INTRODUCTION

More than half of the people in the world are infested with protozoa and helminthes. Most people are asymptomatic but some intestinal parasites can cause diarrhea and other associated problems. At least one parasite, Entamoeba Histolytica (E.H.), occurs as both pathogenic and non-pathogenic strains. Although amoebiosis is very common occurring worldwide and infecting 10-12% of the world’s population, a vast majority are entirely free of symptoms. Patients who were positive for E.H. were evaluated for the symptomology including the type of diarrhea (acute watery diarrhea (AWD) or dysentery), abdominal pain, tenesmus and nausea/vomiting. Examination carried out was assessed for state of hydration, fever and anaemia and nutritional status of those less than 5 years of age. The patients were divided into three age groups to assess the association of the age with severity and type of clinical presentation. Chi-square test was applied to calculate the p-values. P-values of 0.05 or less were considered statistically significant.

ABSTRACT

Objective: To determine the frequency and clinical presentation of amoebic diarrhea in children and its effect on the nutritional status of the affected children.

Study Design: Descriptive.

Place and Duration of Study: Department of Diarrhea Treatment Unit (DTU), Dow Medical College and Civil Hospital, Karachi, from November 1998 to April 2001.

Methodology: Paediatric patients between the ages of > 1 month to 15 years were included, who visited the DTU of the department with diarrhea. Stool samples of all these patients were checked under microscope for the vegetative forms of Entamoeba Histolytica (E.H.). Patients who were positive for E.H. were evaluated for the symptomology including the type of diarrhea (acute watery diarrhea (AWD) or dysentery), abdominal pain, tenesmus and nausea/vomiting. Examination carried out was assessed for state of hydration, fever and anaemia and nutritional status of those less than 5 years of age. The patients were divided into three age groups to assess the association of the age with severity and type of clinical presentation. Chi-square test was applied to calculate the p-values. P-values of 0.05 or less were considered statistically significant.

Results: The stool samples of 3870 patients with diarrhea were examined under microscope. Three hundred and twenty eight (8.47%) of these samples were positive for E.H. The difference between the number of patients presenting with acute watery diarrhea n=157, 47.86% and with dysentery n=171, 52.13% was found to be statistically non-significant (p=0.364). Two hundred and seventy seven (84.45%) patients had tenesmus, while abdominal pain was present in 287 (87.5%). Fever and malnutrition were present in 169 (51.52%) patients each. Malnutrition was significantly most frequent in 1-5 years of age groups (n=98, 57.98%, p=0.026). The nutritional evaluation of the 272 under-5 children with amoebic diarrhea showed a significantly normal status in 123 (45.55%, p-value <0.001). All the signs and symptoms followed a similar trend with 1-5 years age group being the most affected group. However, the frequency of blood in stools increased in direct proportion to the increasing age.

Conclusion: Although dysentery was the more common presenting complaint, almost half of the patients presented with watery diarrhea. Most of the patients with dysentery were under the age of 5 years. Fever was present in a high number of patients. The age group most affected by amoebiasis and malnutrition was 1-5 years.

Key words: Entamoeba histolytica. Diarrhea. Amoebiasis. Malnutrition.

INTRODUCTION

More than half of the people in the world are infested with protozoa and helminthes. Most people are asymptomatic but some intestinal parasites can cause diarrhea and other associated problems. At least one parasite, Entamoeba Histolytica (E.H.), occurs as both pathogenic and non-pathogenic strains. Although amoebiosis is very common occurring worldwide and infecting 10-12% of the world’s population, a vast majority are entirely free of symptoms. About 10% of those infected have clinical symptoms, which occur with invasive amoebiosis thought to affect 48 million people annually. Most (80-98%) of the symptomatic patients present with amoebic colitis while the remaining 02-20% present with extra-intestinal disease, most commonly as liver abscess. The incidence of invasive amoebiasis varies greatly in different parts of the world. The prevalence of infection varies between 1% in industrialized countries to between 50% and 80% in tropical countries. Prevalence is increased so much that the newborn are now being reported with amoebiasis. No effective immunity develops even after repeated infections. The mortality in untreated cases of invasive amoebiasis is high. It is recognized as the third most common cause of death from parasitic disease in the world. The highest prevalence of infection is found in adults. World Health Organization (WHO) has estimated that 5-15% of all the childhood diarrheas in the developing countries is protozoal in origin. E.H. was found to be responsible for 11% of the intestinal parasites in acute diarrhea patients in India. It is not clear that how much of this protozoal diarrhea and how
Intestinal amoebiasis in children and its effect on nutritional status

much of the diarrhea in the tropics is contributed by E.H. Loshak has reported an unexpectedly high prevalence of amoebic colitis among acute diarrhea patients, E.H infection was found to be well over half of the patients with acute diarrhea. Similar results were observed in Egypt, where 57.1% of the general patients with acute diarrheas were positive for E.H. On the contrary in Saudi Arabia, E.H was found to be responsible for only 2.2% of acute diarrheas in under-5 children.11

The aim of this study was to assess the frequency of amoebiasis in cases of acute diarrhea in paediatric patients and the spectrum of clinical presentation of amoebiasis in the local paediatric population.

METHODOLOGY

It was a descriptive study carried out at Diarrhea Treatment Unit (DTU) of the Paediatric Department of Dow University of Health Sciences (DUHS) and Civil Hospital Karachi (CHK), over a period of two-and-a-half years from November 1998 to April 2001.

The study included all paediatric patients under the age of 15 years, who visited DTU of the department with complaint of diarrhea of less than 14 days. Diarrhea was defined as per WHO in the Control of Diarrhoeal Diseases (CDD) program as “the passage of three or more loose or watery stools in 24 hour period, a loose stool being the one that would take the shape of a container into which it is passed”,7 Fresh stool samples of all these patients were microscopically examined for the vegetative forms of Entamoeba Histolytica (E.H) within 15 minutes in the ward laboratory by trained technician. Patients whose stools were positive for E. histolytica were evaluated for the symptomatology including the type of diarrhea, whether Acute Watery Diarrhea (AWD) or dysentery, abdominal pain, tenesmus, fever and nausea/vomiting and the data was recorded. AWD was defined as the acute onset of frequent loose or watery stools without visible blood lasting for less than 14 days, while dysentery was defined as the presence of visible blood in the diarrhoeal stools.7 Tenesmus was defined as the painful, ineffective straining to empty the bowel.12 Patients were taken to be febrile if their body temperature was found to be 37.5°C or above.13 All were assessed for state of hydration in accordance with the CDD programme.7 They were also examined for anemia and nutritional status. Anemia was defined clinically as the presence of palmer pallor.13 Abdominal pain and nausea were the subjective complains in the older patients while the pain was presumed to be present in infants if they cried episodically with flexion of the thighs over the abdomen especially just before defecation and getting relieved after defecation. The nutritional status of those less than 5 years of age with amoebic diarrhea was classified as per modified Gomez classification.14

Patients were divided into three age groups (Group ‘A’ with age = 0 ≤ 1 year, Group B with age = > 1 year - ≤ 5 years; Group C with age > 5 years - ≤ 15 years) to assess the association of the age with the severity and type of clinical presentation. The patients were treated for diarrhea in accordance with the treatment plans as per recommendations of control of diarrhoeal disease program by WHO. Treatment was also given for the associated problems, while the data was analyzed using SPSS version 10 for windows. Chi-square test was applied to calculate the p-values. P-values of 0.05 or less were considered statistically significant.

RESULTS

A total of 3870 stool samples of all diarrhea patients were analyzed under the microscope. Three hundred and twenty eight (8.47%) of those samples proved to be positive for the vegetative form of E.H. One hundred and fifty seven (47.86%) patients had presented with AWD, while 171 (52.13%) had dysentery at the time of presentation. The difference between the number of patients presenting with the two types of diarrheas was not found to be statistically significance (Table I). Most of the patients had tenesmus (84.5%) and abdominal pain (87.5%, Table II). About half of the patients had fever and malnutrition, while hydration status was normal in 85.37% patients (Table III). Malnutrition was significantly most frequent in the 1-5 years age group (98, 57.98%, p=0.026). The nutritional evaluation of 270 children less than 5 years of age with amoebic diarrhea is shown in Table IV. Nutritional status was significantly normal in 45.52% of patients with amoebic diarrhea (p < 0.001). All the signs and symptoms followed a similar trend with 1-5 years age group being the most affected group. But the results were not found to be statistically significant except for overall malnutrition among all age groups (p=0.026) and dehydration (p=0.034). Another exception was the type of diarrhea where the frequency of blood in stools increased in direct proportion to the increasing age.

<table>
<thead>
<tr>
<th>Type of diarrhea</th>
<th>Total</th>
<th>Acute watery diarrhea</th>
<th>Dysentery</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>n</td>
<td>n</td>
<td>n percentage</td>
<td>n</td>
</tr>
<tr>
<td>≥ 1 year</td>
<td>113</td>
<td>58</td>
<td>51.32%</td>
<td>55</td>
</tr>
<tr>
<td>&gt; 1-5 years</td>
<td>159</td>
<td>74</td>
<td>46.54%</td>
<td>85</td>
</tr>
<tr>
<td>&gt; 5-15 years</td>
<td>56</td>
<td>26</td>
<td>46.44%</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>328</td>
<td>157</td>
<td>47.87%</td>
<td>171</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symptoms of amoebiasis</th>
<th>Total</th>
<th>≤ 1 year</th>
<th>1-5 years</th>
<th>&gt; 5-15 years</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>328</td>
<td>113 (34.45%)</td>
<td>159 (48.47%)</td>
<td>56 (17.07%)</td>
<td>0.748</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>287</td>
<td>96 (33.49%)</td>
<td>140 (48.78%)</td>
<td>51 (17.77%)</td>
<td>0.793</td>
</tr>
<tr>
<td>Tenesmus</td>
<td>277</td>
<td>94 (33.93%)</td>
<td>132 (47.65%)</td>
<td>51 (18.41%)</td>
<td>0.668</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>98</td>
<td>34 (34.69%)</td>
<td>48 (48.97%)</td>
<td>16 (16.32%)</td>
<td>0.739</td>
</tr>
</tbody>
</table>

Table I: Types of diarrhea.

Table II: Symptoms of amoebiasis.
Entamoeba histolytica is prevalent worldwide; endemic foci are particularly common in the tropics and especially in areas with low socio-economic and sanitary standards. Humans are the major reservoir. It is estimated that this disease, though usually asymptomatic, is associated with an annual mortality of 40,000-110,000 deaths/year; amoebiasis is the third leading parasitic cause of death on a global scale. It is highly endemic in Africa, Latin America, India and Southeast Asia. The infection acquired in India, Mexico or Durban, South Africa, is apparently more virulent than that from other locations.15

The presence of amoebiasis in 8.47% of the patients with acute diarrhea is somewhat higher than expected if we compare it with the prevalence of 5-15% of all protozoal infections as a cause of acute diarrhea as estimated by WHO. It is also higher than the reported prevalence of 4.2-6.5% of E.H. infection in Bangladeshi children with diarrhea but is similar to the result of a Mexican study that found 8.4% of the samples to be seropositive for E.H.16 In Jordan, 8% of the reported acute gastroenteritis cases are because of E.H.17 A similar study from Colombia reported E.H to be the most responsible for 10% acute diarrhea in children.18 Contrary to these reports, an Australian study did not find E.H in children with acute diarrhea.19 The most common presenting symptoms of abdominal pain and tenesmus being present in 87.5% and 84.5% of the patients respectively are consistent with the reports in the rest of literature.2 The next common symptom of fever, which was present in a little over half of the patients is contrary to the popular belief that fever is not the usual feature of amoebiasis except in fulminant amoebic colitis.1,3

The higher frequency of malnutrition in 51.5% of all the patients and 54.5% of under-5 patients with amoebic colitis in comparison to the 40% prevalence of malnutrition among Pakistani children as reported by the WHO in its annual “state of the world children” is consistent with the already established fact that diarrhoeal diseases reduce the growth rate of young children thus making it an important cause of malnutrition.20 Comparison of the number of diarrhoeal episodes among Bangladeshi children with variable nutrition revealed that better nourished children experienced significantly fewer diarrhoeal episodes compared with malnourished and/or stunted children.21 Most of the patients affected by amoebiasis belonged to the age group of 1-5 years, which is contrary to the reports from Bangladesh and Mexico, where the amoebiasis was found to be most prevalent above the age of 5 years.16 Similar trends were observed for the rest of the clinical features with 1-5 years age group being the most affected age group. The analysis of the nutritional status of the under-5 children revealed malnutrition to be more prevalent in the age group of 1-5 years with most of the patients falling in the category of grade I malnutrition (p=0.001). The only exception observed was in the type of diarrhea, where the frequency of blood in stools increased in direct proportion to the increasing age of the patient. Although this pattern of increasing frequency of dysentery with increasing age is consistent with the literature, most of the patients (81%) were under the age of 5 years, which is contrary to the reports of CDD/WHO. The latter states that amoebic dysentery is rare under the age of 5 years and therefore, treatment for amoebiasis should only be given when bloody stools persist after consecutive treatment with two antibiotics (each given for two days) that are usually effective for Shigella or after identification of trophozoits of EH containing red blood cells in the stools.4,7 WHO also recommends that the presence of AWD in under-5 children should always be taken as viral in origin and hence the treatment recommendations of CDD/IMCI, but this study, and many more clearly show that amoebiasis may present as AWD as was the case in almost 50% of various populations. It is, thus, concluded that the prevalence of amoebiasis among acute diarrheas is high, thus mandating larger scale, multi-centre studies to confirm the results so that we may recommend changes in the treatment plans of CDD/WHO consistent with the local scenario.

Higher prevalence of malnutrition and systemic involvement in the form of fever associated with amoebiasis and the involvement of children at younger ages calls for an energetic approach and massive planning to divert the attention of the concerned personnel towards the provision of safe drinking water, better sanitation and health education as these simple maneuvers can go a long way to rid our child population of this morbid and potentially fatal parasite.

### DISCUSSION

Table III: Signs of amoebiasis.

<table>
<thead>
<tr>
<th>Signs</th>
<th>Total of patients</th>
<th>≤ 1 year</th>
<th>1-5 years</th>
<th>&gt; 5-15 years</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malnutrition</td>
<td>169</td>
<td>47 (27.81%)</td>
<td>98 (59.79%)</td>
<td>24 (14.20%)</td>
<td>0.026*</td>
</tr>
<tr>
<td>Fever</td>
<td>169</td>
<td>61 (36.09%)</td>
<td>82 (48.52%)</td>
<td>26 (15.38%)</td>
<td>0.315</td>
</tr>
<tr>
<td>Anaemia</td>
<td>79</td>
<td>27 (34.18%)</td>
<td>38 (48.10%)</td>
<td>14 (17.22%)</td>
<td>0.346</td>
</tr>
<tr>
<td>Dehydration</td>
<td>50</td>
<td>23 (46%)</td>
<td>23 (46%)</td>
<td>04 (8%)</td>
<td>0.034*</td>
</tr>
</tbody>
</table>

*p-values statistically significant.

Table IV: Nutritional status of < 5 years with amoebic diarrhea.

<table>
<thead>
<tr>
<th>Age</th>
<th>Total number of patients</th>
<th>Normal</th>
<th><strong>PCMI</strong></th>
<th>PCMIi</th>
<th>PCMIll</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1 year</td>
<td>113</td>
<td>64 (56.64%)</td>
<td>31 (27.43%)</td>
<td>6 (5.31%)</td>
<td>12 (10.62%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>&gt; 1-5 years</td>
<td>159</td>
<td>59 (37.11%)</td>
<td>47 (29.56%)</td>
<td>28 (17.61%)</td>
<td>25 (15.72%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Total</td>
<td>272</td>
<td>123 (45.22%)</td>
<td>78 (28.68%)</td>
<td>34 (12.50%)</td>
<td>37 (13.60%)</td>
<td></td>
</tr>
</tbody>
</table>

*p-values statistically significant. **PCM = Protein Calorie Malnutrition

Higher prevalence of malnutrition and systemic involvement in the form of fever associated with amoebiasis and the involvement of children at younger ages calls for an energetic approach and massive planning to divert the attention of the concerned personnel towards the provision of safe drinking water, better sanitation and health education as these simple maneuvers can go a long way to rid our child population of this morbid and potentially fatal parasite.
CONCLUSION
Amoebic diarrhea was common in paediatric patients. Dysentery was the more common presenting complaint, almost half of the patients presented with watery diarrhea. Most of the patients with dysentery were under the age of 5 years. Fever was present in a high number of patients. The age group affected significantly most by amoebiasis and malnutrition was 1-5 years.

REFERENCES