Abstract

Introduction: Diarrhea is a frequent complication observed in patients with hematologic cancer. The normal fecal micro flora changes in chemotherapy-induced diarrhea, which shows a higher proportion of aerobic and oxygen-tolerant bacteria. Hence the causative bacterial pathogens maybe different than the usual etiology.

Objectives: Therefore, the objective of the study was to find out the etiology of diarrhea in children suffering from hematological malignancy and who are on chemotherapy.

Material and Methods: A retrospective study was carried out on patients in hematologic unit of pediatric ward over a period of one and half years at a tertiary care hospital in Mumbai.

Results: Growth of pathogenic bacteria was seen in 15 (27.27%) stool samples, of which 13 patients had acute lymphatic leukemia(ALL) and only two patients had acute myeloid leukemia (AML). Among 15 growths, 11 grew Pseudomonas aeruginosa, two grew Morganella morganii and one each grew Aeromonas hydrophila and Klebsiella pneumoniae.

Conclusion: Organisms usually considered as non pathogenic may cause disease in immunocompromised patients. Stool specimens of all leukemic patients suffering from diarrhea and on chemotherapy, should be sent routinely for culture, so as to find out the exact cause of diarrhea.

Keywords: Bacterial etiology; Diarrhea; Pediatric hematologic unit
tests, [5] followed by antibiotic susceptibility testing on Mueller Hinton agar by Kirby Bauer disc diffusion method, according to CLSI guidelines [6]. The turnaround time for negative result reporting was three days while that of positive reports was three to five days.

**Results and Discussion**

A total of 55 stool samples collected from patients admitted to hematology ward for diarrhea were taken. These patients were suffering from hematological malignancy. Growth of pathogenic bacteria was seen in 27.27% (15/55) stool samples. In remaining 40 samples, no pathogenic bacteria was grown. When analyzed for the type of leukemia these patients were suffering, 15 patients had acute lymphatic leukemia (ALL) and only two patients had acute myeloid leukemia (AML).

Among these 15 stool samples, 11 grew *Pseudomonas aeruginosa*. Out of these, 9 patients were suffering from ALL, while 2 patients had AML. Two patients with ALL grew Morganella morganii. Stool sample of one patient grew *Aeromonas hydrophila* and one grew *Klebsiella pneumoniae*, both were suffering from ALL.

Table 1 shows the antibiotic susceptibility pattern of these 15 isolates.

<table>
<thead>
<tr>
<th>Organism (No.)</th>
<th>Ak</th>
<th>Pi</th>
<th>Caz</th>
<th>Ctx</th>
<th>Nx</th>
<th>Na</th>
<th>Cot</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>P. aeruginosa</em> (11)</td>
<td>10</td>
<td>8</td>
<td>7</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M. morganii (02)</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>A. hydrophila (01)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>K. pneumoniae (01)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 1: Antibiotic susceptibility of 15 isolates from stool samples.

One isolate of *P. aeruginosa*, which was resistant to all first line antibiotics, was susceptible to imipenem. Ak = Amikacin; Pi = Piperacillin; Caz = Ceftazidime; Ctx = Cefotaxime; Nx = Norfloxacin; Na = Nalidixic acid; Cot = Trimethoprin-Sulphamethoxazole

Diarrhea is a common and frequently unclear symptom in patients with acute leukemia after intensive chemotherapy. However, no systematic study is available concerning the proportion of infectious causes. In this study, we observed total 55 patients suffering from hematological malignancy on treatment, with diarrhea. All patients were neutropenic and were on chemotherapy. Of these, only 15 (27.3%) patients’ stool culture grew pathogenic bacteria. Remaining 30 stool culture did not grow any pathogenic bacteria. This observation is in conformity with this study.

In this study, it was observed that one of these isolates was resistant to all baseline drugs. When tested for higher antibiotics, it was sensitive to imipenem. In a study by Goldschmidt and Bodey also, it was seen that *Pseudomonas* strains were by far the most resistant of all the organisms studied [11].

*Morganella morganii* is an opportunistic secondary invader that was originally thought to be the cause of summer diarrhea [14]. In a study done in 1986, *M. morganii* was isolated significantly more in numbers from patients with gastrointestinal disease than from healthy controls [15]. Infections are more common in immunocompromised patients. In this study, two cases of diarrhea showed growth of *Morganella morganii* in stool sample. Both the cases were of AML.

*Klebsiella pneumoniae* has been studied as cause of diarrhea in HIV infected patients. These isolates are shown to have HEp 2 adherence as pathogenic property. These specific isolates are isolated more frequently in immunocompromised patients [16]. One study have reported *E.coli* and *Klebsiella* from the stool culture of a leukemic child, who developed necrotizing enterocolitis [17]. In the present study, one *Klebsiella pneumoniae* was isolated in a patient with AML.

In this study, one *Aeromonas hydrophila* was also isolated. Though the pathogenic role of *Aeromonas* species is controversial in healthy individuals but it has been isolated in patients with some associated immunocompromised status. There is accumulating evidence that these bacteria are capable of causing usually mild, self-limited diarrheal disease [18].

All organisms were sensitive to baseline drugs. All isolates except one were sensitive to amikacin. The one isolate resistant to amikacin was *Pseudomonas aeruginosa*. It was also resistant to other baseline drugs and put up for higher antibiotic susceptibility. It was sensitive to imipenem. *Klebsiella pneumoniae* and *Aeromonas hydrophila* were sensitive to only amikacin. Similar finding was observed in a study in Dakar, where *Klebsiella pneumoniae* was resistant to many of the antibiotics used routinely to treat diarrhea [16]. Timely and appropriate treatment will help to avoid delay in treatment in these patients.

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Citation: Anuradha SD, Baveja SM, Attar FI (2015) Bacterial Etiology of Diarrhea in Children Admitted in Hematologic Unit in a Tertiary Care Hospital. J Leuk S1: S1-005. doi:10.4172/2329-6917.S1-005
The normal fecal microflora changes in chemotherapy-induced diarrhea in many patients, showing a higher proportion of aerobic and oxygen-tolerant bacteria [12]. Organisms usually considered as non-pathogenic may cause disease in immunocompromised patients. Therefore, stool specimens of all leukemic patients suffering from diarrhea and on chemotherapy, should be sent routinely for culture, so as to find out the exact cause of diarrhea. Reporting of pathogens causing diarrhea will help the clinicians to start the appropriate antibiotics and limit the morbidity and mortality in these cases.

References

This article was originally published in a special issue, entitled: “Leukemia Types”, Edited by Rohit Mathur