

Original Research Article

Incidence of rotaviral and adenoviral diarrhoea amongst children under 5 year of age in a tertiary care centre

Jaishree Ambhore, Minhajuddin Ahmed*

Department of Pediatrics, Chirayu Medical College and Hospital, Bhopal, Madhya Pradesh, India

Received: 09 January 2019

Accepted: 16 January 2019

***Correspondence:**

Dr. Minhajuddin Ahmed,

E-mail: minzahmad@yahoo.co.in

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Rotavirus and Adenovirus is considered to be an important cause of diarrhoea in under five children and the data is very scarce due to decrease testing. This study was done to estimate the incidence, clinical profile and laboratory features among under five children with diarrhoea.

Methods: A prospective interventional study was conducted in Chirayu Medical College, Bhopal on children aged between 6 months - 5 years hospitalized with acute non-bloody diarrhea with 30 children in each group.

Results: Total 328 children were included in the study out of which 216 were males and 112 were females with a male:female ratio 1.9:1. 92(28%) patients were positive for rotavirus out of which 64(19.5%) were males and 28(8.5%) were females in present study.

Conclusions: Rotavirus infection is one of the common etiological agents responsible for diarrhoea. Rotavirus infection results in disease burden with morbidity and mortality in children and vaccination is the only control measure to decrease the incidence and mortality in children.

Keywords: Adenovirus, Acute non-bloody diarrhoea, Diarrhoea, Rotavirus, Vaccination

INTRODUCTION

Diarrhoea is defined as passage of 3 or more loose stools without blood during preceding 24 hrs. The overall incidence of diarrhoea remains unchanged at about 3.2 episodes per child per year.¹ Gastroenteritis is due to infection acquired through the feco-oral route or by ingestion of contaminated food or water and associated with poverty, poor environmental hygiene and developmental indices.

Rotaviruses and adenoviruses are leading causes of severe viral diarrhoea, especially in children under 5 yr of age. Rotaviruses are the primary cause of severe gastroenteritis in infants and young children during winter months. Among the 7 rotavirus serogroups (A-G),

group A rotaviruses are the principal cause of human infections.^{2,3}

Adenoviruses, after rotaviruses and noroviruses, are major gastroenteritis pathogens that are transmitted throughout the year.² Adenoviruses are grouped into 6 species (A to F) with >50 serotypes that infect a multitude of tissues, including the respiratory tract, intestines, and eyes.^{3,4} Immunochromatographic assay (ICA) is an attractive diagnostic tool because the test can be run individually, and the results are generally available in less than 30 min. The SD BIOLINE Rota/Adeno Rapid test (SD Rota/Adeno Rapid; Standard Diagnostics, Inc., has recently been developed for one-step, rapid, and simultaneous detection of rotaviruses and adenoviruses in human stool samples.

In this study, authors evaluated the analytical and clinical performance of this ICA for the detection of rotaviruses and adenoviruses.

METHODS

A prospective interventional study was conducted in Department of Pediatrics in Chirayu Medical College and Hospital, Bhopal, during the period of January 2017 to December 2017.

Inclusion criteria

- All admitted children between 6 months to 5 years of acute non-bloody diarrhea of less than 72 hours.

Exclusion criteria

- Diarrhea more than 72 hours with severe malnutrition, other systemic illness like encephalopathy, meningitis, dyselectrolyemia.

History, physical examination, stool examination, rotavirus/adenovirus antigen test (SD rota/adeno rapid; standard diagnostics, inc.), duration of intravenous fluids, duration of hospitalization and total period of illness were recorded. All patients were treated with zinc, ORS and intravenous fluids (if needed) and followed till 2 diarrhea free days.

Immunochromatographic assay

The SD rota/adeno rapid test is a one-step lateral flow Immunochromatographic assay that simultaneously detects group A rotavirus and adenovirus in stool samples. It uses colloidal gold-labelled monoclonal antibodies against the capsid protein of gene 6 (VP6) of rotaviruses and the hexon surface antigens of adenoviruses. Fresh stool sample was added to a tube containing 1mL of diluents and mixed well. Then, 4-5 drops (approximately 100-125µL) of this mixed suspension were added to the sample well of the test device, and results were read after 15 minutes. All procedures were performed according to the manufacturer’s instructions.

Consent procedure and ethical issues: well written consent was taken from parents and hospital ethical committee clearance was taken.

Statistical analysis

Statistical analysis was performed by the SPSS program for Windows, version 17.0.

RESULTS

Total 328 children were included in the study out of which 216 were males and 112 were females with a Male:Female ratio 1.9:1. 92(28%) patients were positive

for rotavirus out of which 64(19.5%) were males and 28(8.5%) were females in present study. None of the patients were positive for adenovirus. There were 50 (15%) children in age group 1-6 months, 144 (44%) in age group 7-12 months, 56 (17%) in age group 13-18 months, 30(9%) in age group 19-24 months, 34(10.4%) in age group 25-30 months, 6(2%) in 31-36 months and 8(2.4%) in > 36 months (Table 1).

Table 1: Variables of subject with diarrhea.

Variables	Group	N	%
Age (in month)	0-6	50	15.2
	7-12	144	43.9
	13-18	56	17
	19-24	30	9.1
	25-30	34	10.4
	31-36	6	1.8
Gender	>36	8	2.4
	Male	216	65.9
Rotavirus positive case	Female	112	34.1
	Male	64	19.51
Duration of diarrhoea (in days)	Female	28	8.53
	0-1	106	32.3
	1-2	130	39.6
Degree of dehydration	2-3	92	28
	No	68	20.7
	Some	138	42
Duration of IV fluids (in days)	Severe	61	37.1
	0-1	160	48.8
	1-2	90	27.4
	2-3	44	13.4
	3-4	8	2.4
Season	No IV fluid	26	7.9
	Dec-Feb	27	29
	Mar-May	16	17
	Jun-Aug	35	38
	Sep-Nov	14	15

Among rotavirus positives cases

Most of the children admitted with diarrhoea with dehydration were infants accounting 44(48%) from 7-12 months and 31(34%) from 12-18 months and 17(18%) from >18 months onwards among rotavirus positive cases.

Table 2: Symptoms among rotavirus positive cases.

Symptoms	Number	Percentage
Diarrhoea	84	91
Vomiting	59	64
Fever	38	41
Decrease oral intake	62	67
Decrease urine out put	24	26
Past history of diarrhoea	21	22

In present study rotavirus cases were more common in rainy season (June-August) 38% followed by 29% in cooler months of December-February. In the present

study almost all patients with rotavirus diarrhoea, 84(91%) had loose motion followed by vomiting in 59 (64%) and fever in 38(41%) cases (Table 2). Out of 92 rotavirus positive cases 23(25%) had severe dehydration, 37(40%) cases had some dehydration while 32(35%) had no dehydration (Table 3). It was observed in present study that mostly cases of rotavirus positivity was seen in low socio-economic group.

Table 3: Distribution of rotavirus positivity in relation to degree of dehydration.

Degree of dehydration	Rotavirus positive cases	Percentage
No	32	35
Some	37	40
Severe	23	25
Total	92	100

DISCUSSION

Diarrhoea is caused by number of bacterial, virus, parasites which are more prevalent typically peak during summer months. Male predominance (65.9%) has been noted in present study as well by Chen et al and Heuilan et al in their respective study.^{5,6} Majority of the patients (54%) were between 6 months to 2 yrs, similar results were found in study from Ghana by Reither et al, where majority of patients were under 5 years.⁷ In present study almost 44% of children were between 7 months to 12 months may be due to complimentary feeds, bottle feeds which is less in 0-6 months of age because of breast feeding as it protects the child against various infection significantly.

After loose stools, second most common presenting feature in present study subjects was vomiting (68%), markedly higher than study of Reither et al, while study by Ozlem Erdogam from Turkey showed vomiting in almost 49.3% children at presentation.^{7,8} Fever was next common presenting complaints (55%), which is less than Reither et al study 83%.⁷

In present study 92 children (28%) children were Rotavirus positive, which is almost equal to study done by Bhatnagar S et al, but the prevalence varies due to climate, social and demographic factors.^{9,10}

Rotavirus is associated with triad of fever, vomiting and dehydration and these symptoms may present in combinations or alone. As per presenting symptoms of Rotavirus diarrhoea along with loose stools 33 children (75%) presented with vomiting, higher than study done by Ozlem Erdogem from Turkey (49.3%).⁸ 23 children (52.3%) presented with fever, 21 (47.7%) with decrease oral intake, 12 (27.3%) with decrease urine output along with loose stools. Such observation for other symptoms were not looked in other study related to rotavirus diarrhoea. In present study only 25% rotavirus positive cases had severe dehydration while 40% cases had some

dehydration, this may be due to late identification of danger signs by parents.

All patients among rotavirus positive cases were unimmunized for rotavirus except for two cases who received one dose of rotavirus vaccination this may be due to late introduction of vaccine in central India by the government and also due to unaffordability for private vaccination.

The mean duration for rotavirus positive cases was 5.21 days where as in non-rotavirus cases was 4.79 days. Ogilvie et al also found the duration of stay ranging from 2.5 to 5.0 days while Rerksuppaphol et al observed the duration of stay is almost equal in both the groups.^{11,12}

In present study, Rotaviral diarrhoea was more common in June to August 38% followed by 29% in winter season (December to February). In present study, stool examination was done for all rotavirus positive cases but were found negative for any bacterial infection.

Due to high number of deaths in childhood due to severe childhood gastroenteritis/diarrhoea worldwide Government of India has added rotavirus vaccine in the national immunisation schedule which is highly commendable.

Limitation of the study is that only admitted population were studied. The advantage of this kit could be useful in clinical practice for rapid detection of rotavirus and adenovirus infection.

CONCLUSION

The incidence of rotavirus diarrhoea is roughly one-third in the studied population. Rotavirus infection results in disease burden with mortality in children and vaccination is the only control measure to decrease the incidence and mortality in children.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Acute Gastroenteritis in children. In: Nelson textbook of Pediatrics. 18th ed, 2nd vol. Elsevier Saunders publisher: Philadelphia; 1605.
2. Bon F, Fascia P, Dauvergne M, Tenenbaum D, Planson H, Petion AM, et al. Prevalence of group A rotavirus, human calicivirus, astrovirus, and adenovirus type 40 and 41 infections among children with acute gastroenteritis in Dijon, France. *J Clin Microbiol.* 1999;37:3055-8.
3. Versalovic J, Carroll KC, et al, eds. Manual of clinical microbiology. 10th ed. Washington, D.C:

- American Society of Microbiology Publishing; 2011:1456-1469.
4. Brown M, Grydsuk JD, Fortsas E, Petric M. Structural features unique to enteric adenoviruses. *Arch Virol Suppl.* 1996;12:301-7.
 5. Chen JM, Ni YH, Chen HI, Chary MH. Microbiology etiology of acute gastroenteritis in hospitalised children in Taiwan. *J Formos Med Assoc.* 2006;105(12):964-70.
 6. Heulian, Hermann J, Blackflow N. Enteric adenoviruses in children: Infection of the gastrointestinal tract. New York Raven Press. 1995;1:1047-53.
 7. Reither K, Ignatius R, Weitzel T, Seidu-Korkor A, Anyidoho L, Saad E, et al. Acute childhood diarrhoea in northern Ghana: epidemiological, clinical and microbiological characteristics. *BMC Infect Dis.* 2007;7(1):104.
 8. Erdogem O. Turkey: The comparison of the efficacy of two different probiotics in Rotavirus gastroenteritis in children. *J Trop Med.* 2012;2012:787-83.
 9. Bhatnagar S, Srivastava G. Clinical profile of children (0-5 years) with rota virus diarrhea. *Int J Contemp Pediatr.* 2017;4:947-50.
 10. Jagadishan B, Yachha SK. Disease of Gastrintestinal system and liver. In: Srivastava A, Paul VK, Bagga A, eds. *Ghai Essential Pediatrics.* 8th ed. CBS Publishers and distributors: India; 2013:291.
 11. Ogilvie I, Khoury H, Goetghebeur MM, El Khoury AC, Giaquinto C. Burden of community-acquired and nosocomial rotavirus gastroenteritis in the pediatric population of Western Europe: a scoping review. *BMC Infect Dis.* 2012;12:62.
 12. Rerksuppaphol S, Rerksuppaphol L. Prevalence and clinical manifestations of rotavirus diarrhea in children of rural area of Thailand. *Int J Collabor Res Int Med Public Health.* 2011;3(9):695-702.

Cite this article as: Ambhore J, Ahmed M. Incidence of rotaviral and adenoviral diarrhoea amongst children under 5 year of age in a tertiary care centre. *Int J Contemp Pediatr* 2019;6:295-8.