Prevalence of Cryptosporidium parvum Among Children At Wasit Province
Abdulsadah Abdulabbas Rahi & Huda Hadi Raheem

Cryptosporidium parvum

Abstract:
Cryptosporidium parvum is an important enteric parasite among infants and children in Wasit Province. The present study was conducted from September to December 2011 in Al-Karamah Teaching Hospital in Wasit Province. Children aged 1 month to 12 years presenting with acute or persistent diarrhea were selected randomly. The oocyst of C. parvum was investigated in stool specimens using a modified acid-fast staining method.

A total of 100 feces samples of children (55 male and 45 female) were examined. Fifty (50%) specimens were oocyst positive. The prevalence of Cryptosporidium infection was significantly higher (59%) in children under one year old compared to children between (7-12)years old(4%). Most of the infected children were had anemia. The infective rate of Cryptosporidium parvum in males was higher 27% than females 23% . Also, there was no significant difference among children in gender.

Key Words : Human, Cryptosporidium parvum, Modified acid-fast stain

1. Introduction:
Protozoans are unicellular organisms which include a number of pathogenic eukaryotes that infect human and animals usually through food and water contamination. Nearly, all the protozoan parasite have complex life cycle requiring both intra-and extracellular stage.
Cryptosporidium parvum, Giardia lamblia, Entamoeba histolytica, and Cyclospora sp. are widespread in the environment which causing of water- and food-borne diseases (1). Cryptosporidium spp. are waterborne, obligate intracellular protozoan parasite that infects epithelial cells lining the small intestines of human and over 170 different host species causing enteric disease (3). There are more than ten species of cryptosporidium, Cryptosporidium parvum and Cryptosporidium hominis are the two species responsible for the most cases of human cryptosporidiosis worldwide (4)(5).

The infection in immunocompromised patients is much more severe. It may often be life threatening. Passage of fluid, up to 12 liters per day, has been reported. Multiple pathways of Cryptosporidium transmission have been implicated. These include animal to human, water contamination and person-to-person. The latter may include contact between members of the same household, day care centers, and homosexual men (6). Diagnosis of Giardia and Cryptosporidium infections has been done through a number of invasive and non-invasive techniques. The non-invasive techniques, microscopic examination of stools has been the most common. However, this method relies on an experienced technician and subsequent observation of intact organisms. Because of the historically low proficiency of correct microscopic examinations and intermittent excretion of organisms, alternative diagnostic methods have been investigated (7).

One important alternative has been the development of an antigen capture enzyme linked immunosorbent assay (ELISA) for use with stools. These tests have shown comparable sensitivity to experienced microscopic examinations, are fairly simple to perform and do not require the observation of intact organisms (8). The aim of present study is to determine the prevalence of Cryptosporidium parvum among children at Wasit Province.

2. Materials and methods:
2.1 Materials

Glass slides, methanol, ethanol, distilled water, wash bottle, HCl, carbol fuchsin, methylene blue, plan tube, EDTA tube, stick, syringes.

2.2 Methods

This study was carried out during the period from October 2011 to January 2012 in Al-Karamah Teaching Hospital of Kut city. A total of 100 fecal samples taken from children aged between 1 month to 12 years presenting with acute or persistent diarrhea. Fecal samples were collected in clean and label containers and examined as soon as received by naked eye for consistency.

Samples were concentrated using either flotation or sedimentation techniques before staining (10). The oocyst of C. parvum was tested by using modified acid-fast staining method which was a sensitive and specific path for the identification of Cryptosporidium in stool (9). Ordinary light microscope with 100 magnification power was used with oil immersion lens. In this technique, the oocysts appear as pink to red, spherical to ovoid bodies on a blue or purple background. Also blood samples were collected from patients with cryptosporidiosis to determine hemoglobin level (Hb%) by the Sahli’s system (Spain), and White blood count (WBC’s count) by thin blood films (11).
3. Results and Discussion:

3.1 Results

A total of 100 children who attended to Al-Karamah Teaching Hospital were suffered from watery diarrhoea and abdominal pain were examined. Samples of feces were stained by modified acid fast stain and examined by microscopy for detecting of C. parvum oocysts. An overall prevalence of C. parvum 50 /100 (50 %) was appeared in table (1).

<table>
<thead>
<tr>
<th>Name of Parasite</th>
<th>No. of Examined sample</th>
<th>No. of infected sample</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. parvum</td>
<td>100</td>
<td>27</td>
<td>23</td>
</tr>
</tbody>
</table>

Table.1 The Overall Prevalence of C. parvum

Table (2) shows the prevalence of C. parvum infection according to the age and gender. The highest infection(59%) was recorded in age group 1(> 1) year, while the lowest (4%) was appeared in age group 3 (7-12) years old. There was no significant difference in occurrence of infection between genders.

<table>
<thead>
<tr>
<th>Age / Year</th>
<th>Male +Ve %</th>
<th>Male -Ve %</th>
<th>Female +Ve %</th>
<th>Female -Ve %</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>20</td>
<td>20</td>
<td>12</td>
<td>13</td>
<td>59</td>
</tr>
<tr>
<td>Group 2</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>6</td>
<td>37</td>
</tr>
<tr>
<td>Group 3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>27</td>
<td>23</td>
<td>22</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Patients with Cryptosporidiosis in Relation of Age & Gender

Abdulsadah Abdulabbas Rahi at all

Table (3) shows the range of hemoglobin (Hb) in Patients with Cryptosporidiosis. The lowest hemoglobin (8-9) was appeared in 7/50 (14%) whose had severe anemic case, while the largest hemoglobin rate (11.1-12) was appeared in group 11/50 (22%).

<table>
<thead>
<tr>
<th>Hemoglobin (Hb %)</th>
<th>No. of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 - 9</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>
The relationship between age and total count of leukocytes appears in Table 4. The large number of WBCs was shown in group 1 and 2, while the low number was in group 3.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. of +Ve cases</th>
<th>Abnormal cases (WBCs more than $10^4$ cell)</th>
<th>%</th>
<th>Normal cases (WBCs less than $10^4$ cell)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) &gt;G1(</td>
<td>25</td>
<td>14</td>
<td>56</td>
<td>11</td>
<td>44</td>
</tr>
<tr>
<td>G2 (1-6)</td>
<td>17</td>
<td>9</td>
<td>53</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>G3 (7-12)</td>
<td>8</td>
<td>3</td>
<td>37.5</td>
<td>5</td>
<td>62.5</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>26</td>
<td>52</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

### 3.2 Discussion

Intestinal parasites are very common in developing countries. Cryptosporidium has revealed to be one of the most common parasites\(^{(12)}\). Human and several mammalian species can be infected with C. parvum transmitted by the fecal-oral route. Outbreaks have been described as a result of transmission in day care centers, swimming pools, public water supplies, and other water sources\(^{(13)}\).

Several methods are available for identification of Cryptosporidial oocysts in fecal specimens including modified acid-fast staining which detects oocyst wall, fluoresceinconjugated monoclonal antibody-based detection of oocyst wall antigen, enzyme-linked immunosorbent assay (ELISA) which detects Cryptosporidial antigen and most recently polymerase chain reaction (PCR) which detects Cryptosporidial DNA. Modified acid-fast stain of a fecal smear has been the gold standard for detecting Cryptosporidium oocysts in stool. This method is commonly used in clinical microbiology laboratories to easily identify Cryptosporidial oocysts. Although the concentration and staining procedures are time-consuming and also require an experienced microscopist to read the slides, it is inexpensive and allows the detection of other parasites (eg, Isospora and Cyclospora) at the same time\(^{(14)}\).

According to the results of the present study C.parvum had an overall prevalence of 50 /100(50 %). Increased numbers of cases of C. parvum infection in Wasit province were associated with contaminated drinking water supplied to these population\(^{(15)}\). Because the 50% infectious dose is relatively low for C. parvum, ranging from approximately 10 to 1,000 for healthy humans, oocysts could be transmitted through low levels of contaminated water or food, followed by person-to-person transmission, especially among household members. Food-borne C. parvum infection
has been transmitted through ingestion of fresh-pressed apple cider, and risk factors for food-borne transmission have had been reported for consumption of stored cooked food and raw milk (16). The infection prevalence of *C. parvum* on average was similar to the results of Elwin et al. (2009) (17) in which the prevalence of *C. parvum* infection was recorded (45.9%). This is also in agreement with the report of Charles et al., (2000) (18) in which the prevalence of *C. parvum* in diarrheal children aged (5-8) years old was found to be 58%.

The study also revealed a significant positive correlation between incidence and intensity of infection among different age groups with peak values among under one year age group. The rate of infection in the present study is similar to other studies in Iraq such as Majidah, (2008) in who proved the prevalence of *C. parvum* infection was higher among children under one year in Ramadi City (19). Also Jong-Yil Chai et al., (2001) noted that infection was more prevalent in infants under one year in Korea (20). The present revealed that no significant difference (P < 0.05) was noted between males (27%) and females (23%). These results were in agreement with Jong-Yil Chai et al., (2001) (20) and Ke-Xia Wang et al., (2002) (21).

The widespread occurrence of anaemic among the examined patients is worrisome but agrees with the earlier observation that about 30% of the world population is anaemic (22). Anaemia is commonly caused by deficiency of iron in diet according to the report of WHO (23). It is common knowledge that due to combined forces of ignorance and poverty the diets of many individuals and households in developing countries often lack many essential blood-building ingredients, including iron. These factors might have contributed to the high occurrence of anaemia in the study area.

References:

4. Victoria, HB.; Vasquez, J.; Nelson, RG.; Forney, JR.; Rosowsky, A. and Sibley, CH. (2000). Identification of *Cryptosporidium parvum* Dihydrofolate Reductase Inhibitors by


