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Original article

Severity of gastroenteritis among children infected with Rotavirus- A

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Abstract:
Acute gastroenteritis is responsible for the most common childhood disease in developing nations. Viral diarrhoea is most common across children less than 5 years across the world. Among viruses, Rotavirus accounts for 36% of hospitalisation among children less than 5 years. The most vulnerable are children among the age of 6 months to 2 years.
323 stool samples were collected which were tested for the presence of Rotavirus antigen through ELISA and Rotavirus A was confirmed through RT-PCR. Grading of severity for clinical disease was done through Vesikari scoring system.
Among the stool sample collected where 231 (71.5%) patients were from OPD and 92 (28.5%) from IPD. Among the OPD patients, Rotavirus positive cases were found to be 95 (41.1%) and non-Rotavirus A cases were 136 (58.9%). Of the IPD patients, children infected with Rotavirus A were 48 (52.2%) whereas the number of non-Rotavirus A infection were 44 (47.8%). Overall, gastroenteritis cases were high among 6-12 months (38.1%), followed by 13-24 months (29.1%) and least among 25-60 months (14.2%) of age. Majority of the children i.e., 51 (35.7%) had a severe score, 49 (34.3%) had moderate score and 43 (30%) had mild score.
Keywords: Gastroenteritis , Vesikari scoring system, Rotavirus A, children

INTRODUCTION:

Acute gastroenteritis is responsible for the most common childhood disease in developing nations. World Health Organization (WHO) reports around two billion cases of diarrheal disease worldwide every year. [1] An estimated 1.3 million deaths are associated with diarrhoeal diseases per year, mostly affecting children from Africa and south-east Asia which constituted up to 25% of deaths; up to 25% of deaths in young children living in Africa and south-east Asia are attributable to AGE. [2] The causative agent can be virus, bacteria,

parasite and rarely fungus. Viral diarrhoea is most common across children less than 5 years across the world. Among viruses, Rotavirus accounts for 36% of hospitalisation among children less than 5 years. The most vulnerable are children among the age of 6 months to 2 years.[3]
The symptoms for Rotavirus A disease starts often within 24–72 hrs of infection with vomiting followed with profuse diarrhoea in the next 4-8 days. Shredding of Rotavirus A in stool happens

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before two days and after ten days of onset of infection, the route of infection being faecal-oral in nature. [4]

Often untraceable diarrhoea is treated with antibiotics disregarding the causative agent. Earlier diagnosis of Rotavirus A infection can limit the misuse of antibiotics. Further prevalence and seasonal trend are also essential for outbreak management and implementing measures for transmission and control of infection. [5]
Detection of Rotavirus A infection can be through rapid immunochromatographic tests, ELISA and RT-PCR method where the first two methods are the most preferred test.

MATERIALS AND METHODS

It was tertiary hospital based cross-sectional study for children under 5 years with diarrhoea / acute gastroenteritis who came in as IPD/OPD patients in Mayo Institute of Medical Sciences.

1. Inclusion and Exclusion criteria

Inclusion criteria: Children under 5 years with acute gastroenteritis or diarrhoea alone were included in the study.
Exclusion criteria: Children under five years with bloody diarrhoea or Parents/children not accepting to participate were excluded from the study
Institutional Ethical Committee approval was taken before initiating the study. A total of 323 stool samples (174 boys and 149 girls) were collected during the study period.

2. Sample collection

Parents were instructed to collect stool specimen of the child in a sterile wide mouthed screw capped plastic container (15-20 ml) provided to them and submit it in the laboratory within an hour of collection.

3. Assessment of Severity

The assessment of clinical severity was done based on the child's examination and interviewing the parents /guardian accompanying the children by the Paediatrician using the Vesikari scoring system, which is a 20-point scale. It is based on the frequency of diarrhoea and its severity, episodes of vomiting, fever and vomiting.
Anything <7 is considered mild, 7–10 moderate and ≥11 is severe in the Vesikari scoring system.

Parameter	1	2	3
Diarrhoea			
Maximum number stools per day	1–3	4–5	≥6
Diarrhoea duration (day)	1–4	5	≥6
Vomiting			
Maximum number per day	1	2–4	≥5
Vomiting duration (day)	1	2	≥3
Maximum body temperature (□)	37.1–38.4	38.5–38.9	≥39.0
Severity of dehydration (%)	N/A	1–5	≥6
Treatment	Rehydration	Hospitalization	N/A
Severity rating scales	**<7 (mild)**	**7–10 (moderate)**	**≥11(severe)**

4. Sample Processing:

Samples were used for detection of Rotavirus antigen through ELISA and further confirmed as Rotavirus A through RT-PCR.

a. ELISA
Rotavirus antigen was detected in stool sample using EDI Fecal Rotavirus ELISA kit.

Interpret test result:
Positive: patient sample extinction is greater than the Positive Cut-Off
Negative: patient sample extinction is less than the Negative Cut-Off
Equivocal: patient sample extinction is between the Positive Cut-Off and the Negative Cut-Off.

b. REAL TIME PCR DETECTION OF ROTAVIRUS A
Helini Rotavirus -A Realtime PCR kit was used for detection of Rotavirus A from stool sample.

Initial sample preparation was done using Helini Purefast stool processing buffer.
The stool was transferred in the stool processing buffer, vortexed and then centrifuged at 13000 RPM for 5 minutes. The supernatant was used for RNA purification.
HELINI Purefast viral nucleic acid mini spin prep kit was used for RNA purification as per the kit's instruction.
The detection of Rotavirus A was done with Helini Rotavirus-A Realtime PCR Kit.

RESULTS:

323 stool sample were collected where 231 (71.5%) patients were from OPD and 92 (28.5%) from IPD.
Among the 231 OPD patients, Rotavirus positive cases were found to be 95 (41.1%) and non-Rotavirus A cases were 136 (58.9%). Of the 92 IPD patients, children infected with Rotavirus A were 48 (52.2%) whereas the number of non-Rotavirus A infection were 44 (47.8%). **(Table 1.1)**

Table 1: DISTRIBUTION OF ROTAVIRUS CASES WARD WISE

WARD	**Number of Cases**	**Number of ROTAVIRUS Positive Cases**	**Number of ROTAVIRUS Negative Cases**
	Number (%)	**Number (%)**	**Number (%)**
OPD	231	95(41.1)	136(58.9)
IPD	92	48(52.2)	44(47.8)
Total	323	143(44.3)	180(55.7)

Overall, gastroenteritis cases were high among 6-12 months (38.1%), followed by 13-24 months (29.1%) and least among 25-60 months (14.2%) of age. **(Table 2)**

Table 2: AGE WISE DISTRIBUTION OF ROTAVIRUS A INFECTION

AGE	**Number of Cases**	**Number of Positive Cases**	**Number of Negative Cases**
(In Months)	**Number (%)**	**Number (%)**	**Number (%)**
0-6 Months	60(18.6)	19(31.7)	41(68.3)
6-12Months	123(38.1)	63(51.2)	60(48.8)
13-24 Months	94(29.1)	41(43.6)	53(56.4)
25-60 Months	46(14.2)	20(43.5)	26(56.5)
Total	323(100)	143(44.3)	180(55.7)

Infection due to Rotavirus A was highest among 6-12 months (44%), followed by 13-24 months (28.7%) and least among the age of 0-6 months (13.3%).

Table 3: Relationship between Rotavirus A infection Vesikari Score System

Severity based on Vesikari Score System	Rotavirus positive (%) **N= 143**
Mild	43(30)
Moderate	49(34.3)
Severe	51(35.7)

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Majority of the children i.e., 51 (35.7%) had a severe score, 49 (34.3%) had moderate score and 43 (30%) had mild score. It suggests that severity of Rotavirus gastroenteritis remains high to moderate in most of the children with infection. **(Table 3)**

DISCUSSION

Our study showed higher prevalence of gastroenteritis in the age group of 6-12 months (38.1%), followed by 13-24 months (28.1%) and among 0-6 months (14.2%). A similar age distribution was unavailable for gastroenteritis. Study by Saha J et al showed an overall prevalence of diarrhoea of 14.4% in the age group of 0-11 months followed by 12-23 month (13.89) and lowest being 48-59 months (4.75%). [6] Similar conclusion was drawn by Paul P where prevalence of diarrheal patients were high in 0-11 months (14%), followed by 12-23 months (13.4%) and least among 48-59 months (4.6%) of age.[7] Adding to the above Ghosh K et al showed higher prevalence of diarrhoea among 0-11 month (14.01%), followed by 12-35 months (10.97%) and least among the age group of 36-59 months (5.25%).[8]

The study shows prevalence of Rotavirus at 44.3% which is close to study conducted by Arun, P at Chennai where the prevalence rate was 41.64%. [9] Higher prevalence among IPD (53.4%)0and OPD (47.5%) patients were found by Mullick, S et al in her study at Kolkata which is in pertinence with our study [10]

In our study, proportion of children having high rotavirus infection were from the age group of 6-12 months (44.05%) followed by 13-24 months (28.67%) and least among the age of 0-6 months (18.6%).

The age group of 6-12 months, where infection with RVA is high i.e., 44.05 is proportionate with the study of Ranjitha S et al where similar age group has a prevalence of 45.2% [11]. Girish Kumar, C et al also had similar outcomes based on age which was 40.7% in the age group of 6-11 months. [12] Another study discussing the Indian national Rotavirus surveillance programme showed 44.3% prevalence in the similar age group.[13]

Majority of the children (35.7% & 34.3%) infected with Rotavirus A has severe to moderate disease based on Vesikari score system which is similar to the study conducted by Gunasekaran Sabharritha et al in Chennai. They also stated that duration of hospital stay among children with Rotavirus infection was longer. [14]

CONCLUSION:

Rotavirus infection among children is still a major health care burden among children less than 5 years. Being a virus, which transmits through faecal-oral route, increased effort to improve water and sanitation quality may reduce the burden of infection.

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