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A Clinico Epidemiological Study of Rotavirus Diarrhea in Under-5 Hospitalised Children with Acute Diarrhea

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Original Research Article

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Abstract: To estimate the prevalence of rotaviral and non rotaviral diarrhea in children aged 30 days – 60 months hospitalised with acute watery diarrhea in a tertiary care hospital in Shillong, Meghalaya. And to compare the two groups based on their background epidemiological data, clinical features and laboratory parameters. 64 bedded Pediatrics ward in Nazareth Hospital, Shillong. In this analytical cross sectional study carried out over 1 year, all children aged 30 days to 60 months hospitalised with acute watery diarrhea were subjected to Rapid Diagnostic Test for Rotavirus antigen in stool sample and the two groups (rotavirus positive and negative) compared on various background characteristics, clinical features and laboratory parameters using tools for statistical significance. Out of 170 total cases of acute watery diarrhea aged 30 days to 60 months which were admitted over a period of one year at Nazareth Hospital, Shillong, 100 (58.8 %) were positive for rotavirus. Mean age of presentation was 18.4 months in Rotavirus positive group and 17.7 months in Rotavirus negative group (p = 0.009). Mean duration of fever was 1.2 days in positive group and 1.8 days in negative group (p = 0.041, Z Score 2.04). Mean duration of loose stools 2.02 days (SD 1.34) in positive group and 1.91 days (SD1.71) in negative group (Z score 3.39, p = 0.0006). Duration of hospital stay 2.76 days in positive group and 2.24 days in negative group (p = 0.0004, 95% CI 0.22, 0.81). Mean potassium levels in positive group was 4.38 Mmol/l (SD 0.64) and in negative group 4.81 Mmol/l (SD 0.72) (<0.05). Study highlights that Rotavirus positive patients were older in age, were admitted in hospital for a longer duration, had shorter duration of fever but longer duration of loose stools and vomiting, were more likely to be from lower economic classes, had less degree of dehydration and lower potassium levels as compared to rotavirus negative patients, this being the first of its kind of study in the state of Meghalaya.
Keywords: Rotaviral diarrhea, children, Shillong, Meghalaya, epidemiological data.

INTRODUCTION

Infectious diarrhea is a leading cause of disease and death worldwide. Rotavirus infection is a major cause of acute watery diarrhea in children less than 5 years of age. Rotavirus infection is characterized by diarrhea, fever and vomiting. Stools are watery and rarely contain blood, mucus, or white blood cells. Vomiting often lasts for 2 to 3 days and diarrhea 5-8 days. Vaccination has been shown to be effective against rotavirus infection. There is very little literature on the prevalence of rotaviral diarrhea and its associated features, especially in comparison to nonrotaviral diarrhea, in north eastern part of India.

Previous national and international research suggests rotaviral prevalence of 20.2% [1] to 45.6% [2] in children hospitalised with acute watery diarrhea. The fact that there is wide variation in data about epidemiology of diarrhea caused by rotavirus in different parts of the world, as well as a lack of a comprehensive study to document the incidence and associated features of rotavirus diarrhea in this part of

the country, form the basis of the need to conduct this study.

METHODS

The study was carried out in Nazareth hospital, Shillong which has a 64 bedded ward for children between 0-18 years. Study was carried out from 1st January, 2015 to 31st December, 2015. A detailed clinical history, general and systemic examination and various relevant laboratory investigations were done.

All hospitalised children between 30 days to 60 months of age with acute onset of watery diarrhea after obtaining informed consent from the father, mother or guardian were included in the study. Exclusion criteria comprised of presence of blood in stools of the patient and duration of diarrhea more than 14 days.

All data was recorded according to a standard questionnaire. Patients were divided in 2 groups – 'Rotavirus Positive' and 'Rotavirus Negative' based on presence or absence of rotavirus antigen in their stool samples, which was determined with Rapid Diagnostic Test, a rapid immunochromatographic assay.

Statistical analysis was done based on chi-square test and Z-Test, as applicable. The associations & correlations were considered statistically significant if the p value was ≤ 0.05. All data were analysed and processed on SPSS Version 22.0 on a Windows 10 operating system.

Ethical approval for the study was obtained from the Institutional Ethical Committee of Nazareth Hospital, Shillong.

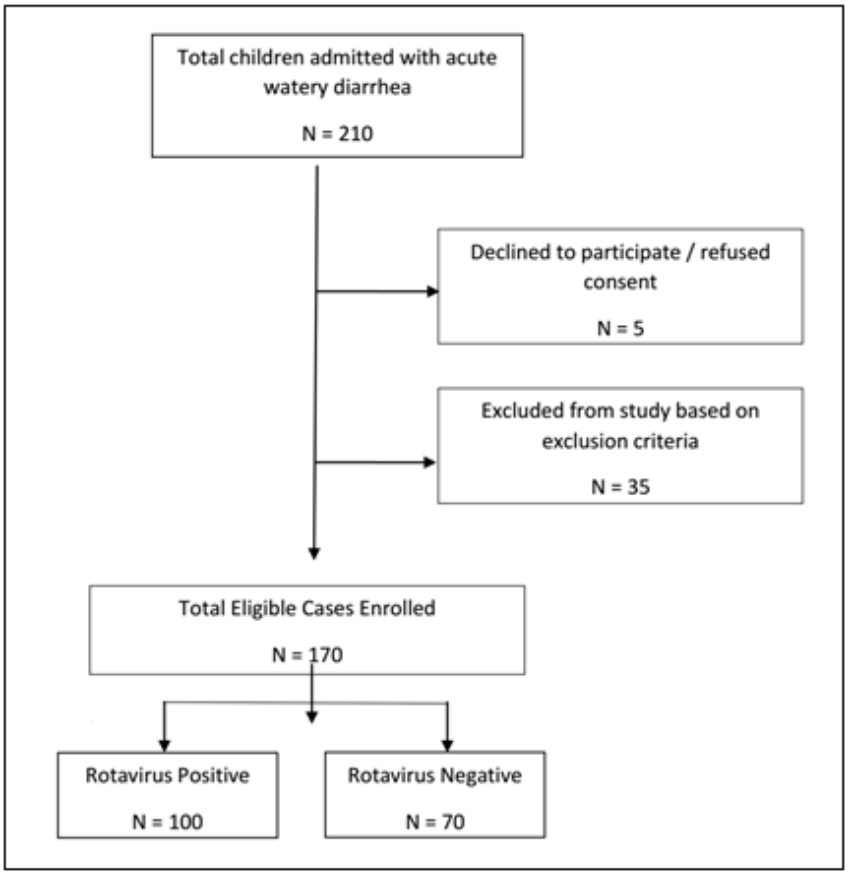

Fig-1: Flow Chart of the cases of present study. Exclusion criteria were presence of blood in stools and duration of diarrhea more than 14 days

RESULTS

The study flow diagram is given in figure 1. Out of 170 cases, 100 (58.8 %) patients were positive for rotavirus and 70 were negative for rotavirus. No association between sex & rotavirus status was found in the present study. On an average, rotavirus positive group had lesser number of episodes of loose stools per day as compared to rotavirus negative group, but the duration of complain of loose stools was more in rotavirus positive group. Additionally, lesser proportion of patients in rotavirus positive group had dehydration as compared to rotavirus negative group. Three [3] patients of acute watery diarrhea were already vaccinated against rotavirus. All the three patients were negative for rotavirus antigen.

Table-1: Summary of findings of rotavirus positive cases (N=100) and rotavirus negative cases (N=70). Significant difference was noted with respect to age, duration of loose stools and hospital stay

Characteristics	Rotavirus Positive N = 100 (Mean)	Rotavirus Negative N = 70 (Mean)	Total Cases N = 170(Mean)	p-Value
Age (in months)	18.43(SD 8.74)	17.7 (SD 12)	18.6(SD 12)	0.009
Sex	Males – 52 Females - 48	Males - 32 Females - 38	Males – 84 Females - 86	0.240
Duration of Fever(days)	1.2 (SD 1.5)	1.8 (SD 2.1)	1.43	0.053
Duration of Loose Stools(days)	2.02 (SD 1.34)	1.91 (SD 1.7)	1.98	0.00069
Frequency of Loose Stools (episodes/day)	4.48 (SD 2.3)	4.53 (SD 2.75)	4.5	0.9
Duration of Vomiting(days)	1.4 (SD 1.39)	1.36 (SD 1.18)	1.4	0.053
Frequency of Vomiting (episodes/day)	2.75 (SD 2.2)	3.14 (SD 1.7)	2.9	0.07
Hospital Stay (days)	2.76 (SD 1.2)	2.24 (SD 0.77)	2.56	0.0004

Table-2: The present study found that more rotavirus negative patients had some and severe dehydration compared to rotavirus positive group (p = 0.083)

Degree of dehydration	Rotavirus Positive (N = 100)	Rotavirus Negative (N = 70)
No dehydration	47 (47%)	26 (37%)
Some dehydration	51 (51%)	40 (57%)
Severe dehydration	2 (2%)	4 (6%)

Table-3:Rotavirus positive group had higher proportion (73% vs. 72%) of patients from Classes IV, V of odified Kuppuswamy Socio Economic Scale, 2015 compared to rotavirus negative group(p = 0.001)

Socioeconomic class	Class I	Class II	Class III	Class IV	Class V
Rotavirus positive	0	1 (1%)	26 (26%)	64 (64%)	9 (9%)
Rotavirus negative	0	0	20 (28%)	48 (69%)	2 (3%)
Total cases	0	1	46	112	11

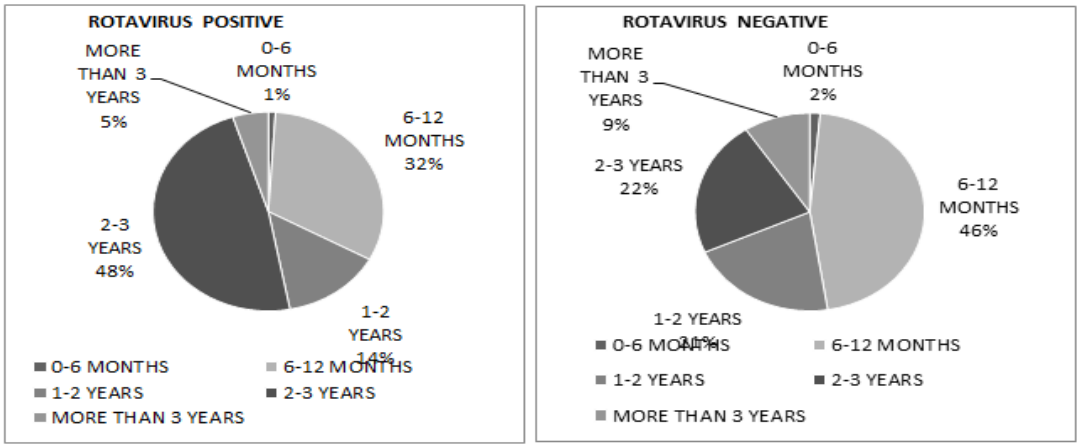

Fig-2: Shows distribution according to age of patients in rotavirus positive and negative group in the present study

DISCUSSIONS

In the present study, the prevalence of rotavirus positive patients among those admitted with acute watery diarrhea was found to be 58.8%. This was higher than values obtained in studies carried out by *N Teotia et al.* [3], *P Saravanan et al.* [4], *Bahl et al.* [5], *V Vashishtha et al.* [2], *Kang at al.*[6], *Shu-Yan Yang et al.* [1], *John et al.* [7] *and Lintao-Sai et al.* [8] which found prevalence of 25%, 22.6%, 23%, 45.6%, 39%, 20.2%, 24% and 41 % respectively.

In the present study, most cases in rotavirus positive group were in age group of 2 – 3 years (48%), and most cases in rotavirus negative group were in age group of 6 – 12 months (44.2%). In comparison, study carried out by *Bahl et al*. [5] found that incidence of rotavirus diarrhea was low during the first 3 months of life, peaked at age 9–11 months, and decreased sharply after age 18 months. While *P Saravanan et al*.[4] found that major proportion of the rotavirus positive cases fell in the age group of 7-18 months (62.5%).

In the present study, it was concluded that rotavirus status of a patient with acute watery diarrhea does not have any sex predilection (p = 0.240). Similar findings were found in studies carried out by *Teotia at al*.[3], *Saravanan et al*. [4], *Shu-Yan Yang et al*. [1].

According to the present study, the mean number of days of admission of a patient in rotavirus positive group was longer (2.76) than the one in rotavirus negative group (2.24) ($p<0.05$). The results obtained were different from studies done by *Teotia et al*.[3] (3.17 vs. 3.18 days) and *Shu-Yan Tang et al*. [1] (5.2 days vs. 5.1 days).

In the present study, 54% of rotavirus positive patients complained of fever as an associated symptom. 70% patients of rotavirus negative group complained of fever. Patients in rotavirus positive group had shorter duration of fever (at the time of admission), as compared to rotavirus negative group (1.2 days vs. 1.8 days) (p = 0.041). Similarly, *Lintao-Sai et al*.[8], *Teotia et al*. [3] *and Shu-Yan Yang et al*. [1]found that fever was found in 85.5%, 72.5% and 94.7% of rotavirus positive patients, respectively.

According to the present study, the average duration of diarrhea (at the time of admission) was 2.02 days for rotavirus positive group and 1.91 days for negative group. *Vashishtha et al*. [2] also found that average duration of diarrhea was more in positive group (6.1 days vs. 4.5 days).

According to the present study, of the rotavirus positive group, 53% patients were dehydrated at admission (3% were suffering from severe dehydration, 50% from some dehydration) and 47% had no dehydration. According to study by *Bahl et al*. [5], none of the hospitalized children with rotavirus diarrhea had disease of mild severity, 73.7% had moderately severe disease, and 26.3% had severe disease.

In the present study, most of the patients in the study group were from Socioeconomic Class 4 (Lower Middle Class), according to Modified Kuppuswamy Scale, 2015, in both Rotavirus positive and negative group. 3% patients of rotavirus positive group and 9% patients of rotavirus negative group were from socioeconomic class V. In the study carried out at Bijnor by *Vashishtha et al*.[2], of all the Rotavirus positive patients, 23% from lower SES and 30% of all rotavirus negative patients were from lower SES

CONCLUSION

This study shows that prevalence of rotavirus infection in hospitalised patients of acute watery diarrhea, aged 1 month to 60 months, was much higher than values obtained in previous studies. Rotavirus positive patients were older in age, were admitted in hospital for a longer duration, had shorter duration of fever but longer duration of loose stools and vomiting, had less degree of dehydration and were more likely to be from lower socio-economic class as compared to the rotavirus negative patients.

There was no difference between the two groups in terms of sex, frequency of loose stools or vomiting per day or the serum electrolyte profile. It is desirable to create awareness amongst pediatricians regarding difference in signs and symptoms of Rotaviral diarrhea in this part of the country. Considering the high prevalence of Rotaviral diarrhea, it is recommended that all patients of acute watery diarrhea be tested for rotavirus antigen in stool. Such high prevalence of disease also warrants encouraging vaccination against rotavirus in the community. But this being a hospital based study, more studies are needed at the community level to establish the true association between rotavirus infection and its associated features in the general population.

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REFERENCES

1. Yang SY, Hwang KP, Wu FT, Wu HS, Hsiung CA, Chang WC, Lin JS, Yang SC, Huang SL, Huang YC. Epidemiology and clinical peculiarities of norovirus and rotavirus infection in hospitalized young children with acute diarrhea in Taiwan, 2009. Journal of Microbiology, Immunology and Infection. 2010 Dec 31;43(6):506-14.
2. Vashishtha V, Thacker S, Namjoshi G. Immunochromatography-based Diagnosis of Rotavirus Infection in Acute Diarrhea. Indian Pediatr. 2016;53:652–3.
3. Teotia N, Upadhyay A, Agarwal S, Garg A, Shah D. Rotavirus diarrhea in children presenting to an urban hospital in Western Uttar Pradesh, India. Indian Pediatr. 2016;53(7):627–9.
4. Saravanan P, Ananthan S, Ananthasubramanian M. Rotavirus infection among infants and young children in Chennai, South India. Indian J Med Microbiol. 2004;22(4):212–21.
5. Bahl R, Ray P, Subodh S, Shambharkar P, Saxena M, Parashar U. Incidence of severe rotavirus diarrhea in New Delhi, India, and G and P types of the infecting rotavirus strains. J Infect Dis. 2005;192 Suppl(Suppl 1):S114–9.
6. Kang G, Green J, Gallimore CI, Brown DWG. Molecular epidemiology of rotaviral infection in South Indian children with acute diarrhea from 1995-1996 to 1998-1999. J Med Virol. 2002 May [cited 2017 Apr 11];67(1):101–5.
7. John BM, Devgan A, Mitra B. Prevalence of rotavirus infection in children below two years

presenting with diarrhea. Med journal, Armed Forces India. 2014 Apr [cited 2017 Apr 11]; 70(2):116–9.

8. Sai L, Sun J, Shao L, Chen S, Liu H, Ma L. Epidemiology and clinical features of rotavirus and norovirus infection among children in Ji'nan, China. Virol J. 2013;10(302):1–8.