FREQUENCY OF ROTAVIRUS INFECTION IN CHILDREN WITH ACUTE DIARRHEA

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Abstract

Objective: To determine the frequency of rotavirus infection in children admitted to the Military Hospital Rawalpindi with acute watery diarrhea.
Study Design: Descriptive study
Place and duration of study: Department of Pediatrics Military Hospital Rawalpindi, in collaboration with Virology department of Armed Forces Institute of Pathology, Rawalpindi from January to June 2007.
Patients and Methods: a total of 200 patients of acute watery diarrhea in age group 3 months to 5 years were included. After taking informed consent, stool samples were taken and tested for rotavirus (group A) antigen by Latex Agglutination. Results were entered in pre-designed proformas.
Results: Out of 200 patients with acute watery diarrhea ninety eight (49%) were male and 102 (51%) were female with mean age of 14.8 months (SD ± 9.1). Rotavirus serology was positive in 62 patients (31%). Among Rotavirus positive, 35 patients were male (56.5%) and 27 were female (43.5%) with mean age of 17.2 months (SD ± 8.8). The peak age was between 13-24 months. Among rotavirus positive patients 60% had some dehydration while 40% had severe dehydration as compared to 55% and 19% respectively in patients negative for rotavirus (p-value=<0.05). Average number of loose stools was 10 stools per day (SD + 9.2) in rotavirus positive cases as compared to 8 per day (SD + 8.5) in negative cases (p-value=<0.05). More than 96% patients with rotavirus presented with vomiting as compared to 62% patients who were negative for rotavirus. Fever was present in more than 93% of the patient with rotavirus disease while only 33% patients were febrile in the rotavirus negative group (p-value=<0.05).
Conclusion: Rotavirus is an important cause of acute watery diarrhea resulting in severe diarrhea and vomiting leading to subsequent dehydration. As this study estimated only burden of Group A rotavirus, overall burden of all serotypes is expected to be much more.

Keywords : Acute watery diarrhea, Rotavirus, Rota vaccine.

Article

INRODUCTION

Diarrhea is one of the leading causes of morbidity and mortality in young children less than 5 years of age throughout the world1. Among various causes, viruses especially rotavirus is the most prevalent cause of diarrhea. It is responsible for 20-50% cases of acute gastroenteritis with 527,000 deaths annually; mainly in developing countries2. A multicenter study conducted by World Health Organization Diarrhea Disease Control (CDD) program in five developing countries, including Pakistan, showed rotavirus to be the most frequent pathogen detected in diarrheal episodes3. Rotavirus is a double stranded RNA virus4. It is divided into various groups and serotypes depending on the antigenic properties of capsid protein. There is great geographical variation among different types with G1 and P8 the most prevalent strains of group A rotavirus worldwide5. It mainly affect children less than 2 years of age with male predominance6. It mostly occurs in winter months7. It is transmitted by feco-oral route,8 so outbreaks are common as nosocomial infections in hospitals and day care centers9. It presents with loose watery stools, vomiting, fever and dehydration and is associated with more severe illness in comparison with other viral causes of gastroenteritis10.

Rotavirus is detected in stool sample by latex agglutination, Enzyme Linked Immunoassay and Polymerase Chain Reaction11. It causes a self limiting illness with no role of anti-diarrheal, antiviral or antibiotic therapy12. Rehydration and maintenance of proper fluid and electrolyte balance remains

the mainstay of treatment13. A live oral vaccine was introduced in 1998 but its use was abandoned due to its association with intussusception14. A live oral pentavalent rotavirus vaccine has been approved in 2006. Various studies have proved that substantial protection is provided by three doses of vaccination against severe rotavirus gastroenteritis15. In a study of >70,000 infants, this vaccine did not increase the risk for intussusception16.

The objective of this study was to determine the frequency of rotavirus infection in children admitted with acute diarrhea at Military Hospital Rawalpindi which would help the assessing rotavirus associated disease burden in our setup.

PATIENTS AND METHODS

This descriptive study was conducted over a period of six months at Pediatric department of the Military Hospital, Rawalpindi in collaboration with Virology department of Armed Forces Institute of Pathology from January to June 2007. During this 6 months period, 200 cases of acute watery diarrhea in age group 3 months to 5 years admitted in children ward of Military hospital Rawalpindi were selected by nonprobability convenience sampling. All those children who had bloody diarrhea or had taken treatment for gastroenteritis were excluded.

Informed consent was obtained from parents of children for enrollment in the study. Detailed history and physical examination was carried out. Hydration status was assessed according to World Health Organizations guidelines. Appropriate rehydration started and a fresh stool samples were collected in sterile plastic container. Stool samples from the patient with no evidence of pus cells and red blood cells were re-collected the next morning and dispatched to Virology department of Armed Forces Institute of Pathology within 2-3 hours of collection for detection of rotavirus by commercially available Latex agglutination kit by Far Diagnostics. Standard procedure was followed and the result was interpreted positive when agglutination (clumping) occurred in the Test Latex reagent, while the Control Latex reagent remained smooth and free of agglutination.

Data was analyzed using SPSS version 10. Mean and standard deviations were calculated for all quantitative variables like age. The frequency and percentage were calculated for qualitative variable like gender, fever, vomiting and dehydration. Peak age was measured using mode in frequency distribution of age (children were divided into 5 age groups). Test of significance was applied for comparing frequency of loose stools, fever, vomiting and degree of dehydration in patients who were positive for rotavirus with those who were negative. The results were expressed in the form of tables, pie charts and bar diagrams.

RESULTS

Out of 200 patients with acute watery diarrhea, 98 were male (49 %) and 102 were female (51%). Mean age was 14.8 months (SD ± 9.1). Rotavirus serology was positive in 62 patients (31%) while 138 patients (69%) tested negative. Among Rotavirus positive patients 35 were male (56.5%), and 27 were female (43.5%) and the mean age for the group was 17.2 months with SD of 8.8 as depicted by histogram (Figure 1).

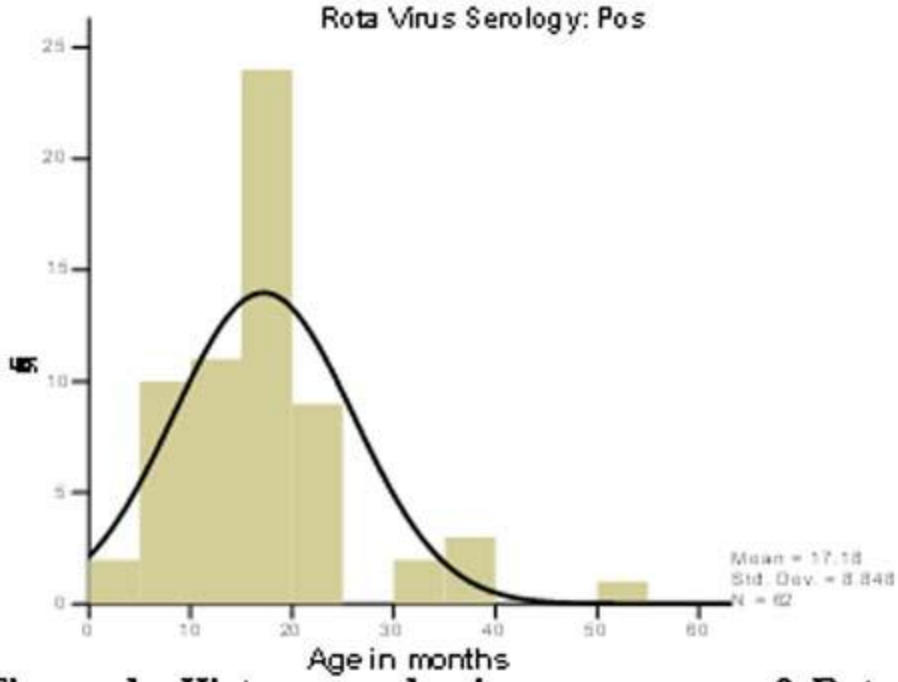

Figure 1: Histogram showing mean age of Rotavirus positive cases.

The peak age was found to be between 13-24 months.

Among rotavirus positive patients 60% had some dehydration while 40% had severe dehydration as compared to 55% and 19% respectively in patients negative for rotavirus (Figure 2).

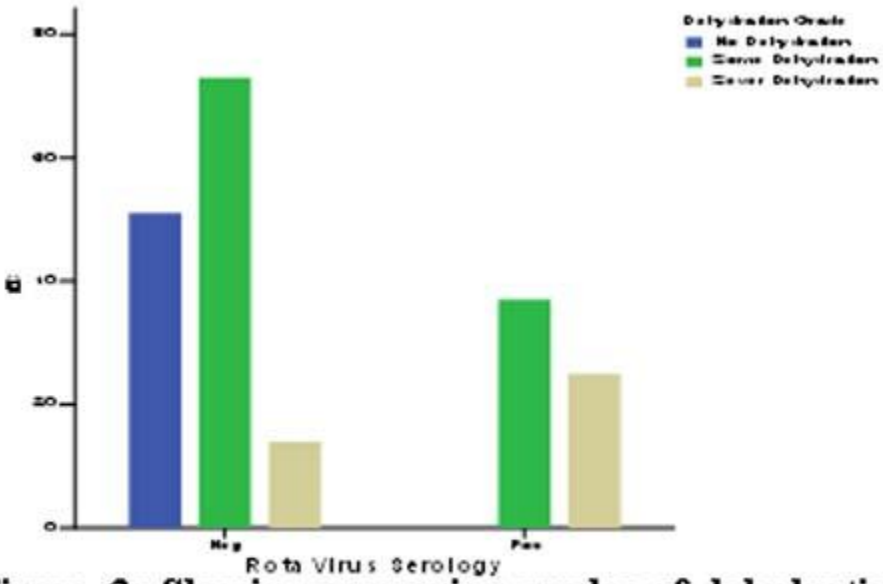

Figure 2: Showing comparing grades of dehydration in patients with rotavirus with those negative for Rotavirus.

This was found to be statistically significant (p-value=<0.05). Average number of loose stools was 10 per day (SD + 9.2) in rotavirus positive cases as compared to 8 per day (SD + 8.5) in negative cases.

Vomiting was more frequent among Rota virus positive group (96%) as compared to negative group (62%) with p-value <0.05. Fever was present in 104 (52%) patients with a frequency of more than 93% in those who were positive for rotavirus (p-value=<0.05). (Table)

Table: Frequency of vomiting and fever in patients with Rotavirus in

	Vomiting		Fever	
	Present	absent	present	absent
Rotavirus positive (62 patients)	60	2	58	4
Rotavirus negative (138 patients)	86	52	46	92

Comparison to patients negative for Rotavirus

DISCUSSION

Rotavirus is the single most common cause of acute watery diarrhea worldwide, leading to subsequent hospitalization18. A study done in Russian states by Mirzayeva et al19. has reported that 33 % cases of diarrhea were due to rotavirus. An Indian study has reported 39% positivity for rotavirus in children with acute diarrhea20. A study done at a tertiary care hospital in Rawalpindi, Pakistan showed prevalence of 38%21. In our study rotavirus was found to be positive in 31% of the patients admitted with acute diarrhea. The results are close to both regional and international studies. The slightly high detection rate found in Rawalpindi General Hospital study is probably due to different laboratory method used, as Enzyme Linked Assay is more sensitive than latex agglutination11.

World wide studies have shown that rotavirus affect male gender more than female.7 A study done at Myanmar showed rotavirus to be present in 62% of the male patients22. These results are consistent with our results.

Rotavirus can affect children of any age group but usually shows age dependant susceptibility. A study conducted in hospitalized children in Switzerland showed peak age between 13-24 months23. Another study in Saudi Arabia revealed that infection with rotavirus was more frequent among infants and children < 2 years old6. In our study the peak age group was also between 13 - 24 month (64.5%) which is consistent with other studies.

Clinically rotavirus infection presents with vomiting and fever followed by diarrhea. Rotavirus diarrheal episodes always tend to be more acute, causing vomiting and dehydration and more often require hospitalization24. Our study also showed that about 96% patients with rotavirus had vomiting as compared to 62% patients who were negative for rotavirus.

A study done by Narkeviciute and Tamusauskaite25 showed that about 97% patients with rotavirus gastroenteritis had fever. In our study fever was present in more than 93% of the patient with rotavirus disease while only 33% patients were febrile in rotavirus negative cases.

Intensive diarrhea more frequently appeared in children with rotavirus infection than with other viral causes of gastroenteritis10. In our study the frequency of loose stool was 10-12 episodes per day, which is consistent with other studies. A study done in hospitalized children at India has showed that all patients who were positive for rotavirus were dehydrated, 70% had moderate and remaining 30% had severe dehydration26. Our study result is compatible with this study as frequency of dehydration was more in patients with rotavirus disease as compared to other patients. Among positive cases 60% were having some dehydration and 40% had severe dehydration as compared to 55% and 19% respectively in patients who were negative for rotavirus.

Our study showed that presence of more intense diarrhea, increased frequency of fever and vomiting and presence of more severe dehydration in patients with rotavirus disease were statistically significant (p-value <0.05). This study, though conducted on a smaller scale, can provide basis for further studies on a larger scale, which can prove the increased frequency of Rotavirus in children beyond doubt. By including rotavirus vaccination in immunization schedule, we can reduce the incidence, as well as morbidity and mortality, of rotavirus infection in our children.

Conclusion

Rotavirus was detected in significant number leading cause in less than 5 years age group. Clinically it was associated with more severe diarrhea, vomiting and dehydration.

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