CRYPTOSPORIDIOSIS AND OTHER INTESTINAL PROTOZOA INFECTIONS IN CHILDREN LESS THAN ONE YEAR OF AGE IN MEXICO CITY

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Abstract. Parasitic diseases are very important in Mexico because of their economic impact and adverse effects on normal growth in children. Cryptosporidiosis has been associated with acute diarrhea in immune competent and incompetent human hosts, fecal contamination of drinking water sources, and handling of animals. Due to the lack of reports on cryptosporidiosis in Mexico, we conducted a parasitologic study in children with diarrhea and other clinical symptoms. The main objectives were 1) to determine the prevalence of cryptosporidiosis in children less than one year of age in Mexico City, and 2) to correlate Cryptosporidium infection with gastrointestinal symptoms. Two hundred fecal samples from children seen at the Gabriel Mancera Familiar Medicine Unit of the Instituto Mexicano del Seguro Social were studied. Children were divided into two groups. Group A was composed of sick children with 6–8 watery diarrheic episodes every 24 hours attended at the emergency service. Group B was composed of healthy babies getting routine checkups. Only children in group A were found to be infected with intestinal protozoa (50% with Giardia lamblia, 41% with Cryptosporidium spp., and 4% with Entamoeba histolytica). The results suggested a high incidence of Cryptosporidium infections in children in Mexico City, which make these observations useful for future studies.

INTRODUCTION

Cryptosporidiosis in an enteric disease caused by a coccidian parasite of the genus Cryptosporidium, which includes several species that affect wild and domestic mammals such as calves, cats, and dogs, as well as humans.1–4 Initially described in mice,5 this parasite was first reported in humans in 19766 and was associated with immune compromised hosts. Cryptosporidiosis is regarded as an emerging diarrheic disease that characteristically produces 6–8 watery diarrheic episodes per day, which define a clinical picture of acute diarrhea.7,8 Since first being reported, cryptosporidiosis has been detected in patients with several immune impairments such as acquired immunodeficiency syndrome,9–11 diabetes mellitus,12 acute leukemia and other hematologic disorders,13,14 interferon deficiencies,15 graft transplants,16 hospitalized and malnourished children,17 and populations living with health risks factors.18–25 Poverty, unsafe drinking water, and poor housing and education in developing countries facilitate gastrointestinal infections, mainly affecting from newborn to 12 years old children who usually have abdominal pain, acute diarrhea, nausea, vomiting, fever, and dehydration.10,18,26 Malnourished, non-breast-fed children, those less than six months old, and those living in poor hygienic environments are most affected.27 In developing countries, many outbreaks of diarrheal diseases have been associated with contaminated drinking water,21,22,28,29 while in the United States, Canada, and the United Kingdom, cryptosporidiosis outbreaks have been associated with swimming pool users and defective treatment of water supplies.30–34 However, Cryptosporidium is not the only pathogen causing acute diarrhea because other protozoa such as Giardia lamblia, Entamoeba histolytica, Cystoispora, and Enterocytozoon have also been identified in patients with diarrheal disease, and combinations of these parasites have occasionally been isolated from the same patients.35–38

There are few reports on the prevalence of cryptosporidiosis in Mexico. Therefore, we conducted a parasitologic study in children with diarrhea and other clinical symptoms. The main objectives were 1) to determine the prevalence of cryptosporidiosis in children less than one year of age in Mexico City, and 2) to correlate Cryptosporidium infection with gastrointestinal symptoms.

MATERIALS AND METHODS

Two hundred children in Mexico City less than one year of age who were seen at the Gabriel Mancera Familiar Medicine Unit of the Instituto Mexicano del Seguro Social were included in the study. The population was divided into two groups. Group A was composed of 100 children seen at the emergency service for acute diarrheic disease, and group B

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Figure 1. Cryptosporidium spp. cysts in feces (Kinyoun acid-fast stained, magnification ×1,000).
was composed of 100 healthy children seen for periodic check ups. All children’s parents were informed and asked to give their consent. One rectal fecal sample per child was obtained to yield 200 samples. Each fecal sample was smeared on three clean slides, stained by the modified Kinyoun acid-fast technique, and observed by light microscopy at magnifications of 100×, 400×, and 1,000×.

RESULTS

Forty-four of 100 children in group A had protozoan cysts or oocysts. Of the 44 protozoa-positive cases, Cryptosporidium oocysts were detected in 18 (41%) (Figure 1), G. lamblia in 22 (50%) (Figure 2), and E. histolytica in 4 (9%) (Figure 3). The signs and symptoms found in the patients with these parasites are shown in Table 1. The incidence of Cryptosporidium infection was higher in males (77.78%) than in females (22.22%), while that of G. lamblia was higher in females (81%) than in males (0.88%). However, E. histolytica did not show a difference in distribution by sex (50% in males and 50% in females). Although the other 56 children in group A had no parasitic protozoan infections, they had the same signs and symptoms as the positive cases. Abdominal distension was present in most cases (57.14%), followed by vomiting (46.43%), fever (42.85%), dehydration (21.43%), and blood in the feces (7.14%). No intestinal parasites were detected in the children in group B.

DISCUSSION

The important role played by Cryptosporidium spp. in diarrheic diseases affecting children in developing countries is well known. Although many immunodeficient individuals are infected by this parasite, it is not uncommon to find it in infants with a normal immune status in whom the infections may be either asymptomatic or self limited. In rural areas of Mexico, a high prevalence of infections with Cryptosporidium has been sporadically reported, but this infection is also endemic in urban environments.

Our findings demonstrate a high incidence of acute Cryptosporidium infection in children in Mexico City with no immune disorders and apparently adequate sanitary conditions at home and in the surrounding environment. The families of the children in this study had chlorinated water, adequate drainage around their homes, and practiced personal hygiene (e.g., took showers). The parents of these children washed their hands before preparing and eating meals, took showers daily, and were aware of the involvement of parasites in intestinal infections. In addition, all children studied had normal ranges of height and weight.

The detection of other intestinal parasites such as G. lamblia and E. histolytica infecting these children suggests exposure of the children to fecal contamination sources in the places where they live. Since G. lamblia is a common parasite in Mexico City among children less than five years old and has the same transmission mechanisms as Cryptosporidium, it is not surprising to find both parasites in our patients. Our finding of a higher susceptibility for giardiasis in girls and cryptosporidiosis in boys is consistent with previous observations in developing and developed regions of Mexico.

Children with clinical gastrointestinal findings, but with no infections by intestinal protozoa, could be infected by other pathogens such as bacteria or viruses. However, examination of only one fecal sample, as in this study, does not eliminate infections by other parasites, which require exami-

<table>
<thead>
<tr>
<th>Protozoa No. (%)</th>
<th>Fever</th>
<th>Dehydration</th>
<th>Vomiting</th>
<th>Abdominal distension</th>
<th>Feed repulsion</th>
<th>Blood in feces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giardia lamblia 22 (50)</td>
<td>14</td>
<td>9</td>
<td>6</td>
<td>22</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Cryptosporidium 18 (41)</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Entamoeba histolytica 4 (9)</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>
nation of three consecutive samples for a more accurate diagnosis. Some years ago, amebiasis was among the main causes of diarrhea in children in Mexico City. However, the present results on *E. histolytica* morbidity suggests changes in the current epidemiologic patterns.

In conclusion, if one considers the increasing importance of *Cryptosporidium* infections in human and farm animal hosts, the development of a vaccine against this parasite would be of great benefit to both children in developing countries and neonatal ruminants.

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