RESEARCH BRIEF

Rotavirus Infection in Children with Acute Gastroenteritis in Aurangabad, Central Maharashtra

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Objective: To determine the prevalence of rotavirus diarrhea and its genotypes in children from Aurangabad, India.

Methods: Stool samples collected during 2012-2013 from 168 children, aged ≤3 years, were tested by ELISA to detect rotavirus. Rotavirus strains were genotyped by multiplex reverse-transcription polymerase chain reaction.

Results: Stool samples from 20 (11.9%) children tested positive for rotavirus. Rotavirus positivity was higher among the children aged 0-12 months than those in 13-24 and 25-36 months. Severity of disease was moderate in both rotavirus-infected and uninfected children. Genotype G1P[8] combination was detected predominantly in circulation.

Conclusion: Rotavirus diarrhea was caused mainly by G1P[8] strains during 2012-2013 in Aurangabad, Central Maharashtra, India.

Keywords: *Acute diarrhea, Epidemiology, Etiology.*

Rotavirus is a major cause of severe diarrhea among children worldwide [1]. Studies conducted in India have established rotavirus strain diversity in the study regions [2]. Rotavirus vaccine has now been introduced in the national immunization program by Government of India. While impact of rotavirus vaccination on rotavirus disease is yet to be gauged, ongoing rotavirus surveillance continues to be crucial in pre- and post-vaccination period in India wherein diversity in climatic conditions and geographic regions is well known. The present study was performed to estimate the proportion of diarrhea due to rotavirus, and to identify the rotavirus genotypes among diarrheal children ≤3 years from Aurangabad, Central Maharashtra, India.

METHODS

The study was conducted from January, 2012 to October, 2013 in children ≤3 years, admitted or visiting outpatient department (OPD) for acute gastroenteritis in a tertiary care Government Medical College Hospital, Aurangabad, India. Institutional Ethics Committee's approval, and informed consent from parents were obtained. A case of acute gastroenteritis enrolled in the study was defined as the passage of ≥3 loose or watery stools a day with or without associated symptoms such as vomiting, fever and abdominal pain. Clinical information was obtained from each patient for assessment of severity of diarrhea [3]. Stool samples collected from all children (n=168) who fulfilled the inclusion criteria were transported on ice to National Institute of Virology (NIV), Pune and processed to detect rotavirus antigen using commercially available ELISA kit (Generic Assays, Dahlewitz, Germany).

Viral RNA extracted from all ELISA-positive stool specimens using Trizol (Invitrogen, Carlsbad, CA) was genotyped for VP7 and VP4 genes by multiplex reverse-transcription polymerase chain reaction (RT- PCR) as described earlier [4,5]. First round PCR products that remained non-amplified in the second round PCR were sequenced using ABI-PRISM Big Dye Terminator Cycle Sequencing Kit (Applied Biosystems, Foster city, CA) and a ABI-PRISM 310 Genetic analyzer (Applied Biosystems).

Data from case report forms was entered into Excel 2007 (Microsoft, Redmond, WA, USA) for analysis. Tests of proportion were applied and a P value <0.05 was considered to be statistically significant.

RESULTS

One hundred sixty-eight children who participated in the study during 2012-2013, comprised of 125 hospitalized and 43 OPD patients, with male to female ratio at 1.37:1.

TABLE I CHARACTERISTICS OF ROTAVIRUS-INFECTED AND UNINFECTED CHILDREN WITH ACUTE GASTROENTERITIS

Variables	*Rotavirus infected children (n=20) No. (%)*	*Rotavirus uninfected children (n=148) No. (%)*	*P Value*
Male Gender	14 (70)	83 (56)	0.34
Age (mo), Mean (SD)	13.1 (8.7)	16.7 (11.4)	0.07
Vomiting	9 (45)	55 (37)	0.66
Fever	8 (40)	28 (18.9)	0.06
Diarrhea duration (d), Mean (SD)	4.8 (1.7)	4.7 (1.8)	0.83
Diarrhea episodes, Mean (SD)	8.9 (4.6)	8.2 (2.7)	0.52
Vesikari score, Mean (SD)	9.6 (2.5)	9.2 (3.2)	0.54
Disease severity by Vesikari score			
Mild	0 (0)	11(7.4)	0.43
Moderate	14 (70)	89 (60.1)	0.54
Severe	5 (25)	42 (28.4)	0.98
Very Severe	1 (5)	6 (4)	0.69
Dehydration			
None	11 (55)	86 (58.1)	0.98
Some	9 (45)	61 (41.2)	0.93
Severe	0 (0)	1 (0.67)	0.23

Twenty (11.9%) children showed positivity to rotavirus antigen in the stool samples. Males showed higher (14/97, 14.4%) positivity than females (6/71, 8.4%) (P=0.34).

The mean (SD) age of children was 16.6 (11.6) months; that of rotavirus infected and uninfected children was 13.1 (8.7) and 16.7 (11.4) months, respectively (***Table* I**). Among rotavirus positive children, age group of 0-12 months showed higher score (13/20, 65%) as compared to those of 13-24 (5/20, 25%) and 25-36 months (2/20, 10%) (P=0.02 and 0.001, respectively). Rotavirus infections were detected in almost all months of the year (***Fig.* 1**).

Presence of fever, vomiting, duration and number of episodes of diarrhea and the mean (SD) Vesikari scores did not differ in rotavirus positive and negative children (***Table* I**), and a moderate severity of disease were found in both categories.

Infections with G1P[8] (12/20,60%) were most prevalent as compared to other rotavirus strains (G2P[4] (10%), mixed:G1G10P[8] (10%)). Two strains with genotype VP4 P[8] remained non-typeable for VP7 gene, while two strains were non-typeable for both VP7 and VP4 genes.

DISCUSSION

The present study reports moderate level of rotavirus diarrhea in Aurangabad during 2012-2013. During 1982-2004, 6% to 45% (median 20.8) rotavirus positivity rates were reported among diarrheal children from various parts of the country [6]. Another study carried out by Indian Rotavirus Strain Surveillance Network (IRSN) during 2005-2009 in seven different cities has documented 40% rotavirus positivity in children hospitalized for diarrhea [2]. Compared to these data, lower rate noted in our study may be attributed to the moderate severity of diarrheal disease experienced by most of the enrolled inpatients and inclusion of OPD patients in our study. The prevalence of rotavirus infection has been reported to be low in outpatients as compared to the hospitalized patients [7].

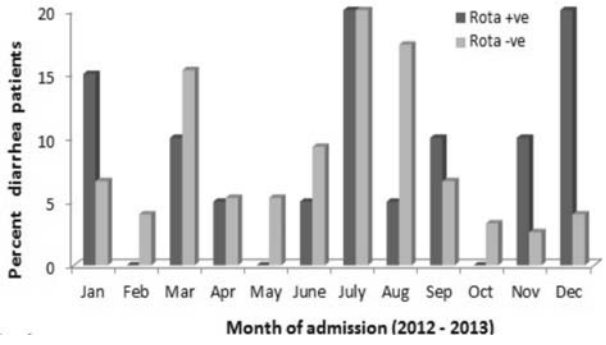

FIG. 1 *Month-wise distribution of rotavirus positivity during 2012-13.*

WHAT THIS STUDY ADDS?

- Moderate level (11.9%) of rotavirus disease with significant (60%) contribution of G1P[8] strains was seen in children (age ≤3 years) suffering from acute diarrhea in Aurangabad, Central Maharashtra.

Rotavirus positivity was noted in the months of March, July and September along with December-January known for highest proportion of rotavirus infections [8]. This may be due to the semi-arid climate described under the Koppen climate classification system for Aurangabad, central Maharashtra [9]. The high contribution of G1P[8] strain is consistent with the data reported from other regions of India recently [2,10].

Our study had a limitation of a small sample size. However, it highlights rotavirus epidemiology and strain diversity in Aurangabad, central Maharashtra. Continued surveillance of rotavirus disease and strains in this region of India would be useful to ascertain rotavirus prevalence and changing pattern, if any, in the circulating strains.

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