

Clinical and Epidemiological Aspects of Children Hospitalized with Severe Rotavirus-Associated Gastroenteritis in Salvador, BA, Brazil

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Little is known about the epidemiology of severe rotavirus-associated gastroenteritis in Brazil. Given the morbidity associated with this condition and the importance of having detailed knowledge about the impact of rotavirus infection on the epidemiology of acute diarrhea in children, especially those with the most severe diarrheal conditions, we retrospectively reviewed the medical records of all pediatric patients admitted to a tertiary hospital in Salvador, Brazil, due to rotavirus-associated gastroenteritis during one year. It was observed that rotavirus was responsible for 15.6% of the hospitalizations caused by diarrhea and/or vomiting during the period of the study and that 87 of 218 (39.1%) patients seen at the emergency room with rotavirus-associated gastroenteritis needed to be hospitalized, comprising the population of our study. Most patients presented signs of dehydration, and 41% of them had metabolic acidosis. Most patients (79%) were between six months and four years of age and 72% of the cases occurred in June and July. Gastrointestinal symptoms were rarely present at the beginning of the clinical presentation, and they normally did not last for more than one week.

Key Words: Rotavirus, acute diarrhea, epidemiology, children.

Rotavirus is a very common cause of acute diarrhea in children worldwide, chiefly affecting children younger than five years and accounting for over 800,000 deaths yearly [1,2]. Clinical presentation of rotaviral disease ranges from asymptomatic to severe dehydration pictures due to the intensity of diarrhea and vomiting; however, little is known about the prevalence and clinical outcome of the severe cases.

Given the importance of rotavirus infection for the epidemiology of acute childhood diarrhea and the fact that improved hygiene conditions fail to decrease the incidence of rotavirus-associated diarrhea, a vaccine

against rotavirus has been intensely researched; but the first vaccine against rotavirus was withdrawn from the market few months after becoming commercially available due to an association with intestinal intussusception [3]. Another safer and efficacious vaccine against rotavirus is already available in several countries, including Brazil, and more data about the impact of rotavirus infection on the epidemiology of acute diarrhea in children, especially in the most severe cases, is needed to support massive vaccination.

We examined the epidemiological and clinical aspects of rotavirus-associated gastroenteritis in children admitted to a tertiary hospital in Salvador, Brazil.

Material and Methods

We made a retrospective study by examining the medical records of all patients aged 0 to 19 years-old

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admitted to the Centro Aliança de Pediatria, Hospital Aliança, Salvador, Brazil, because of severe rotavirus-associated gastroenteritis between November 2003 and November 2004. Data about the age and sex of the patients, along with the clinical features, was gathered at hospital admission and during the hospitalization period.

Fresh stools were collected soon after the first consultation in the emergency room. All samples were cultured to exclude the presence of enteropathogenic bacteria, i.e. *Shigella spp.*, *Salmonella spp.*, *E. coli* and *Campylobacter spp.*, according to the protocols of the microbiology laboratory of the Aliança Hospital, as described elsewhere [4]. The samples were tested for the presence of Rotavirus antigens with a commercially available enzyme immunoassay kit (Rotaclone, Meridian Diagnostics, Cincinnati, USA). Rotavirus-associated illness was diagnosed only in patients who had rotavirus antigens detected in the stools and negative stool cultures.

Results

During the study period, 218 patients seen at the emergency room of Centro Aliança de Pediatria with diarrhea and/or vomiting had rotavirus antigens detected in their stools, 131 (60.9%) of which were sent home after oral rehydration, symptomatic medication and observation. The remaining 87 (39.1%) were admitted to the hospital after these procedures, and they constitute the population of our study. Diarrhea and/or vomiting motivated 558 out of 2,105 (26.5%) hospital admissions during the study period. Thus, rotavirus accounted for 15.6% of the admissions related to diarrhea and/or vomiting and 4.1% of all admissions to our hospital during the study period.

Forty-six out of the 87 (53%) patients were male. Most patients were between six months and two years of age (Table 1) and most admissions related to rotavirus-associated gastroenteritis (63 out of 87, or 72%) occurred in June and July (Figure 1).

Diarrhea, vomiting and fever were the commonest symptoms (Table 2). Most patients (74; 85%) presented diarrhea exclusively between the second and the sixth days

of illness, whereas only seven (8%) presented it on the first day, and six (7%) persisted with diarrhea after the seventh day. The greatest incidence of vomiting occurred on the second and third days of illness, but eight (9%) children still presented that symptom on the sixth day. Seventy-two (83%) patients had fever, while 15 (17%) had no fever throughout the course of the disease. Most patients (49; 56%) only had fever between the first and third days after admission, while 20 (23%) had fever after the third day and eight (9%) after the fourth day.

Clinical signs of dehydration were observed in 75 (86%) patients either upon admission or during the hospital stay, while metabolic acidosis was documented in 36 (41%) patients. Only four (5%) patients had hypoglycemia and one (1%) had to be admitted to the intensive care unit because of hypovolemic shock.

Discussion

The association between rotavirus infection and severe acute diarrhea is controversial. A large proportion (39%) of the patients seen at the emergency room with rotavirus-associated gastroenteritis needed to be admitted to the hospital; this may be considered an indicator of severity. Several other studies that considered hospital admission as an indicator of severity reported that rotavirus-associated diarrhea was often more severe than the diarrhea caused by other enteropathogens [5-9]. We also observed that 15.6% of the admissions related to diarrhea and/or vomiting during the study period were associated with rotavirus-infection, suggesting that other pathogens also cause diarrheal symptoms that require hospital admission. Reports from several other countries suggest a more relevant role of rotavirus in hospital admissions caused by acute gastroenteritis in children younger than five years [5,6,10-13]. This is probably due to improved hygiene conditions offered to those populations, which decreases the exposure of those patients to more aggressive enteropathogens, such as invasive bacteria.

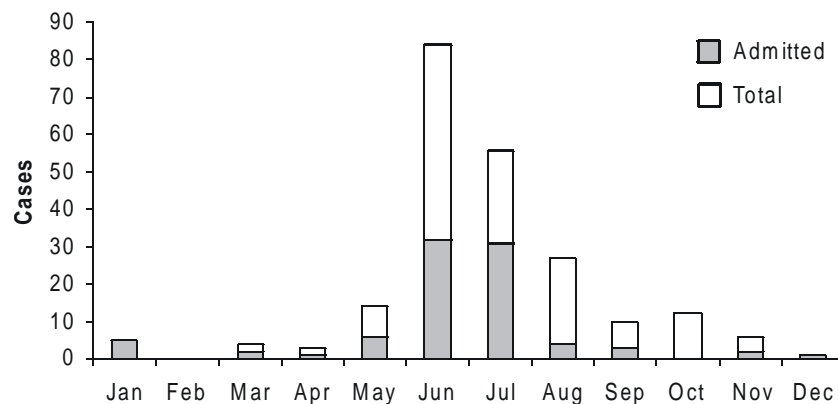
Several studies that adopted dehydration as an indicator of severity have reported that rotavirus-associated acute diarrhea is not associated with severe

Table 1. Age distribution of the patients admitted to the hospital with acute gastroenteritis and with rotavirus antigens detected in the stools

Age	N
< 6 months	7 (8%)
6 months to 2 years	56 (64%)
2-4 years	13 (15%)
> 4 years	11 (13%)

Table 2. Symptoms most frequently reported by patients admitted to the hospital with acute gastroenteritis and with rotavirus antigens detected in the stools

Symptom	N
Diarrhea	86 (98.8%)
Vomiting	83 (95.4%)
Fever	72 (82.7%)
Anorexia	44 (50.6%)
Malaise	39 (44.8%)
Abdominal distention	31 (35.6%)
Abdominal tenderness	20 (23.0%)

Figure 1. Monthly distribution of the cases admitted to the hospital with acute gastroenteritis and with rotavirus antigens detected in the stools.

dehydration [14-17]. We found that most of our patients presented signs of dehydration, as expected in patients requiring hospital admission. Additionally, 41% of our patients had metabolic acidosis, suggesting severe dehydration. The interpretation of that finding,

however, is clouded by the lack of a control group composed of patients admitted because of diarrhea caused by other pathogens.

We observed that only a small part of the patients presented diarrhea at the onset of the illness and that it

rarely lasted for more than a week. Likewise, vomiting was also rare at the onset of illness, in consonance with the pathophysiology of rotavirus-associated diarrheal disease, which becomes more intense as the infected cells are replaced by immature enterocytes.

In spite of the tropical climate in Salvador, the seasonal distribution of rotavirus-associated gastroenteritis cases seen at the emergency room and admitted to the hospital followed the pattern reported from cooler climate countries, with a great concentration of cases during the winter or during the rainiest months of the year; this disease rarely being detected in the summer.

Most of the patients in our study were under four years of age, and 79% of them were between six months and four years. These data reinforce the importance of early prevention, suggesting that if vaccination is to be adopted it should be administered during the six first months of life in order to have a significant impact on public health indicators. Another important risk factor for rotavirus gastroenteritis is early weaning; mothers should be encouraged to avoid this practice. Additionally, it is crucial to have diagnostic tools that allow early differentiation between severe viral and invasive bacterial diarrheas, most importantly in young infants. Preventive measures against nosocomial rotavirus infection must also be emphasized, since this is an important nosocomial infection in pediatric patients.

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