

Prevalence of Rotavirus Diarrhoea among Childrens in Akola

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Abstract

The present study was conducted to understand the current prevalence of rotavirus diarrhoea in Akola District. Latex Agglutination test was used to detect rotavirus in the stools of 228 patients presenting with diarrhoea. Rotavirus was detected in 50.4% (115/228) samples with male predominance and winter peak positivity. The second half of infancy had the peak of rotavirus diarrhoea infection. The average age of rotavirus diarrhoea male and female cases taken together was 13.55 ± 0.3266 months, the median age being 12 months. The minimum age of rotavirus infection was found to be 3.5 months and maximum age, 30 months. The standard deviation of rotavirus diarrhoea patient's age was 4.935 with coefficient of variation 36.42% and interquartile range of 4.187 months. The moderately high incidence of rotavirus diarrhoea in the present study confirms the immense importance of rotavirus diarrhoea with regard to public health.

KEY WORDS: *Rotavirus, prevalence, diarrhoea, latex agglutination.*

Introduction:

Rotavirus is the most common cause of severe diarrhoea in young children worldwide.¹ An estimated 600,000 children worldwide die each year from rotavirus gastroenteritis, 80 percent of whom live in developing countries. Worldwide rotavirus causes nearly 2 million hospitalizations each year.

Rotavirus is transmitted by fecal oral route via contact with contaminated hands, surfaces and objects² and possibly the respiratory route.³ Rotavirus gastroenteritis is a mild to severe disease characterized by vomiting, watery diarrhoea and low grade fever.⁴ Symptoms often start with vomiting followed by 4 to 8 days of profuse diarrhoea. Dehydration is more common in rotavirus infection than in most of those caused by bacterial pathogen, and is the most common cause of death related to rotavirus infection.⁵ Sanitary measures adequate for eliminating bacteria and parasites seem to be ineffective in control of rotavirus as the incidence of rotavirus infection in countries with high and low health standards is similar.³ So further improvements in hygiene are unlikely to prevent the disease. Rotavirus is a relatively "new" disease only clinically discovered in 1973. Since then it has taken many years to get

a sound estimate of the disease burden and complete accurate data from Asia and Africa are still needed.

A number of Indian studies have established the high prevalence of pediatric gastroenteritis in India.⁶⁻¹⁰ With an aim to understand the current prevalence of rotavirus cases in Akola district we undertook the retrospective analysis of pediatric stool samples. The determination of the prevalence of rotavirus infection is expected to contribute to the information we have about epidemiology of rotavirus infection in our country.

Materials and Method:

The present study was conducted at Biochemistry Department of Shri Shivaji College, Akola between October 2008 and March 2010. Children below 30 months of age suffering from acute watery diarrhoea admitted in various pediatric hospitals of Akola district were enrolled for study.

Sample collection:

Stools were collected preferably within 24 hours of the patients hospital stay for detection of rotavirus antigen. Containers used were

wide mouth, clean transparent plastic bottles that were labeled properly before sample collection. Demographic data like age, sex, date of admission of patient was also recorded.

Rotavirus antigen detection:

Rotavirus antigen was detected in stool specimens by using rotavirus latex test kit which was procured from Plasmatec Laboratory Products Ltd. (U.K.). Test was carried out according to manufacturer's instructions. The kit uses the principle of slide agglutination and claims a sensitivity and specificity of 97.2% and 97.1% respectively when compared with Polymerase Chain Reaction (PCR)

Statistical analysis:

Mann-Whitney U test was used to test the difference between the prevalence of rotavirus and nonrotavirus diarrhoea amongst sex. The difference between the male and female rotavirus diarrhoea cases was tested with "t" test.

Results & Discussion:

In the present study, a total of 228 diarrhoea cases were identified. Rotavirus was identified in 115 (50.4%) of 228 studied specimens. An overall male predominance was observed in both rotavirus as well as non rotavirus diarrhoea cases. Amongst the rotavirus diarrhoea cases, males were 83 (72%) and females were 32 (28%). The test was significant at ($P= 0.01$) with Z value 12.15. Amongst the non rotavirus diarrhoea cases, males were 74 (65%) and females were 39 (35%) out of 113. The Z value was 7.32, significant at ($P=0.01$). Male female ratio observed in rotavirus diarrhoea group was 2.59:1 and that of nonrotavirus diarrhoea group was 1.89:1.

The difference between male and female rotavirus positive was tested with 't' test. The mean age of rotavirus positive males were 13.93 ± 0.5610 and females were 12.63 ± 0.7550 . It was non significant (t value = 1.07). The average age of rotavirus diarrhoea male and female cases taken together was 13.55 ± 0.3266 months, the median age being 12 months. The minimum age of rotavirus infection was found to be 3.5 months and maximum age, 30 months. The standard deviation of rotavirus diarrhoea patient's age was 4.935 with coefficient of variation (CV) = 36.42% and interquartile range of 4.187 months. (Table1).

An analysis for the age of children positive for rotavirus showed a significant increase in infection among children who are one year of age or less 54.8% (63/115) compared to those who are above one year of age 45.2% (52/115). The second half of infancy had the peak of rotavirus diarrhoea infection. The incidence of rotavirus diarrhoea was low during first 6 months of life and peaked at the age of 7 to 12 months and decreased sharply after 18 months (Fig. 1). A distinct peak of rotavirus infection was seen during winter season (Fig 2).

Indian studies have shown a wide range of rotavirus prevalence ranging from 4 to 62.6%^{6, 8, 9, 11, 12}. In the present study there was 50.4% prevalence of rotavirus. Differences of prevalence rate can be attributed to differences in age groups studied, detection method used, geographical location and the season^{6, 8, 9, 11, 12}. When the prevalence of rotavirus is considered in relation to sex, the results obtained here agree with those reported in previous studies which observe a significant difference between genders with higher positivity rates among males¹³⁻¹⁶.

In the present study, a lower proportion of infection was observed in infants younger than 6 months and in children older than 2 years. Infection is not infrequent in neonates, but they seldom develop diarrhoea, perhaps because of maternal passive immunity. On the other hand a lower proportion of infection observed in children older than 2 years is perhaps, owing to the fact that most of the children older than 2 years have already contact with the virus, with the consequent acquisition of immune response.^{17,18} The frequency of infection was higher among 7 to 18 months old children. Other studies too have shown higher occurrence of infection in these age range possibly reflecting the socio economic-sanitary conditions of the population.^{13, 19, 20}

Previous studies from India have reported that the disease occurs year-round²¹⁻²⁵. Those studies found either a peak in the occurrence of rotavirus disease in winter^{21, 22} the occurrence of two peaks in a year.^{23, 24} or no seasonal pattern.²⁵ In the present study, we observed that a very few cases of diarrhoea are reported before the onset and at the end of winter, but we identified a distinct peak of rotavirus infection in winter (i.e. from November through January) (fig. 2) during which the disease occurs in the form of epidemic. Hospitalizations for diarrhoea occur year round in Akola. But since the present study was restricted only to winter months, the seasonal distribution pattern of rotavirus

infection in Akola remains to be assessed. This limitation of present study needs consideration.

Conclusion

The prevalence regarding age range and gender of rotavirus diarrhoea observed in present study agree with those reported in previous studies. The moderately high incidence of rotavirus diarrhoea in the present

study confirms the immense importance of rotavirus diarrhoea with regard to public health. An effective vaccine could prevent most of these hospitalizations and also save health care costs. The minimum age of infection observed was 3.5 months, prompting the need of vaccination to be carried out very early during infancy to prevent the burden of disease.

Table 1: Descriptive statistics and U test of rotavirus diarrhoea samples.

Measures of central tendency (age)		Dispersion range		Mann-Whitney U test	
AM	13.55 months (±0.3266)	S. D.	4.935	Male prevalence	83
Median	12 months	Interquartile range	4.187 months	Female prevalence	32
Minimum	3.5 months	CV %	36.42%	Z Value	12.15 **
Maximum	30 months				

** Significant at 1% level of significance.

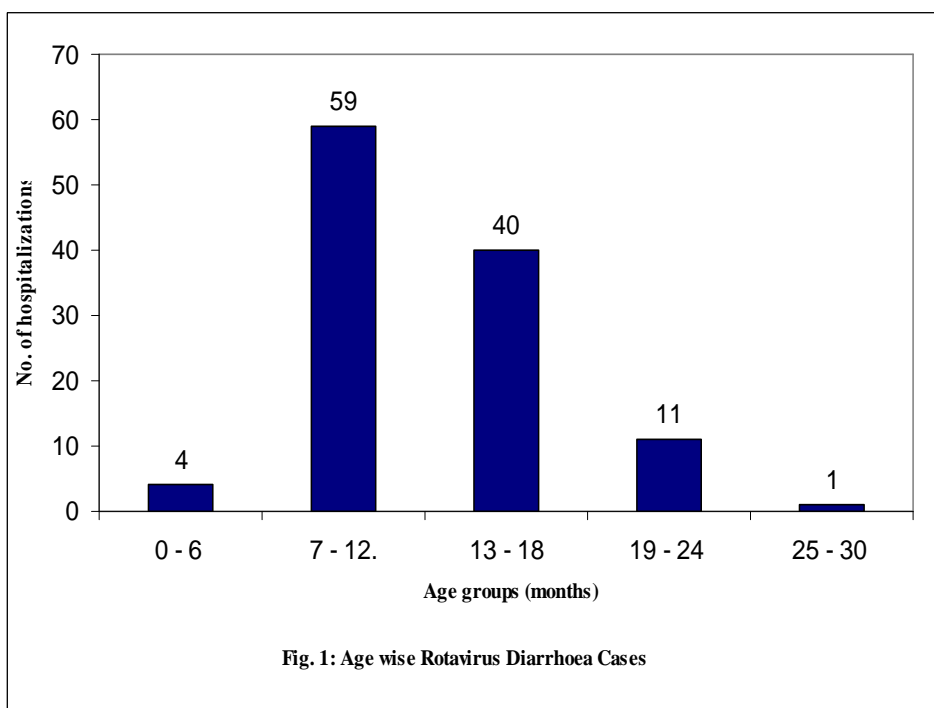


Fig. 1: Age wise Rotavirus Diarrhoea Cases

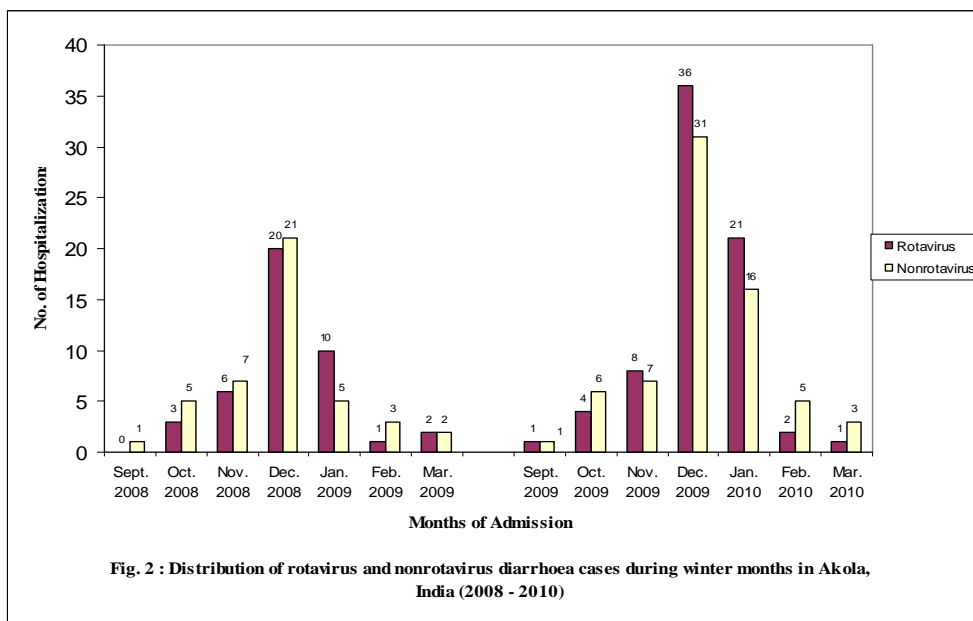


Fig. 2 : Distribution of rotavirus and nonrotavirus diarrhoea cases during winter months in Akola, India (2008 - 2010)

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