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# PREVALENCE OF ROTAVIRAL INFECTION AMONG CHILDREN ADMITTED WITH ACUTE DIARRHOEA IN A TERTIARY CARE HOSPITAL OF TRIPURA

**Paediatrics**

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## ABSTRACT

**Introduction:** Rotavirus has been recognized as most common cause of diarrhoea in children.

**Objectives:** To study prevalence of rotavirus infection in acute diarrhoea among children below five years age and clinical profile of rotaviral diarrhoea.

**Material and methods:** Present study was conducted at Agartala Government Medical College from Nov-2014 to April-2016. Stool samples from 460 hospitalized children with acute diarrhoea were tested for rotaviral antigen. Caregivers were interviewed, physical examination conducted and assessment of dehydration was done.

**Results:** Out of 460 stool samples, 36% were rotavirus positive. 60.24% cases were below 12 months age group, 61.44% were male children. 66.26% children had fever and 94% cases had vomiting. Mean duration of diarrhoea (4.97 days) and mean duration of hospital stay (3.71 days) was significantly high in Rotaviral diarrhoea as compare with non-rotaviral diarrhoea.

**Conclusion:** Rotavirus is a significant cause of acute diarrhoea and mainly affects children below 12 months age.

## KEYWORDS

Acute diarrhoea, Dehydration, Rotavirus

### Introduction

Diarrhoea remains one of the most common illnesses of children. Globally it is the second most common cause of under-five death. (Center for Disease Control and Prevention, 2015). Diarrhoea killed 7,60,000 under five children per year; of this 4,53,000 are rotaviral death. (Wardlaw, Anthony, Mullerbeck, 2013). Recent estimation has shown that about 8,72,000 hospitalizations and 78,500 deaths occur due to rotavirus infections annually in India. (WHO, 2013). The majority of severe rotavirus gastroenteritis (RVGE) episodes occurs in low-income countries and affects infants under one year of age. (Sibal & Patwari, 2014).

Rotavirus is the most frequent causative agent for the most severe disease in children younger than five years of age. Rotavirus caused 15-30% of all hospital admissions for diarrhoea and 7-15% in community. (Wardlaw, Anthony, Mullerbeck, 2013) & (Sibal & Patwari, 2014). The magnitude of RVGE is underestimated, because many children with RVGE may not present for medical treatment, and those who do present are not asked for investigation especially in primary care centres.

As mortality, morbidity and economic burden associated with rotavirus is high and vary in different regions, present study was undertaken to measure the prevalence of rotavirus infection and its clinical profile in north-east region of the country.

### Material and methods

This hospital based cross-sectional study was conducted in the Department of Paediatrics, Agartala Government Medical College and GB Pant Hospital, Agartala, Tripura, from Nov-2014 to April-2016 (18 months). Children aged upto 5 years and admitted in Paediatrics ward with acute diarrhoea (≥3 episodes of loose or watery stool in 24 hours) were included in the study with prior ethical clearance from Institutional Ethics Committee. Total 460 patients admitted during this period were registered for the study after taking informed and written consent from patient's care-takers. Clinical and demographic profile was recorded as per pre-designed proforma. Assessment of dehydration and management was done as per WHO guidelines.

Stool samples were collected in a sterile port and immediately sent to microbiology laboratory for ELISA Test, routine stool and other investigation was done as necessary. Ridascreen Rotavirus (C0901) was used for qualitative determination of rotavirus in stool samples.

Children registered in the study were followed-up daily during their hospital stay and record was taken about average frequency of loose motion, hospital stay, any complication and outcome. Data was analysed both manually and using SPSS version 15.0 statistical software. Chi-square test and Fisher's exact test was used to see significance of association, p value <0.05 was considered as statistically significant.

### Results

Present study showed that prevalence of rotaviral infection in acute diarrhoea was 36% (166/460) in children below five years of age. In this study rotaviral diarrhoea was observed as low as in 3.5 months and very few cases were above 4 years of age; but, peak infection was observed in children below 12 months of age, constituting 60.24% of total positive children. Around 85% of the positive cases occurred below two years of age (Figure 1). Male children were affected more than female, constituted 61.44% (102) and 38.55% (64) respectively, in a ratio of male: female of 1.59: 1.

Rotaviral infection was observed throughout year but maximum cases were seen during cooler months than hotter months. There was a higher prevalence during January to March (54.21%), second high during October to December (26.5%) as shown in Figure 2. The study reveals that lower rate of exclusive breastfeeding (45.65%) and vaccination with rotaviral vaccine (6/460) in this region. There was no significant association between rotaviral and non-rotaviral diarrhoea with breastfeeding (p value 0.626). (Table 1)

It was observed that, 94% rotavirus positive cases had vomiting during the onset of loose motion and in 67.46% cases vomiting persisted for 1 to 2 days. Moderate (63.25%) to severe dehydration (33.13%) was commonly observed among children of rotavirus diarrhoea at the time of hospitalization. Out of 166 cases, 110 (66.26%) children had fever. It was also observed that low weight-for-age (WAZ <-2 Z) and stunting (HAZ <-2 Z) were relatively common in this population (19.56% and 7.39% respectively). There was no significant difference in rotaviral (24.68%) and non-rotaviral (16.62%) diarrhoea in relation to weight for age Z score <-2. But there was significant difference between

rotaviral (10.84%) and non-rotaviral (5.44%) diarrhoea in relation to height-for-age Z score <-2 i.e. stunting. (Table 1)

Mean duration of diarrhoea in rotavirus positive cases was 4.97 days (SD ± 2.21) and in non-rotaviral diarrhoea it was 3.42 days (SD ± 1.42). Diarrhoea lasting >5 days in case of rotaviral and non-rotaviral was observed as 36.14% and 6.8% respectively. Mean duration of hospital stay in case of rotavirus was 3.71 days (SD ± 2.03), as compare with non-rotaviral 2.42 days (SD ± 1.21). (Table 1) Complication like electrolyte imbalance, convulsion were seen in few cases and unusual complication like rectal prolapse was seen in two rotavirus positive cases. There was no mortality in the study population.

## Discussion

In the present study prevalence of rotavirus was seen in 36% of children admitted with diarrhoea. Previous studies from India as well as from different countries have revealed varying rates of prevalence of rotavirus infection that ranged from 4% to 62.6%. (Ananthanarayan & Paniker, 2009) (P.556-558). These wide ranges can be due to the differences in age group studied, selection of cases from community or hospital, detection methods employed, time of onset and the seasonal variation of rotavirus diarrhoea in different regions of the country. (Broor, Ghosh, Mathur, 2003).

In our study, maximum cases were observed below one year of age, few cases were also seen above 4 years of age, but frequency and severity was less in higher age group due to acquisition of antibody due to natural infection, less severe disease was also seen in young children due to persistence of maternal antibodies. These findings are in agreement with data from similar study which reported incidence of rotavirus infection as high in less than one year age. (Saravanan, Ananthan, Subramanian, 2004).

Male preponderance of infection was observed in our study with male: female being 1.59: 1, compared to study conducted in Chandigarh hospital which found male and female ratio of 3:1. (Samajdar et al., 2008). Majority cases were observed during cooler season (December-March). It has been observed that temperature influences the stability of human and animal rotaviruses that contributes to the efficient transmission of the human rotaviruses. (Chan et al., 1998).

Analysis of diarrhoeal disease severity showed that children with rotavirus infection had fever and vomiting before the occurrence of loose motion. Similar study observed that 10.4% children with rotavirus diarrhoea had dehydration, and 61.5% children had severe dehydration. (John, Devgan, Mitra, 2014). This high percentage of dehydration may also be due to the fact that late referral from peripheral hospital from far distance occurs frequently.

We couldn't find any association of rotaviral diarrhoea with acute malnutrition, but significant high numbers of cases with chronic malnutrition were stunted. This is against study done in Bangladesh which observed significant lower number of rotaviral diarrhoea in malnourished children. (Verkerkea et al., 2016). Mean duration of diarrhoea and total hospital stay in rotaviral diarrhoea was significantly high as compared with non-rotaviral diarrhoea which is in accordance with study done in Hong Kong. (Chan et al., 1998).

## Conclusion

Rotavirus is a significant cause of acute diarrhoea in north-east part of India and mainly affects children below 12 months age. Improvement in nutritional status, promoting breast feeding provides protection against rotaviral and non-rotaviral diarrhoea. Vaccines offer the most promising tool for preventing morbidity and mortality caused by rotavirus.

**Figure 1: Age-wise distribution of rotaviral and non-rotaviral diarrhoea cases**

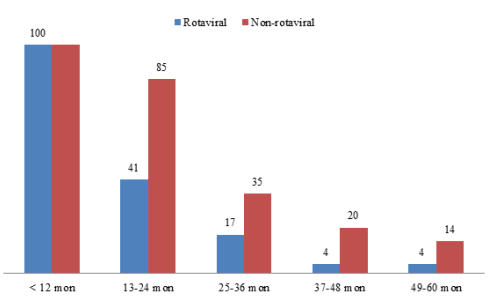


**Figure 2: Month-wise distribution of rotaviral and non-rotaviral diarrhoea cases**

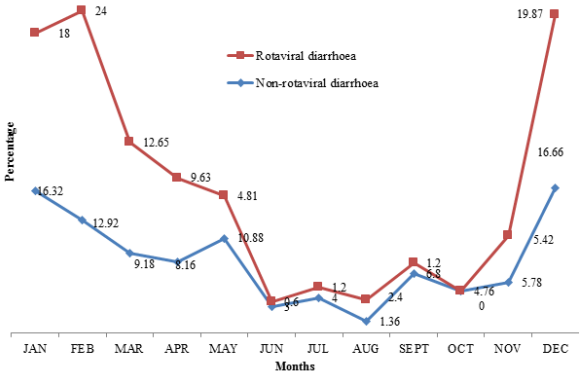


**Table 1: Distribution of rotaviral and non-rotaviral diarrhoea cases according to clinical features**

| Characteristics | | Rotaviral diarrhoea (N=166) | Non-rotaviral diarrhoea (N=294) | p value |
|---|---|---|---|---|
| Gender | Boy<br>Girl | 102 (61.44)<br>64 (38.55) | 186 (63.26)<br>108 (36.73) | 0.763 |
| Breastfeeding | Exclusive<br>Not exclusive | 73<br>93 | 137<br>157 | 0.626 |
| Rotavirus | Received<br>Not received | 1<br>165 | 5<br>289 | 0.425 |
| Vomiting | Yes<br>No | 156<br>10 | 218<br>76 | **<0.001** |
| Fever | Present<br>Absent | 110<br>56 | 146<br>148 | **0.001** |
| Dehydration | No<br>Some dehydration<br>Severe dehydration | 6 (3.61)<br>105 (63.25)<br>55 (33.13) | 142 (48.29)<br>139 (48.27)<br>13 (4.42) | **<0.001** |
| Weight-for-age | -2SD to +2SD<br><-2SD to -3SD<br>< -3SD | 125<br>37<br>4 | 245<br>43<br>6 | 0.103 |
| Height-for-age | -2SD to +2SD<br><-2SD to -3SD | 148<br>18 | 278<br>16 | **0.041** |
| Duration of diarrhoea (in days) † | Mean ± SD | 4.97 ± 2.21 | 3.42 ± 1.42 | **<0.001** |
| Duration of hospital stay (in days) † | Mean ± SD | 3.71 ± 2.03 | 2.42 ± 1.21 | **<0.001** |

** Figures in parenthesis indicate percentages*
*† Fisher's exact test*

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