Int.J.Curr.Microbiol.App.Sci (2016) *5*(8): 71-74

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 5 Number 8 (2016) pp. 71-74**
Journal homepage: http://www.ijcmas.com

Original Research Article http://dx.doi.org/10.20546/ijcmas.2016.508.008

Prevalence of Rotavirus Diarrhoea in Children Below 5 Years, A Pilot Study

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Keywords

Rotavirus, Diarrhoea, watery stool, ELISA, Antigen detection, Gastroenteritis.

Article Info

Accepted:
06 July 2016
Available Online:
10 August 2016

A B S T R A C T

Rotavirus is a leading cause of severe acute gastroenteritis requiring hospitalization among infants and young children worldwide. Data on rotavirus disease burden are needed across India to support credible, evidence-based decisions regarding any intervention. This pilot study was taken up to estimate the prevalence of rotavirus diarrhoea in children younger than 5 years of age in a tertiary health care setting. Stool specimens were collected from children aged less than 5 years suffering from acute watery diarrhoea admitted in the paediatric ward Guntur medical college / hospital, Guntur and rotavirus antigen was detected in stool samples by Enzyme Immunoassay. Out of 44 stool specimens tested, rotavirus was detected in 11 (25%) samples. High prevalence of rotavirus diarrhoea was seen in children aged 6 months to 11 months 36.4% followed by 12 months to 23 months 27.3%. Among rotavirus positive children 72.7% were males and 27.3% were females. Hence rotavirus diarrhoea accounts for a large proportion of diarrheal disease in hospitalized children less than 5 years.

Introduction

Diarrheal diseases are a major cause of hospitalizations and child deaths globally. Together they account for approximately one in six deaths among children younger than five years (Shaun Morris *et al.*, 2012). Rotavirus is the leading cause of diarrhoea hospitalization among children worldwide (Umesh Parashar *et al.*, 2006; Mathew *et al.*, 2014; Kahn *et al.*, 2012). Studies in the last decade estimate the annual mortality due to rotavirus in India to be between 90,000 and 153,000 (Jacob John *et al.*, 2014). Rotavirus infection ranges from asymptomatic infection to severe life threatening diarrhoea. It has been estimated that 29% of all diarrheal deaths in children <5 years of age is due to rotavirus and about 23% of rotavirus deaths are in the Indian subcontinent. 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 aetiologies (John *et al.*, 2014). Improved treatment using oral rehydration solution and diarrhoea control measures, such as sanitation and water purification, have been effective strategies to reduce diarrhoea-associated mortality over the past 2 decades. However, interventions that prevent

diarrhoea associated with some bacterial and parasitic agents are less effective against rotavirus diarrhoea. Consequently, the World Health Organization (WHO) and others have recommended rotavirus vaccines as the most effective strategy to prevent rotavirus-related morbidity and mortality (Mark Malek *et al.,* 2010).

There are limited data on rotavirus disease burden among children in Andhra Pradesh and there is a need for data on prevalence of rotavirus diarrhea especially in our setting. So we conducted a pilot study in our Guntur medical college / hospital which is a tertiary care hospital with the objective to estimate the prevalence of diarrhoea due to rotavirus among hospitalized children younger than 5 years of age.

Materials and Methods

This was a pilot study carried over a period of 4 months from January to April 2015 at clinical microbiology lab, Guntur medical college / hospital, Guntur, Andhra Pradesh, India. Informed consent was taken from parents/guardians. Study was approved by institution ethics committee.

All children aged less than 5 years suffering from acute diarrhoea admitted in the paediatric ward were included in the study. Children above 5 years, children with dysentery and chronic diarrhoeas were excluded. Demographic data was collected in a prescribed proforma. Stool specimens were collected from hospitalized children and stored in the refrigerator at 4°C and later transported to the laboratory in icebox and stored at -20°C in the testing laboratory. Rotavirus antigen was detected in stool samples by Enzyme Immunoassay (Premier Rotaclone) which utilizes monoclonal antibodies in a solid phase sandwich type EIA which was highly sensitive (100%) and specific (97%) for rotavirus antigen.

Results and Discussion

During the study period a total of 44 children below 5 years of age with acute diarrhoea admitted in the hospital were included and had a stool specimen collected for rotavirus antigen testing and most of the children 28(63.6%) were males and 16(36.4%) were females (Table I). Age wise distribution of patients showed maximum number of patients in age group of 6 months to 23 months 28(63.6%).

Of the 44 stool specimens tested, rotavirus was detected in 11 (25%) samples. High prevalence of rotavirus diarrhoea was seen in children aged 6 months to 11 months 4((36.4%) followed by 12 months to 23 months 3(27.3%). Low prevalence was seen in children less than 5 months of age and in children between 36 months to 59 months 1(18.2%) (Table II). Out of 11 positive cases 8(72.7%) were males and 3(27.3%) were females. There was no mortality in the study population.

Rotavirus infection has a worldwide distribution and is the single most important cause of gastroenteritis in young children. The virus mainly spreads via the feco-oral route, through respiratory route, person-to-person contact, or contaminated environmental surfaces and fomites. Symptomatic infections are most common in children between the ages of 6 months to 2 yr with a peak incidence at 9-12 months. Males are more frequently affected than females (Shobha Broor *et al.,* 2003).

Table.1 Gender wise distribution of cases presenting with diarrhoea and rotavirus positivity

Gender	Positive	Negative	Total
Female	3	13	16
Male	8	20	28
Total	11	33	44

Table.2 Age wise distribution of cases presenting with diarrhea and rotavirus positivity

Age group (in Months)	Enzyme Immunoassay for Rotavirus		Total
	Negative	Positive	
0-5	7	1	8
6-11	13	4	17
12-23	8	3	11
24-35	4	2	6
36-59	1	1	2
Total	33	11	44

This was a pilot study to assess the prevalence of rotavirus diarrhoea among children younger than 5 years of age in Guntur, Andhra Pradesh. In this study, rotavirus was detected in 25% of diarrhoea related hospital admissions among children less than 5 years of age.

Similar results 25.67% were reported by Manohar Badur *et al.,* (2015) for rotavirus by ELISA. In the study conducted by B.M. John *et al.,* (2014) 24% were found to be positive for rotavirus antigen in their stool samples. Saravanan *et al.,* (2004) from Chennai reported 22.6% positivity was associated with Rotavirus diarrhoea. Rotavirus accounts for close to 40% of hospitalizations for diarrhoea in India by G Kahn *et al.,* (2012). In the present study most of the Rotavirus diarrhoea cases (63.6%) occurred during the first 2 years of life, peaking at 6-11 months age. Similar result was found by Rajiv Bahl *et al.,* (2005) from New Delhi.

Preponderance of infection observed in male children (72.7%) in our study. Kelkar *et al.,* (1999) from Pune also reported male preponderance of rotavirus diarrhoea. Sex wise incidence of rotavirus infection among male and female was 68% and 32% respectively by (Nilesh Shyam Chavan *et al.,* 2014). However no predilection of infection was seen among sex of the patients analysed by Saravanan *et al.,* (2004) from Chennai.

In conclusion, this study highlights that rotavirus diarrhoea accounts for a large proportion of diarrheal disease in hospitalized children less than 5 years in Guntur district, Andhra Pradesh and this high prevalence of rotavirus diarrhoea requiring patient hospitalisation confirms the immense importance of rotavirus diarrhoea with regard to public health.

As this study is pilot study, further study is required to assess the prevalence of rotavirus diarrhoea. The incidence of the disease could not be calculated in this study.

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How to cite this article:

Jyothi, P., K. Prasanthi and Kamala, P. 2016. Prevalence of Rotavirus Diarrhoea in Children Below 5 Years, A Pilot Study. *Int.J.Curr.Microbiol.App.Sci.* 5(8): 71-74.
doi: http://dx.doi.org/10.20546/ijcmas.2016.508.008