Study of Prevalence of Intestinal parasitic infection in symptomatic children at Tertiary Care Hospital.

Dr. Suwarna Pawar, Dr. Kishor Ingole, Dr. Mayuri Bhise

Abstract

Background
Intestinal parasitic infections cause severe diarrhoea specially in childrens and immunocompromised people amongst which Cryptosporidium and Cyclospora are emerging protozan parasites that causes diarrhea worldwide, particularly in young children.

Aims-To know the prevalence of intestinal parasitic infection amongst the symptomatic children at a tertiary care centre.

Methods-This study is conducted at tertiary care hospital from January 2015 to December 2015 for one year in which 100 children were included who came with complains of pain in abdomen and diarrhea.

Single stool sample was collected aseptically in wide mouth container following all aseptic precautions.

Stool microscopy was performed which included saline mount, iodine mount and modified acid fast stain for the detection of Cryptosporidium parvum, Isospora and Cyclospora spp in stool.

Results-Out of all 100 childrens in the study, 64 were suffering from infection out of which of 7 (10.94%) were positive for Cryptosporidium alone, 2 (3.13%) were positive for Cyclospora species alone while 34 (53.13%) were positive for both Cryptosporidium and Cyclospora together resulting into diarrhoea. In 16 (25%) children Entamoeba histolytica was detected while in 5 (7.80%) children Giardia was found. Among all infected children male cases were more as compared to female cases.

Most of the cases were in the 6-10 yrs of the age group followed by 1-5 yrs and 11-15 yrs. The numbers of cases were more in warm season as compared to cooler season.

Conclusions- C. parvum and Cyc. cayetanensis are major causes of diarrhea, followed by E.histolytica and Giardia species. So, these pathogens should be taken into account in the differential diagnosis of diarrhea in children particularly from rural areas. And also there is a need of periodic deworming particularly in childrens along with maintenance of hygienic conditions to prevent this parasitic infection as these infections are the leading cause of death among children.

Keywords: Intestinal parasitic infections, Cryptosporidium parvum, Cyclospora species, Entamoeba histolytica, Giardia species, deworming.

1. Introduction
Intestinal parasitic infections (IPIs) constitute a global health burden causing clinical morbidity in 450 million people; many of them are children in developing countries1. Intestinal parasitic infections are among the most common infections worldwide. It is estimated that some 3.5 billion people around the world are affected as a result of these infections, the majority being children1. The distribution and prevalence of the various intestinal parasites species depend on social, geographical and economical conditions, as well as customs of inhabitants5. Poverty, illiteracy, poor hygiene, lack of access to potable water, and hot and humid tropical climate are the factors associated with IPIs1. The main clinical manifestation of the disease caused by these parasites is diarrhoea2. Diarrhea is defined as an increased loss of stool with a frequency and fluidity greater than the usual habit for each individual1. Persistent diarrhea is the leading cause of death in children younger than five years of age in developing countries, where it accounts for 30 to 50% of childhood mortality1.

It has a devastating effect particularly on infants; annually killing at least 4 to 5 million of those aged less than five years in Africa, Asia and Latin America5. The World Health Organization (WHO) suspects that there are more than 700 million episodes of diarrhea annually in children less than five years of age in developing countries6.
Thus, diarrhoea caused by opportunistic intestinal parasites could be life threatening particularly for infants during the course of acute diseases. Although only bacteria and viruses were previously assumed to be the causes of diarrhoea, parasite-caused diarrhoea has also been found in 30-80% of patients. For example, in 90% of paediatric diarrhoeal patients studied in the Gambia, the etiological agents isolated were opportunistic parasites. The parasites that emerged in recent years, thus, include members of the protozoan genera Cryptosporidium, Cyclospora, Isospora and Microsporidia. These opportunistic parasites cause diarrhoeal diseases in children and are also considered as important AIDS-associated pathogens worldwide. Coccidian parasite are being increasingly recognized as important causes of diarrhoea in children. Species of Cryptosporidium are ubiquitous in their distribution. In recent years, Cryptosporidium parvum occurs in up to 7% of children with diarrhoea in developed countries and up to 12% of children with diarrhoea in developing countries. In temperate climate it accounts for only 1%-4% of the cases of self-limiting childhood diarrhoea while in case of tropical climate cryptosporidiosis is much prevalent accounts for 4%-20% cases of childhood diarrhoea and is associated with high morbidity and mortality in children. Clinically immunocompetent patients usually suffer from watery diarrhoea occasionally accompanied by nausea, vomiting, weight loss, anorexia, and dehydration. Intestinal parasites would be expected to be highly prevalent in tertiary care centre because of the shortage of clean water, problems in the sewage system and other unhygienic factors that increase the probability of infection by these parasites. Therefore, this study was aimed at determining the extent and association of opportunistic intestinal parasites in paediatric diarrhoea cases in Tertiary care centre. Coccidian protozoa of genus Cyclospora are obligate intracellular apicomplexan parasites that infect the mucosal epithelium of the small intestine. Cyc. cayetanensis was first described in 1986 as a pathogen and is now recognized as a worldwide cause of diarrhoea in humans. Cyclospora cayetanensis—originally referred to as “cyanobacterium-like bodies”—has recently been recognized as a waterborne pathogen and reclassified. It has been associated with several waterborne outbreaks worldwide. Cyclospora was first identified as a human pathogen in three patients from Papua, New Guinea but it was thought to be a coccidian. Cyclospora is an important emerging cause of diarrhoea worldwide that leads to significant morbidity and mortality. The clinical presentation of C. cayetanensis also includes gastrointestinal (GI) symptoms such as loose or watery diarrhea, nausea, vomiting, abdominal cramps and loss of appetite; or constitutional symptoms such as unintentional weight loss, fever, chills, muscle aches, joint aches, generalized body aches, headache, or fatigue. Cyclospora oocysts can be transmitted in humans through exposure to fecally contaminated environmental water, food or soil. Entamoeba histolytica is the third leading parasitic cause of death in the developing countries, infecting more than 10% of world’s population. It is endemic in India and affects all age groups. Humans are affected through food and water contaminated with the cysts of E. histolytica due to feces, flies or unwashed hands of food handlers.

**Giardia lamblia** is a flagellate of worldwide distribution. It is the most common flagellate of intestinal tract, causing Giardiasis. Most common symptom of Giardiasis is diarrhea. It is well documented that in developing countries, infections are associated with poor sanitary conditions, poor water quality and overcrowding. In developing countries, there is a very high prevalence and incidence of infection and data suggest that long-term growth retardation can result from chronic giardiasis.

This study was carried out to know the prevalence of intestinal parasites among the symptomatic childrens.

**2. Material and methods**

The present study was conducted in Department of Microbiology from January 2015 to December 2015 at tertiary care hospital, Solapur. Any case suffering from a chronic disease or receiving treatment leading to immune-suppression was excluded. Stool was collected in a clean container. Patient name, date, & time of collection were written on the container. The specimens were transported to the Laboratory as soon as possible. Stool examination

(a) Direct smear examination (saline and iodine smear).

(b) Staining using modified Ziehl–Neelsen stains.

Saline mount and Iodine mount: Iodine and saline wet mount preparation of stool samples were made and microscopically examined under a magnification of 400x to detect ova and/or parasites. The cyst of Entamoeba histolytica were detected which were round in shape, 12 μm x 20 μm in size (Figure 1) and also the cysts of Giardia lamblia were observed in saline and iodine mount which were about 8μmX 12μm in size oval in shape. It has two pairs of nuclei which were seen on both the sides of axostyle (Figure 2).
Cyclospora oocysts were identified as acid-fast round structures with crumpled celophane appearance and size of approximate 8-10μm (Figure 4).

Fig 3: *Cryptosporidium* oocyst in Mod. ZN Stain

Fig 4: *Cyclospora* oocyst in Mod. ZN Stain

### 3. Results

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>In the year 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>1-5 yrs</td>
<td>6</td>
</tr>
<tr>
<td>6-10 yrs</td>
<td>25</td>
</tr>
<tr>
<td>11-15 yrs</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
</tr>
</tbody>
</table>

Out of total 64 positive patients, most of the cases were observed in the age group of 6-10 years followed by 1-5 years in both sexes. Male cases were slightly more as compared to female cases.

Table 2: Seasonal variation of cases.

<table>
<thead>
<tr>
<th>Month</th>
<th>Cases in 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>5</td>
</tr>
<tr>
<td>February</td>
<td>9</td>
</tr>
<tr>
<td>March</td>
<td>7</td>
</tr>
<tr>
<td>April</td>
<td>6</td>
</tr>
<tr>
<td>May</td>
<td>6</td>
</tr>
<tr>
<td>June</td>
<td>5</td>
</tr>
<tr>
<td>July</td>
<td>3</td>
</tr>
<tr>
<td>August</td>
<td>2</td>
</tr>
<tr>
<td>September</td>
<td>2</td>
</tr>
</tbody>
</table>

In present study most of the cases were observed in the warm season (February to July) as compared to cooler season (August to January).
Table 3: The prevalence of diarrhea causing intestinal parasites detected among cases.

<table>
<thead>
<tr>
<th>Name parasite</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cryptosporidium parvum</td>
<td>7 (10.94%)</td>
</tr>
<tr>
<td>Cyclospora Cyatenensis</td>
<td>2 (3.13%)</td>
</tr>
<tr>
<td>Both C. parvum an Cyc Cyatenensis</td>
<td>34 (53.13%)</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td>16 (25%)</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>5 (7.80%)</td>
</tr>
</tbody>
</table>

Out of total 64 cases, 34 (53.13%) cases were positive for both C. parvum and Cyclospora Cyatenensis infection. C. parvum alone was detected in only 7 (10.94%) cases, Cycl. Cyatenensis in 2 (3.13%) cases, E. histolytica in 16 (25%) cases and G. lamblia was detected in 8 (7.80%) cases.

4. Discussion
It is estimated that diarrhoeal diseases are responsible for more than 2 million deaths in children less 5 years of age, most of those deaths being in developing countries. Rotavirus is the commonest cause of acute watery diarrhea in children throughout the world. *Cryptosporidium* spp. are usually the third or fourth commonest cause of diarrhoeal diseases. *Cryptosporidium* infection continues to be a significant health problem in both developed and developing countries, where it is recognized as an important cause of diarrhoea in both immunocompromised and immunocompetent people. The members of the protozoan genera- *Cryptosporidium*, *Cyclospora*, *Isospora* and *Microsporidia* are the opportunistic parasites which causes diarrhoeal diseases in children. Malnutrition, immunosuppression, young age and an increase in the preceding diarrhoea burdens are all risk factors for the development of persistent diarrhea. Persistent diarrhoea seriously affects nutritional status, growth, and intellectual function. In present study most commonly affected age group is 6-10 yrs, followed by 1-5 years and lastly 11-15 years. Naguib *et al* included the children less than 5 years of age group and they observed that infection is most commonly seen in the age group is less than 2 years as compared to more than 2 years. The numbers of male cases were more as compared to female cases in present study. Adamu *et al* performed a study at Ethiopia found that there were almost equal numbers infected cases among both sexes. The slight male preponderance in our study may be because of cultural environment. In this study most of the cases were seen in warm season as compared to cold season which is also seen in the study conducted by Snelling *et al*. Among total 64 cases, both *C. parvum* and *Cyclospora Cyatenensis* infection was observed in 34 (53.13%) cases. *C. parvum* alone was detected in only 7 (10.94%) cases, *Cycl. Cyatenensis* in 2 (3.13%) cases, *E. histolytica* in 16 (25%) cases and *G. lamblia* was detected in 8 (7.80%) cases. The infection prevalence of *Cryptosporidiasis* in Middle East is 1.6% - 10%. In Saudi Arabia the prevalence was 1% very low as compared to present study. In Tanzania, 1.8% of children with acute diarrhea were found to have *C. cayetanensis* while 5.6% of the children under 8 years of age in Peru 2.3% of children in Guatemala were found to be infected with the same. The difference in prevalence of...
infection may be because of the geographical distribution. By this study it is confirmed that there is the existence of various opportunistic parasitic infections in children with diarrhea. The high prevalence of organisms, such as Cryptosporidium, and cyclospora, among the young people is of concern and deserves careful consideration in the development of health policies in the region. This is even more important because of the lasting detrimental effects of enteric infections that occur during early childhood and later on physical and cognitive development. Emerging pathogens, such as Cryptosporidium and Cyc cayetanensis, which are resistant to chlorine disinfection, were found in the hospital patients and school children. All together, these pathogens can be transmitted through contaminated water or food, or poor hygiene. Factors that might be associated with the transmission of these pathogens may include low socioeconomic status, low level of education, use of unchlorinated well or river-water, and a low level of personal hygiene. These factors reflect the living conditions, lifestyle, and environmental conditions of the local population. The level of gastrointestinal disease associated with the faecal-oral route of transmission could be decreased significantly by implementing relatively simple strategies, such as better wastewater treatment and hygiene education. Studies in Indonesia suggested that a systematic and sustained effort to teach children to (a) avoid certain types of behaviour that favours infection and (b) practice good personal hygiene are the best approaches to significant and enduring reduction of the scourge of intestinal parasitism. This can help for the proper care of pediatric diarrheal patients and for controlling the disease.

5. Conclusion

The prevalence of Cryptosporidium in humans in both developed and developing countries demonstrates the magnitude of this parasite in public health. This study confirms the presence of different opportunistic parasites in children with diarrhea. C. parvum and Cyc cayetanensis are major causes of diarrhea, followed by E. histolytica and Giardia species. So, these pathogens should be taken into account in the differential diagnosis of diarrhea in children particularly from rural areas. As there is no effective and specific treatment to these diseases, prevention and control of these infections is very important. These parasitic infections can be avoided by increasing the awareness about personal hygiene in public as well as by providing and monitoring the quality of drinking water. Better education and increased awareness of cryptosporidiosis among the general public could potentially reduce case numbers. Along with all these measures there is a need of periodic deworming particularly in children along with maintenance of hygienic conditions to prevent this parasitic infection as these are the leading cause of death among children.

6. References

22. Michael J Cuomo, Lawrence B Noel, Daryl B White. DIAGNOSING MEDICAL PARASITES A Public Health Officers Guide to Assisting Laboratory and Medical Officers.