

# Diarrhea in Hospitalized Children in Tertiary Hospital

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**Abstract:** *Diarrheal diseases are a great public health problem that leads to morbidity and mortality of infants and children particularly in developing countries and even in developed countries. The aim of the study was to determine the etiology of acute diarrhea in young children. This is a retrospective study. A total of 345 cases of acute diarrhea mainly in children below 5 years of age admitted at tertiary care Pediatric hospital in University Center "Mother Theresa" over the period 2011- 2013 were included in the study. Medical history, diarrhea symptoms, treatment prior to hospitalization and demographics were obtained from medical records. Stool samples were analyzed for parasites, rotavirus and enteric bacteria. Of the total samples examined, 181 (53.3%) were positive for at least one pathogen: bacterial pathogens were isolated from 11 (3.2%) samples, parasites from 51 (14.8%), and rotavirus from 122 (35.8%) Etiologic data on diarrheal diseases and are important tools for clinical management and control strategic planning.*

**Keywords:** diarrhea, pathogen, hospitalization, rotavirus, children

## 1. Introduction

Diarrhea, frequent runny or watery bowel movements, is usually brought on by gastrointestinal infections caused by viruses, bacteria, or parasites. The specific germs that cause diarrhea can vary among geographic regions depending on their level of sanitation, economic development, and hygiene (1). Developing countries with poor sanitation or where human waste is used as fertilizer often have outbreaks of diarrhea when intestinal bacteria or parasites contaminate crops or drinking water. Despite global success in the reduction of all cause and diarrhea a specific mortality in the past 30 years, diarrhea remains the second leading cause of death due to infections among children under five years of age worldwide (2). It is estimated that diarrhea accounted for 9.9% of the 6.9 million deaths among children under 5 in 2011 (4). Several organisms have been implicated as important causes of these deaths (5), yet there has not been a review using standardized methods to determine the importance of all of the common pathogens. In developed countries, including the United States, diarrhea outbreaks are more often linked to contaminated water supplies, person-to-person contact in places such as child-care centers, or food poisoning. In general, infections that cause diarrhea are highly contagious. Most cases can be spread to others for as long as someone has diarrhea, and some infections can be contagious even longer (6). Diarrheal infections can be spread through, dirty hands, contaminated food or water, some pets, direct contact with fecal matter from dirty diapers or the toilet. Anything that the infectious germs come in contact with can become contaminated. This includes toys, changing tables, surfaces in restrooms, even the hands of someone preparing food. Kids can become infected by touching a contaminated surface, such as a toilet or toy, and then putting their fingers in their mouth (7). Limited data on enteropathogens causing diarrhea among young children are available. The objective of the present study was to evaluate the aetiological cause of diarrhea in young children hospitalized for acute gastroenteritis.

## 2. Material and Methods

This is a retrospective study. A total of 345 cases with diagnosis of acute diarrhea mainly in children below 5 years of age admitted at tertiary care Pediatric hospital in University center "Mother Theresa" over the period 2011-2013 were included in the study. Medical history, diarrhea symptoms, treatment prior to hospitalization and demographics were obtained from medical records. Stool samples were collected and analyzed for parasites, rotavirus and enteric bacteria.

## 3. Statistical Analysis

Data analysis was performed using statistical software SPSS 16. Categorical variables are presented with their absolute and relative frequency. The  $\chi^2$  and Fisher's exact test were used to compare the percentages of categorical variables. A p value  $\leq 0.05$  was considered statistically significant.

## 4. Results and Discussion

Samples were collected from 345 children with diarrhea. The mean age of children with diarrhea was  $20.3 \pm 28.8$  (SD) months. One hundred ninety-one children (55.4%) were boys. 181 (52.5%) were younger than 12 months of age, 132 (38.3%) were between 1 and 4 years of age and 32 (9.3%) were elder than 4yrs of age (table 1). 16 (4.6%) of patients live in no good conditions, 129 (37.4%) live in moderate conditions and 200 (58%) of patients live in good conditions. Of the 345 samples examined, 181 (53.3%) were positive for at least one pathogen: bacterial pathogens were isolated from 11 (3.2%) samples, parasites from 51 (14.8%), and rotavirus from 122 (35.8%) (fig. 1).

Rotavirus was detected in all age groups, ( $p=0.4$ ). Eight out of 11 bacterial (72.7%) pathogens were *Salmonella enteritidis* isolated in children above one year of age and 3 pathogens were *Pseudomonas aeruginosa* isolated in children less than one year. The prevalence of intestinal

parasites *Giardia lamblia* (4.6%), *Entamoeba histolytica* (8.4%), *Cryptosporidium spp.* (1.7%) was significantly higher among children 1-4 years of age, ( $p=0.01$ ). The average number of days of admission was  $5.1 \pm 2.3$  days. Watery diarrhea was the most common consistency found in all stools. Vomits (87.5%), fever (80%) and cough (19.1%) were the most frequent clinical finding in children, independent of having had an enteropathogen isolated. Mild diarrhea was found in 38 (11%) patients, moderate in 292 (84.7%) patients and severe in 15 (4.3%) patients (fig. 2). In 87 (25.2%) of children this was a single episode of diarrhea whereas the majority of children 238 (69%) had repeated episodes of diarrhea. The highest percentage of rotavirus positivity is observed in January (52%), May (50%) and November (50%) (fig. 3).

The seasonal distribution demonstrates that rotavirus associated diarrhea is more frequent during winter (42.2%) and spring (40.4%) seasons, bacterial diarrhea is more frequent in summer (4.9) and winter (4.8) whereas parasitic diarrhea is more frequent in autumn (13.8%) and summer (12.3%) (fig. 4). This study was designed to evaluate the etiology of diarrhea among young children admitted to hospital. In this study, at least one pathogen was isolated from 53.3% of the stools of patients with diarrhea so, half of the cases of acute pediatric gastroenteritis studied are related to the presence of a known pathogen. Various factors may account for such a difference supporting the existence of a large number of undiagnosed pathogens causing gastroenteritis, despite the significant advances made in diagnostic methods and techniques (8). In our study, rotavirus were the most frequent agent detected in 35.4% of stool specimens, confirming its role in diarrhea during childhood. This percentage is lower compared with previous studies carried out in developing countries (9). Rotavirus was detected in all age groups, ( $p=0.4$ ). 72.7% of bacterial pathogens were *Salmonella enteritidis* isolated in children above one year of age and 3 pathogens were *Pseudomonas aeruginosa* isolated in children less than one year. The frequency of enteric parasites found in our study (14.8%) is similar to that reported in other studies (10). It is well-documented that parasites such as, *Giardia lamblia*, *Entamoeba histolytica*, *Cryptosporidium spp.* are a cause of diarrhea. Vomiting was frequent in the vast majority of children regardless the presence of a pathogen. The data from this study showed that 25.2% of children this was a single episode of diarrhea whereas the majority of children (69%) had repeated episodes of diarrhea. Viral diarrhea, mainly occurred during winter and spring. As in our study, many other studies report that hospitalizations with diarrhea follow a seasonal pattern, with admissions peaking from January–March, in May, and around October (11,12). The epidemiologic data suggest that there is an age dependency in the isolation of parasites, and bacteria being more frequently isolated in older children. This could be because of the fact that children older than 12 months of age are in permanent contact with soil and thus more prone to infection.

## 5. Conclusion

Child-care facilities appear to provide daily opportunities for exposure and transmission of bacteria, viruses and parasites

(13). Feeding habits can also play a role in infection and could be the reason why bacteria tends to be more frequently isolated from children younger than 12 months of age (14). Etiologic data on diarrheal diseases and are important tools for clinical management and control strategic planning.

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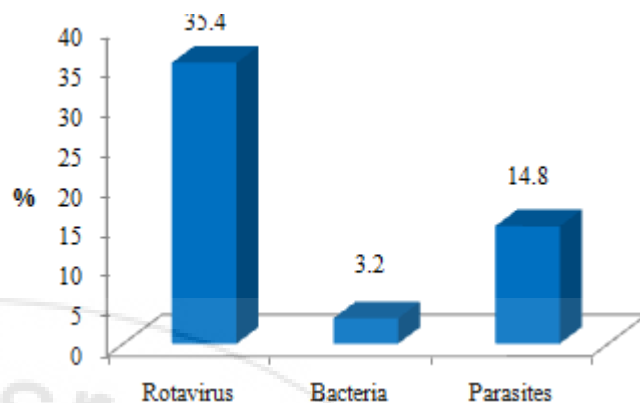
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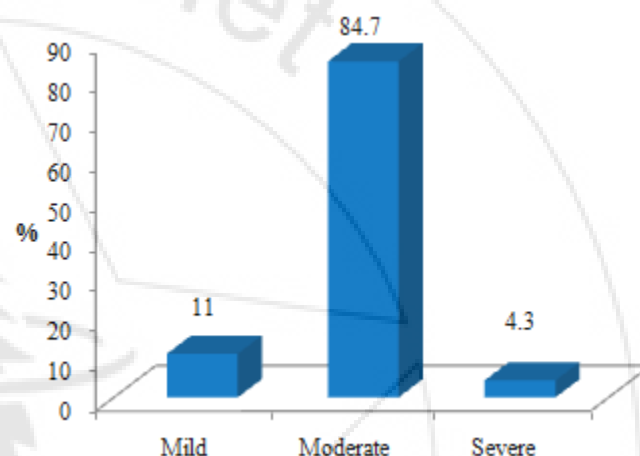
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**Table 1:** Sociodemographic characteristics of study participants

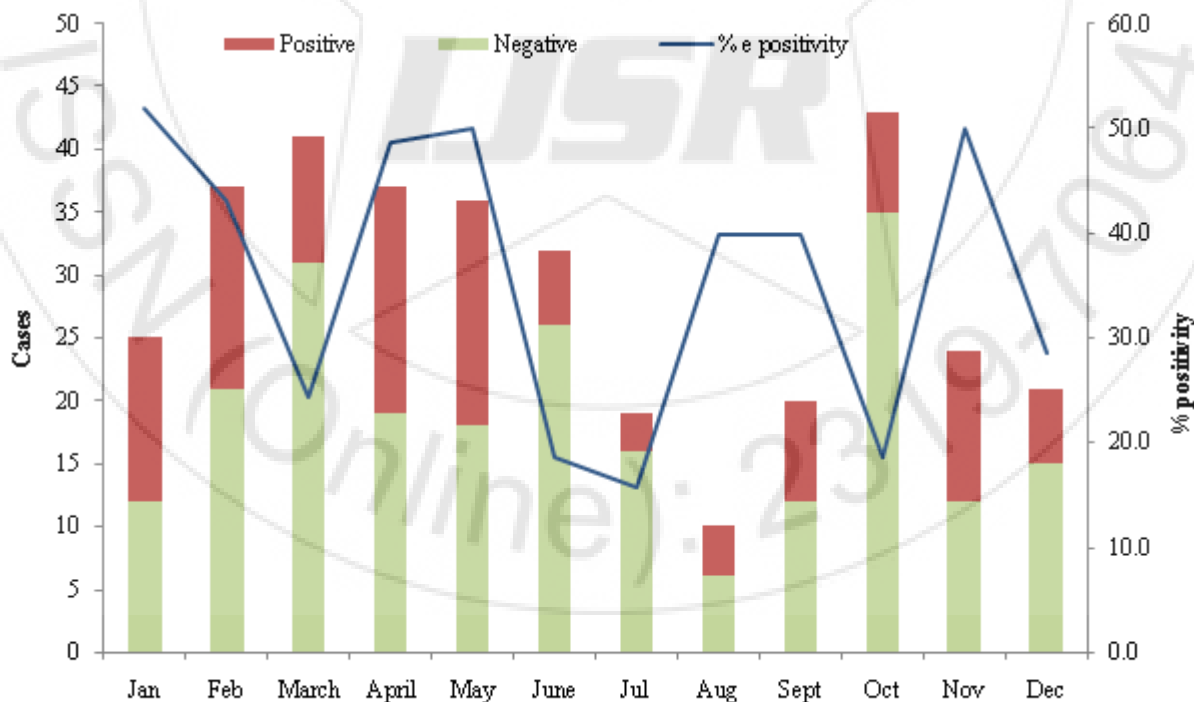
	N	%
<b>Gender</b>		
Female	154	44.6
Male	191	55.4
<b>Age, M (SD)</b>		
<b>Agegroup, months</b>		
<3	33	9.6
3-5	55	15.9
6-8	49	14.2
9-11	44	12.8
12-23	85	24.6
24-35	33	9.6
36-47	13	3.8
48-59	7	2.0
>60	26	7.5
<b>Residence</b>		
Rural	251	72.8
Urban	94	27.2
<b>Living conditions</b>		
Good	16	4.6
Moderate	129	37.4
Bad	200	58.0
<b>Parents' education</b>		
University	51	14.7
High school	246	71.2
Elementary	37	10.6
None	12	3.5



**Figure 1:** The etiologic causes of acute diarrhea among pediatric patients



**Figure 2:** The degree of severity of diarrhea



**Figure 3:** Rotavirus positivity percent by month

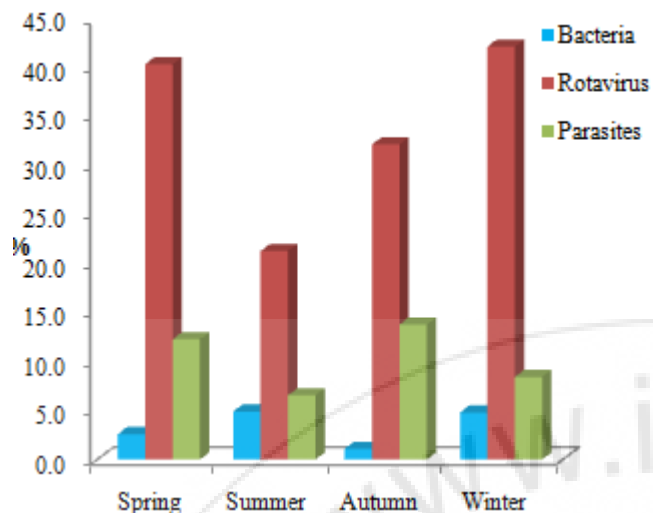


Figure 4: Seasonal distribution of diarrhea according to etiologic cause

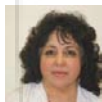
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