(29.4%) , (4.3%) respectively than females(27.3%), (3.2%) without significant difference. Table 4.

**Table 4:** Infection rate of *E.histolytica* and *Giardia* according to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>No. of Samples</th>
<th><em>E.histolytica</em> Positive</th>
<th>%</th>
<th><em>Giardia</em> Positive</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>215</td>
<td>117</td>
<td>29.4</td>
<td>17</td>
<td>4.3</td>
</tr>
<tr>
<td>Female</td>
<td>183</td>
<td>109</td>
<td>27.3</td>
<td>13</td>
<td>3.2</td>
</tr>
<tr>
<td>Total</td>
<td>398</td>
<td>226</td>
<td>56.7</td>
<td>30</td>
<td>7.5</td>
</tr>
</tbody>
</table>

*non- significant difference P value >0.05.

**Discussion**

Prevalence of *E. histolytica* (56.7 %) in our study was significantly higher than *G. lamblia* (7.5 %). The high incidence may have suggested by the occurrence of the cysts contaminating the environment of the studied area and the infection rate improved by the continuation of the cysts in the environment for long time and resisting the harsh conditions affecting its viability or infectivity.

This agree with the results that recorded by [3] also the frequency of *E. histolytica* and *G. lamblia* (29.2% and 15.0%) respectively was recorded by [12] and [13] who found that both *G. lamblia* along with *E. histolytica/dispar* represent the most common types of pathogenic parasites, sequentially. This high rate of infection related mainly with the type of climate in Iraq, where those parasites more common in warm climates [14]. Moreover, the simplicity of transferring the infection by wrong sanitation habits and contamination of rivers and water sources in this region which require a specified study to explore and confirm the parasitic existence in those waterbodies. Especially for the intestinal parasites who have high vulnerability for oral rout ingestion [4].

The study outputs revealed elevated recorded incidence of *E. histolytica* in ages older than 35 years, and more than 35 years and 15-35 years age group for *G. lamblia* as appear in Table 2, this may be due to type of activities in this age groups in this area exclusively in those ages, where the outdoor activities and contacting with the contaminated water bodies by swimming. Or by using of human feces for the fertilization of soil which lead to raise the chance of infection rate [15] or may be returned to contaminated food and water by fecal of reservoirs hosts such as cats, rodents and dogs, and the effect of moisture and warmth that assist separation and complete the parasite life cycle [16]. Of these results, [12] study has a divergent result from our findings regarding *G. lamblia* has the highest incidence in ages (5-14) years but *E. histolytica/dispar* being more common in the ages older than Giardial ages and extend to include ages (15-45) years as indicated in our results. By contrast; the results of [13] far away from all of above findings by indicating the ages (40-60) years to be the most vulnerable to infection which is consistent with findings of [17] and [18] the difference may...
be attributed to the difference in the chances of sample collection from a specific age more than other and the accumulating effect of those ages and may be caused by weakening of the immunity by aging and chronic diseases common in those age group.

Also, this study expressed no significant contrast between the prevalence of *E. histolytica* and *G. lamblia* in males and females as showed in Table 4 this result may be return to the both male and female are evenly implicated in out and indoor life that lead to the parasite dissemination in both groups.

This was agreeing with [1]) that prove the infection rate in males and females was16%, 19 % respectively. but disagree with the result that recorded by [3] who reported 14.6 %,35.6% in males and females respectively. It was shown that the reason may be due their weak immune system in female. In [12] same findings obtained where males showed to be at higher risk for the most of parasites compared to females. regarding *G. lamblia, E. histolytica*. The fluctuation of the incidence among males and females with bias toward males could be explained by the types of habits related with same above causes that increased the whole incidence by outdoor and dealing with contaminated supplies more than females. [18] the findings of [14] were inconsistent with our results by more prevalence in females compared with males. The sex affected daily habits differ from demographic area to other and type of geological different structures would explain the difference between studies [19].

Our study showed the high infection rate of *E. histolytica* was recorded in August (14.6%) then May (11.30%) and June, July, September (12%,9.8%,9%) respectively. Result of infection rate of *Giardia lamblia* showed significant difference according to months, highest infection rate recorded in May, June (8%) followed by, July, August (5%) and then by September (4%) As shown in Table 3, this can be explained by the fact that the parasite is more active and has the ability to cause infection during the summer months or to the abundance of fruits that contaminated with the infective stages of parasites. These are agreement with [14] also agreement with [15] Who attributed those reasons to increase separation and reproduction of insects that contributed to the spread parasites during the hot months of the year.

**Conclusion**

The current study found a high prevalence of infection rate with the amebiasis and giardiasis in the patients that arrivals the hospital of Heet region. high infection rate of Amebiasis was in more than 35 years of age group. While the high infection rate of giardiasis was in above 35 years old and 15-35 years. It was noted that there was an effect for the months of the year in the rate of infection, but it was not affected by gender.

**Reference**

دراسة انتشار المتحولة الحالة للنسيج والجيارديا اللمبلية في الأشخاص الوافدين الى مستشفى هيت في الانبار

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الخلاصة:

598 عينة تم جمعها من الأطفال والبالغين الذين حضروا إلى مستشفى هيت العام، وبعض المختبرات الخاصة التابعة لهيت. وبلغت نسبة الإصابة الإجمالية 64.3%. كان معدل الإصابة المحتملة للنسيج أعلى (56.7%) من عدوى الجيارديا اللمبلية (7.5%). لا يوجد فرق معنوي في نسبة الإصابة بالمتلازمة الحالة للنسيج طبقًا لأشهر السنة. وبلغت نسبة الإصابة بالجيارديا الإجمالية 7.5% في شهر نيسان و5% في شهر أيار وحزيران حيث بلغت نسبة الإصابة في شهر أيلول (12.6%) ونوفمبر (14.7%) وديسمبر (16.6%) ويناير (18.7%) وفبراير (20.8%) ومارس (22.9%). ولم يتم الاكتشاف للعمر تأثير معنوي في نسبة الإصابة بالجيارديا الإجمالية، حيث بلغت أعلى نسبة إصابة في الفئة العمرية من 15-35 سنة واقل نسبة إصابة في الفئة العمرية من 35-45 سنة. ولم يتم الانتهاء إلى وجود فرق معنوي للنسوية في نسبة الإصابة بجوارديا الإجمالية، حيث بلغت أعلى نسبة بنسوية في الفئة العمرية من 25-35 سنة واقل نسبة بنسوية في الفئة العمرية من 35-45 سنة. ولم يتم الانتهاء إلى وجود فرق معنوي بين الجنسين في نسبة الإصابة بالمتلازمة الحالة للنسيج والجيارديا في الذكور (29.4%) واثنتين (4.3%) على التوالي وفي الإناث (27.3% و3.2%) على التوالي.  

الكلمات المفتاحية:

المتحولة الحالة للنسيج، الجيارديا، معدل الإصابة، الانتشار

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