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Study of Rotavirus as a Causative Agent in Acute Diarrhoea in Infants and Children

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Abstract: ***Rotavirus is the most common cause of severe diarrhea requiring hospitalization among infants and young children worldwide. Rotavirus infection affects 95% of children under the age of 5 years regardless of the socio- economic or environmental conditions and leads more frequently to dehydration than other etiologies. This study was carried out to determine the frequency of Rotavirus diarrhea in hospitalized children less than 5 years of age in Guwahati medical college and hospital by ELISA test. Methods: 140 stool samples were collected within 24 to 48hrs of hospitalization from children below 5 years who were admitted to the Pediatric wards with acute diarrhea from June 2014 to may 2015. All patients underwent physical examination for sign of dehydration. The presence of Rotavirus antigen was tested by enzyme immunoassay (EIA). Result: Out of 140 stool samples Rotavirus antigen was detected in 42 (30%) stool samples by Rotaclone ELISA test. Highest Rotavirus positive cases was found in age group 1-2 years with 21 (50%), followed by 11(26%) in age group of 6-12 months. Gender distribution of Rotavirus positive cases was found more in male 28(32.94%) than female 14(25.45%). The most commonly associated clinical features with Rotavirus positive cases was vomiting(73%), fever(66%), some dehydration (71%), severe dehydration (26%) and pain abdomen(47%). The peak incidence of diarrhea caused by Rotavirus was seen in winter. Highest positive cases was seen in January 12(28.57%) followed by February 10(23.8%). Conclusion: The present study shows the significant burden of Rotavirus diarrhea in hospitalized children less than 5 years of age. There is need to promote awareness among parents and care taker about hygiene and Rotavirus vaccine to reduce the incidence.***

Keywords: Rotavirus, under 5years children, Acute diarrhea

1. Introduction

Diarrheal disorders account for an estimated 1.5 million deaths globally every year making it the second leading cause of childhood mortality.[1] Diarrhea can be caused by bacteria, viruses, parasites and rarely fungi. Viral diarrhea is commonest among children under 5 years and Rotavirus being the commonest virus. Other viruses like enteric adenovirus, Calcivirus and Astrovirus are also known to cause diarrhea.[2]

The World Health Organisation (WHO) data showed that each child practically has viral diarrhoea irrespective of race and socioeconomic status within 5 years of life and this has great economic burden for the system of public health services and all society.[3, 4] The virus mainly spreads via the feco-oral route, through respiratory route, person to person contact or contaminated environmental surfaces and fomites.[5] Marked seasonality is seen in temperate or cooler climates where outbreaks usually occur in winter and early spring between November and april.[6] In the tropical countries however, the seasonal variation is not clear. In certain studies higher incidences have been reported during the rainy season while in others no seasonal variation has been found. Symptomatic infections are most common in children between the age of 6months to 2 years with peak incidence at 9-12 months. Males are more frequently affected than females.[5] Treatment of acute Rotavirus infection is nonspecific and involves management of symptoms and most importantly maintenance of hydration. In 2004, the WHO and UNICEF recommended the use of low osmolarity oral rehydration solution and zinc supplementation as a two –pronged treatment of acute diarrhoea.[7] WHO Enhanced Diarrhoeal Disease Control (EDDC) focuses on a combination of public health issues like hand washing, preparation and storage of food as well as drinking water and sanitation. Promotion of breast feeding, zinc supplement and Rotavirus vaccines.[8]

2. Aims and Objectives

To study Rotavirus as a causative agent in acute diarrhea in infants and children in Gauhati Medical College and Hospital.

Methods
Fresh stool samples were obtained within 24 to 48 hours of admission from hospitalized children below 5 years of age with diarrhea <7 days from Pediatrics department.

A portion of the sample were transferred to a sterile aliquot and stored at -20°C or -80^{0}C until the ELISA test for Rotavirus was performed.

Study Design: Hospital based prospective study.

Study Population: Infants and children with acute diarrhea admitted in Pediatrics department in Gauhati Medical College and Hospital.

Study Period: One year period from June 2014 to May 2015.

The sample size: 140 samples were included in the study.
Informed Consent were be taken from parents of the children before the collection of the sample and detailed patient data were recorded in a predesigned porforma

Inclusion criteria:
Children admitted with acute diarrhea under 5 years of age.

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Exclusion criteria:

1) Children whose care provider's givers refused to enrolled in the study.
2) Children with frank bloody diarrhea.
3) Chronic diarrhea.
4) Immunocompromised child.

ELISA is a cheap method for processing a large number of specimens. The presence of Rotavirus antigen was detected by using commercially available antigen detection apparatus, Enzyme Immunoassay (EIA). (Premier ™ Rotaclone ®, Meridian Biosciences, Cincinnati, Ohio, USA).

Result and observations: Out of 140 cases Rotavirus antigen was detected in 42 (30%) stool samples by Rotaclone ELISA test

The table below shows the sex distribution of acute diarrhoea cases .Male and female ratio of total cases was 1.5:1. Rotavirus positive was found more is male 28(32.94%) than in female 14(25.45%).

Table 1: Sex distribution of Rotavirus positive cases

Sex	No. of cases	Rotavirus positive	Percentage (%)
Male	85	28	32.94(%)
Female	55	14	25.45(%)
	140	42	

The table below shows the highest number of Rotavirus positive cases were found in the age group 1-2 years with 21(50%) cases followed by 6-12 months with 11(26%) cases.

Table 2: Age distribution of children positive for Rotavirus antigen

Age group	Number of cases n =140	Rotavirus positive n =42
0-6 months	11 (7.85%)	4(9.50%)
6-12 months	39(27.85%)	11 (26%)
1-2 years	55 (39.28%)	21 (50%)
2-3 years	24 (17.14%)	4 (9.52%)
3-4 years	8 (5.71%)	1 (2.38%)
4-5 years	3 (2.14%)	1 (2.38%)

The table below shows the peak Rotavirus positive was found in the month of January with 12(28%) followed by February month 10(23%).

Table 3: Monthwise distribution of rotavirus positive cases

Month	Positive rotavirus cases n =42	Total n =140
October 2014	1(2.38%)	6 (4.28%)
November 2014	3 (7.14%)	9(6.42%)
December 2014	5(11.90%)	11 (7.85%)
January 2015	12(28.57%)	31(22.14%)
February 2015	10 (23.8%)	36(25.71%)
March 2015	4 (9.52%)	23(16.42%)
April 2015	5(11.9%)	15(10.71%)
May 2015	2(4.76%)	9(6.42%)

3. Discussion

In the present study Rotavirus was detected in 30% of hospitalized children. Which is similar to the Indian study in 2001 (30%) in 1982 (32%) and in 2006 (27%) prevalence for Rotavirus.[9, 10, 11] A very high prevalence rate in Indian studies were found in 1982 (70.7%) and in 1981 study in Manipur with prevalence rate of 89.9%.[12, 13]

In the present study of 140 cases, highest Rotavirus positive cases 21(50%) were found in age group of 1-2 years which correspondence with study made in 2013 found 75% of Rotavirus case were below 2 years of age. A study in 2014 found 78.3% of children with Rotavirus diarrhea were in the age group of 6-15months.[14, 15]

In the present study the sex distribution of Rotavirus positive cases was found to be 28(32.94%) in male and 14(25.45%) in female. Study in 2013 and 1992 also found Rotavirus positive was more prevalent in male than female.[16, 17]

The peak incidence of Rotavirus diarrhea in the present study was found highest in January 12(28.57%) followed by February 10(23.8%). A study from Assam in [18] 2003 found peak incidence in winter with prevalence 38.37%.[18] Other studies from western India in 1999 and 2001 also reported peak Rotavirus in winter.[19, 20]

In the present study it has been observed that the incidence of diarrhea was highest amongst lower middle followed by upper middle group. Most cases 62% belong to rural areas and 42.85% source of drinking water was from tube well and 36% from concrete well

Besides age, sex and season various other factors have been observed by different authors to have a bearing on the incidence of diarrhea in children. Insanitary environment, poor socioeconomic condition, inadequate nutrition, unhygienic food and water, feeding habits of child etc are thought to be the commonest predisposing factors of diarrhea.[21]

Studies have reported that in acute episodes of Rotavirus diarrhea as compared to non Rotavirus diarrhea, there is a higher incidence of complications from severe dehydration and acid –base electrolytes imbalances. [22, 23]

As diarrhea is mainly caused by enteric pathogens including viruses, bacteria and parasites etiology of diarrhea causing pathogens need to be identified. Detecting Rotavirus can avoid use of not only non-indicated but the hazardous antibiotics which are excessively used in the treatment of diarrhea.

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