Hospital-based Surveillance of Rotavirus Diarrhea among Under-five Children in Chandigarh

In a prospective hospital-based surveillance of 958 under five children admitted with acute gastroenteritis in Chandigarh (May 2011 to July 2012), 239 stool samples were collected. Rotavirus antigen was detected in 18.8% of samples by reverse transcriptase polymerase chain reaction. Genotypes G1P[8] (53.3%), G12P[6] (15.6%) were prevalent, and G3 not detected.

Key words: *Epidemiology, Prevalence, Rotavirus infections.*

Aprospective hospital-based rotavirus surveillance was set up as part of a multicenteric study to estimate the prevalence of rotavirus infection and identify circulating genotypes among under-five children hospitalized with acute gastroenteritis in Chandigarh, between May 2011 to July 2012 [1].

The study was approved by the Institute Ethics Committee. All under-five children presenting with acute gastroenteritis requiring hospitalization for rehydration treatment for at least 6 hours were eligible for inclusion. Prior written informed consent was obtained from the parents.

Systematic random sampling technique was used to select children for collecting stool samples from cases. Assuming prevalence of rotavirus positivity to be 35%, sample size calculated was 216 for 6.5% precision. Under-five children admitted with acute gastroenteritis during the study period was estimated to be 1000 (based on hospital records); hence the sampling interval was calculated as 4.6, and stool samples were collected from every fifth case. A pediatrician performed the medical examination and routine assessments. The severity of diarrhea was assessed using the Vesikari scoring system [2]. Diarrheal episode was considered mild for a score of ≤5, moderate for a score between 6 and 10, severe cor scores 11 to 15, and very severe for a score ≥16. About 5 g stool sample was collected within 24 hours of enrolment and transported in cold chain for testing for rotavirus VP6 antigen using a commercial enzyme immunoassay kit (Premier Rota clone Qualitative EIA, Meridian Bioscience Inc. Cincinnati, USA). The stool samples positive for rotavirus antigen were stored at -80^0C and shipped in frozen state to Christian Medical College, Vellore for strain characterization.

Out of 958 admissions of under-five children with diarrhea, 239 stool samples were collected during study period. Rotavirus antigen was detected in 18.8% (45/239) of the stool samples. Majority (84%) of children with rotavirus diarrhea were less than one year of age. Duration of diarrhea varied from 1 to 60 days. About 36% children had a history of diarrhea for 1 day, and 23% had it for two days. The mean duration of hospital stay of enrolled children was 3.6 days. Rotavirus infection was significantly higher (58%) during colder months (November to April). (*P*<0.001). Sixty percent children with rotavirus diarrhea had severe, and 20% each had moderate and very severe dehydration. The commonest strains were combination of G1P[8] (24, 53%) and G12 P[6] (7,16%). The G1P[8] strains were associated with very severe disease. However, one case had G12 strain with very severe disease. Genotypes G1, G12, G4, P[6], P[8], P[8]P[6] were detected throughout the year while G3 was not detected. G9P[4] was identified mainly in winter months.

The burden of rotavirus diarrheal disease of 18.8% in this study is similar to previous studies from Chandigarh [3-4], but lower than documented in other parts of the country [5,6]. This study reports a trend in the emergence of G12 genotype and absence of G3 genotype from Chandigarh, which is similar to the trend observed in Delhi [7] and Manipur [8], and with that reported in a systematic review [9]. Large diversity of rotavirus strains with evolving virological characteristics is challenging for prevention of rotavirus disease by existing rotavirus vaccine, which emphasizes the need for continuous rotavirus surveillance [10].

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Immunochromatography-based Diagnosis of Rotavirus Infection in Acute Diarrhea

Documentation of rotavirus diarrhea in a rural, resource-poor setting is a difficult task. We analyzed stool samples of 103 children admitted for acute diarrhea in a pediatric hospital in Bijnor, UP, India, using a simple bedside immunochromatography kit. Rotavirus infection was detected in 47 out of total of 103 children (45.6%).

Keywords: *Dehydration, Epidemiology, Surveillance.*

Estimates suggest that India has a high burden of rotavirus diarrhea, and related mortality [1-3]. Most studies evaluating rotavirus infection used the standard diagnostic techniques like ELISA. Documentation of rotavirus disease in semi-urban and rural areas presents challenges due to non-availability of this diagnostic facility. Immunochromatography is a relatively economical bedside method to detect rotavirus infection.

This study was conducted at a pediatric hospital based in a semi-urban area in Bijnor district of Western Uttar Pradesh, India during 2010 and 2011. Rotavirus detection was performed using VIKIA Rota-Adeno kit (M/s BioMérieux) on stool samples of children less than 5 years of age, suffering from acute diarrhea and requiring hospitalization. Acute diarrheal illness was defined as occurrence of ≥3 watery stools and/or forceful vomiting, and severity was categorized as per Clarke and Vesikari

TABLE I CHARACTERISTICS OF THE STUDY PARTICIPANTS

	Rotavirus positive (n=47)	Rotavirus pegative (n=56)
Age (mo)*	7.6 (4.6)	7.8 (5.4)
Male gender, *n* (%)	38 (80.8)	38 (67.8)
Lower SES	11 (23.4)	17 (30.36)
Rural residence, *n*(%)	29 (61.7)	36 (64.3)
Diarrhea duration*	6.1 (5.3)	4.5 (4.3)
Vomiting	24 (51%)	32 (57.1%)
Severity as per Clarke scoring system		
Mild, *n* (%)	11 (23.4)	13 (23.2)
Moderate, *n* (%)	33 (70.2)	42 (75.0)
Severe, *n* (%)	3 (6.4)	1 (1.8)
Severity as per Vesikari Scoring system		
Moderate, *n* (%)	5 (10.6)	7 (12.5)
Severe, *n* (%)	42 (89.4)	49 (87.5)

Mean (SD); SES: Socioeconomic status; all P >0.05.

scoring systems [4,5]. Statistical analysis was conducted using chi-square and unpaired *t*-tests. The study was cleared by hospital's ethics committee, and informed consent was obtained from the parents of all included children.

During the study period, 103 under-five children hospitalized due to acute diarrhea were tested. Key demographic features are listed in *Table* **I**. Most of the testing occurred in months of May, June and July in both the years (about 98% of total testing for year 2010 and 73% of