

Prevalence of rotavirus during rainy season in children below 5 years of age presented with acute gastroenteritis at tertiary care hospital, Valsad

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Abstract

Introduction: Rotavirus infection is a leading cause of acute gastroenteritis in children below 5 years of age. Rotavirus infection is estimated 29% of all diarrheal deaths in children below 5 years of age. It affects almost 95% of children under 5 years of age.

Aims and Objectives: The study was used to detect prevalence of rotavirus infection in children below 5 years of age presenting with diarrhea and vomiting in a tertiary care hospital. The study was used to analyze the epidemiology of Rotavirus infection in local area.

Materials and Methods: All children suffering from acute diarrhea admitted in pediatric ward were included in the study. Stool samples were tested for detection of Rotavirus antigen by ELISA method.

Results: Total 60 stool sample were collected during study period of 2 months. 50 samples were collected from symptomatic patients and 10 samples were collected as control samples. Rotavirus antigen was detected from 6 stool samples.

Conclusion: Rotavirus infection prevalence is 12% in our study which is low when compared to other studies. The factors attributing to this incidence are seasonal variation, socio-economic status and personal hygiene and sanitation practices.

Limitations: As the study duration was 2 months (STS- ICMR Study), further more analysis is required with good sample strength in all seasons to know the epidemiological trends of rotavirus.

Keywords: Rotavirus, Diarrhea, Risk factors, Stool antigen, ELISA.

Introduction

Acute gastroenteritis refers to diarrhea which is abnormal frequency and liquidity of fecal discharge i.e. more than 3 loose stools per day¹. Annually diarrheal diseases kill 1.8 million children worldwide less than 5 years of age.² The most common cause of acute infectious diarrhea is due to viral pathogens in the age group of 0-5 years. Rotavirus is the most common causative agent for acute viral diarrhea.³ It is estimated that Rotavirus is responsible for 24 millions out patients visit, and 2.4 millions hospital visits with 6, 11,000 deaths annually⁴. Rotavirus infection affects almost 95% of children under 5 years of age and leads to dehydration and causes more economical burden on their families⁵. In children Rotavirus accounts for 70-80% of all diarrheal episodes globally, 20-30% is due to bacteria and only 0-5% is due to other parasites.⁶

Rotavirus gastroenteritis has incubation period of about 1-2 days. The symptoms of the disease mainly include diarrhea, nausea, abdominal cramps, vomiting, etc. or it can be symptomless.⁷ The exact modes of transmission are unknown but presumed to involve droplet or direct contact via fecal-oral route.⁸ Study done by WHO reported that 8.8 million deaths in children younger than 5 years worldwide in 2008. Diarrheal diseases are responsible for 15% death in 2008⁹. India contributes 22% of global rotavirus deaths.¹⁰ In India prevalence of rotavirus infection is various from 5-71% in different states of India.¹¹ A study from Vellore showed that 5.8% annual household income was spent on hospitalization of child due to diarrhea which was causes economical burden on families.¹²

Poor standard of personal health and hygiene are factors which can be attributed to the disease.¹³ Nosocomial

infection with the rotavirus is dangerous; particularly in paediatric ward.¹⁵ Rotavirus Adiarreha outbreaks are common in hospitalized infants, day care centers and in nursing homes.¹⁴ In temperate areas, rotavirus infections occur primarily in the winter, but in the tropics they occur throughout the year.¹⁶ Vaccination has significant impact on controlling the incidence of severely dehydrating rotavirus diarrhea.¹⁷

There is limited information regarding the causes and epidemiological trend of rotavirus infection even though it causes high morbidity and mortality in children below 5 years of age.

Materials and Methods

Ethical Clearance

Approval of ethics committee was obtained prior to the study.

Study Site

Department of Microbiology, GMERS Medical College, Valsad.

Study Population

The samples were taken from children ageing from 0-5 years with suspected gastroenteritis.

Study Design

A prospective study was done.

Sample Strength

60 stool samples.

Nature of Sample Collected

Stool samples semi-solid to liquid were taken.

Inclusion criteria:

The samples were taken into account on the basis of

1. Children under 5 years of age.

- Children with acute diarrhea i.e. duration less than 7 days.
- Children suspected with viral diarrhea.

Exclusion Criteria

The samples which were excluded were

- Children over 5 years of age.
- Children with chronic diarrhea i.e. duration more than 7 days.
- Suspected cases of dysentery cases.

Sample Collection

The samples were collected from the pediatric ward and collected in Universal sterile container.

Transportation

The transportation was done by the staff and sent to the microbiology laboratory for testing.

Stool samples were examined macroscopically and microscopically for other bacteria and parasite

Kit Used

Fecal rotavirus antigen detection ELISA kit (Epitope diagnostics Inc., USA)

Observations and Results

Total 60 stool sample were collected during study period of 2 months. 50 samples were collected from symptomatic patients and 10 samples were collected as control samples. From symptomatic 50 samples, 32 samples were from males and 18 samples were from females. The samples were tested for rotavirus antigen detection using fecal rotavirus antigen detection ELISA kit (Epitope diagnostics Inc., USA).

Out of total 50 samples from suspected cases, 6 (12%) patients were positive for rotavirus antigen and 44 (88%) were negative. Out of total 6 positive samples, 5 were male and 1 was female patients. (Figure 1, 2)

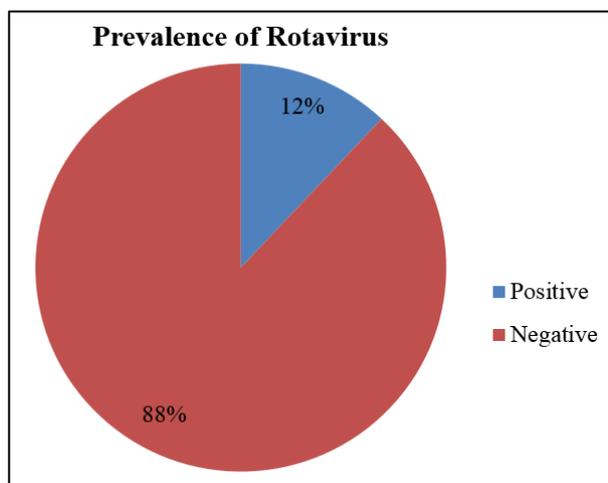


Fig. 1: Prevalence of rotavirus in stool samples

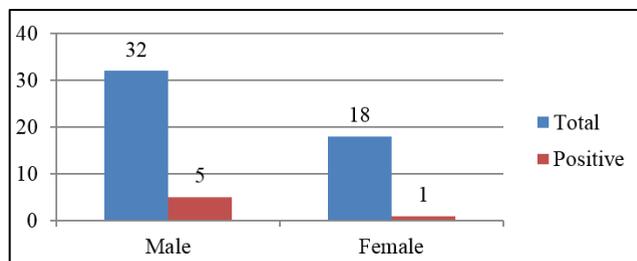


Fig. 2: Sex wise distribution of samples and positivity rate

Discussion

Diarrheal disease is one of the commonest causes of death in children in developing countries. A Diarrheal disease has different bacteriological, viral and parasitic etiology. Rotavirus has been consistently identified as the commonest pathogen causing severe viral diarrheal diseases. In our study, 6 samples were positive for rotavirus antigen from total 50 suspected symptomatic patients. So the prevalence of rotavirus infection in age group 0-5 years of age was found to be 12%. Sex wise distribution shown that male is affected more than female.

While study conducted in different region of India showed prevalence rate higher, for example, Broor S et al¹⁸ (16-19%, Chandigarh), Brown DW et al¹⁹ (18%, Vellore), Jain V et al¹¹ (41%, Manipur), Shobha et al²⁰ (28-30%, Pune) and Pooja et al³ (48.6%, Mangalore). The prevalence of rotavirus was also high in developing country like Bangladesh (41.8%).²¹

This variation may be due to seasonal trends related to rotavirus diarrhea like prevalence rate increasing during winter season (November to January) and (October to December).^{3,22} Our study was conducted in the month July-August during rainy season. There were many researches reporting high prevalence of the rotavirus in dry season such as winter, so more number of patients is found in the dry season.^{3,22} The study duration was 2 months approximately and there may be lower prevalence particularly in the span of 2 months. Thus the samples collected were in minimal prevalence period attributing to our lower prevalence of rotavirus infection.

Rotavirus is transmitted by feco-oral route because of poor personal hygiene, poor sanitary practice and lower socio economic class. Our study was conducted in a tertiary care hospital and mainly patients were coming from rural and other peripheral areas. In previous studies, prevalence rate was high because of lacking awareness about personal hygiene, use of open defecation and other poor sanitary practices. Nowadays people from rural area are also well educated, follow good personal hygiene and proper use of toilets leads to lower infection among themselves and in children also. The government have also increased the awareness regarding the sanitation and improved hygiene through their programs which further lead to decrease in the infection rates. The reason behind the low incidence of the rotavirus may be that there is proper maintenance of personal hygiene, due to which there is overall rise in the

immunity of community which decrease the infection chances.

Proper sanitation is of great improvement in preventing the risk of the infection. The transmission of rotavirus infection occurs through feco-oral route, so if proper sanitation is maintained there will be decline in the prevalent rates of rotavirus as there is hindrance in transmission of infection.

In our study there is more positivity rate in males as compared to females. In our study the male positivity rate was 15.6% and the female positivity rate was 5.5%. This result was not statistically significant because the p value was 0.29 ($p=0.29>0.05$).

Conclusion

In our study the prevalence found was 12%. Peak prevalence of the rotavirus infection in dry seasons such as winter and lower prevalence is observed in the wet season such as monsoon. The socio-economic status doesn't merely accompany chances of rotavirus infection, but there may be socio-economic burden on family to treat it. Personal hygiene carries the contaminant risk of infection spread through fomites. Sanitation also affects the great risk of transmission of infection because of high number of rotavirus particles in feces and may lay a risk of transmitting infection through the same.

Conflict of Interest: None.

References

1. Nelson, Essentials of Pediatrics, fifth edition, section XVI, chapter:112, Acute Gastroenteritis, pages, 512-515
2. World health organization, estimated rotavirus deaths for children under 5 years of age, 2004, http://www.who.int/immunization_monitoring/burden/rotavirus_estimates.
3. Pooja Rao, Shrikara Mallaya. Prevalence of rotavirus in acute pediatrics patients admitted to a tertiary care hospital in Mangalore. *J Adv Sci Res* 2015;6(3):37-40.
4. World gastroenterology organization practice guideline. Acute diarrhea March 2008.
5. Apurba Shastry, Sandhya Bhatt. Essentials of Medical Microbiology. Viral Gastroenteritis 1st Edition. 524-526
6. Sana Fatima, Nuzhath Irfana. A cross-sectional study to assess prevalence and management of acute gastroenteritis in pediatric inpatients of a large teaching Hospital.
7. Evan j A and Stephen G W. Rotavirus infection in adults. *Lancet Infect Dis* 2004;4:91-99.
8. Estes MK, Kapikian AZ. Rotaviruses In: Knipe DM, Howley PM, Griffin DE, editors. Field virology. 5th ed. Philadelphia: Lipincott Williams and Wilkins; 2007:1918-1958.
9. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *Lancet* 2010;375:1969-1987.
10. Tate JE, Burton AH, Boschi-Pinto C, Parashar UD, Agocs M. Global, regional and national estimates of rotavirus mortality in children < 5 years of age, 2000-2013. *Clin Infect Diseases* 2016;62(suppl 2):S96-105.
11. Jain V, Parashar UD, Glass RI: Epidemiology of rotavirus in India. *Indian J Pediatr* 2001;68:855-862.

12. Tate JE, Chitambar S, Esposito, Sarkar R, Gladstone B. Disease and economic burden of rotavirus diarrhoea in India. *Vaccine* 2009;27(Suppl 5):F18-24.
13. Arya SC. Rotaviral infection and intestinal lactase level. *J Infect Dis* 1984;150(5):791.
14. Anderson EJ, Weber SG (February 2004). Rotavirus infection in adults. *Lancet Infect Diseases* 2004;4(2):91-99.
15. Ryan MJ, Ramsay M, Brown D, Gay NJ, Farrington CP, Wall PG (1996). Hospital admissions attributable to rotavirus infection in England and Wales". *J Infect Dis* 174 Suppl 1:S12-18.
16. Levy K, Hubbard AE, Eisenberg JN (December 2009). Seasonality of rotavirus disease in the tropics: a systematic review and metaanalysis. *Int J Epidemiol* 2009;38(6):1487-1496.
17. Dennehy PH: Rotavirus Vaccines: an overview. *Clin Microbiol Rev* 2008;21:198-208.
18. Broor S, Singh V, Venkateshwarlu, Gautam S. *J Diarrhoeal Dis Res* 1985;3:158-161
19. Brown DW, Manthan MM, Mathew M, Martin R. *J Clin Microbiol* 1988; 26: 2410-2414.
20. Shobha Broor, Dhruva Ghosh & Purva Mathur. *Indian J Med Res* 2003;59-67.
21. Selim Ahmed. *Iranian J Pediatr* 2009;19(Number 2):107-116.
22. WgCdr B.M. John, Amit Devgan, Barnali Mitra. Prevalence of rotavirus infection below two years presenting with diarrhea. *Med J Armed Forces India* 2014;70:116-119.

How to cite this article: Gohel U, Gandhi V, Nerurkar A. Prevalence of rotavirus during rainy season in children below 5 years of age presented with acute gastroenteritis at tertiary care hospital, Valsad. *Indian J Microbiol Res* 2019;6(1):35-37.