



## ROTAVIRUS A INFECTION AMONG IMMUNIZED CHILDREN IN RURAL AREA OF EASTERN UTTAR PRADESH

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### Abstract:

Diarrheal disease is a major concern in developing world with 248 million episodes every year. 453,000 children die from rotavirus diarrhoea every year and India alone accounts for 22% of deaths. This study was to determine Rotavirus A infection among immunized children less than 5 years. A total of 323 stool samples were collected to determine the presence of Rotavirus antigen and conformation was done through Rotavirus A through RT-PCR. Results showed a prevalence 44.3% of Rotavirus A infection among immunized children. Infection was high among the age group of 6-12 months followed by 13-24 months and lowest among 0-6 months.

**Keyword:** Rotavirus A, immunization, infection

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## Introduction

Diarrheal diseases continue to be a major concern for developing countries [1]. An estimated 248 million episodes of diarrhoea occurs every year in children under 5 years [2]. Surveillance data show that around 40% of hospitalization for diarrhoea among children less than 5 years is due to Rotavirus infection [3]. 453,000 children die from various rotavirus diarrhoea every year, with most of these deaths occurring in low-income groups in Africa and Asia; India alone accounts for 22% of deaths [4].

Belonging to the family reoviridae, Rotavirus is a non-enveloped, double stranded RNA virus. Seven groups (A to G) of the Rotavirus have been identified. Group A rotavirus is the most common cause of diarrhoea in children less than 5 years of age worldwide. The genome of Rotavirus constitutes of 11 segments of ds RNA encoding six non-structural proteins and six structural viral proteins. The virion consists of the RNA segments and several molecules of VP1 and VP3 proteins surrounded by an inner VP2 protein layer, central part containing VP6 protein capsid and the outer consists of VP4 protein spikes embedded in VP7 capsid [5]. Rotavirus is classified into G and P types on the basis of two outer layer viral protein VP4 and VP7 respectively [6].

Nearly all children by the age of 5 years, experience rotavirus infection whether they live in a developed or developing country. Hence, WHO has recommended the inclusion of rotavirus vaccine in all national immunization programme, worldwide [7,8,9]. As of 2021, the number of countries that introduced Rotavirus vaccine were 106 while 20 are planning for the same. Around 68 countries are yet to plan and introduce Rotavirus vaccine.

In 2017, Ranjitha S Shetty et al tested 81 stool samples for rotavirus. 31 samples (38.3%) were positive for rotavirus VP6 antigen. Majority of the rotavirus positive cases (45.2%) were among children aged 13–24 months and among those who had very severe diarrhoea were 56.5%. [10]. Stool sample positivity varied from 4.6% in Kolkata [11] to 89.8% in Manipur [12], among hospitalized children, and from 4% in Delhi [13] to 33.7% in Manipur [14] in community.

## Materials and Methods:

- Study Setting:** Hospital Based study (Tertiary care hospital)
- Study design:** Cross sectional study

- Study population:** Children under 5 years with diarrhoea / acute gastroenteritis coming in as OPD or IPD patients
- Study period:** Two years
- Sample size:** 323
- Selection of sample:**

### i) Inclusion criteria

- Children under 5 years with acute gastroenteritis
- Children under 5 years with diarrhea alone

### ii) Exclusion criteria

- Children under five years with bloody diarrhea
- Parents or children not accepting to participate

### Sample collection:

Freshly passed stool sample were sent to microbiology laboratory in central lab.

The sample was divided into two parts:

- One part of the sample was stored at -20 degrees with buffer for further investigation of rotavirus antigen.
- The second part was used for further: routine microscopic / macroscopic examination for detection of parasites

### Detection of Rotavirus:

All stool samples were first used for the Rotavirus antigen detection using EDI Faecal Rotavirus ELISA kit.

Detection of Rotavirus A was done with Helini Rotavirus -A Realtime PCR kit for detection of Rotavirus A from stool sample. Initial stool sample preparation was done with the help of Helini Purefast stool processing buffer. The supernatant of around 350µl separated after centrifuging the stool mixed buffer at 13000 rpm was used for RNA purification. The HELINI Purefast viral nucleic acid mini spin prep kit was used for RNA purification.

The purified RNA was then used as a template for Detection of Rotavirus A with Helini Rotavirus-A Realtime PCR Kit.

### Result:

A total of 323 stool samples were collected of children till 5 years with diarrhea during the study period. The samples were subjected to ELISA for Rotavirus detection and further subjected to RT-PCR for conformation where the number of positive samples was around 143. All the participants in the study were immunized with Rotavirus vaccine.

The overall gastroenteritis cases as high among the age group 6-12 months (38.0%), second being

13-24 months (29.1%) and least across the age of 25-60 months (14.24%).

Rotavirus A positive cases were high among the age group of 6-12 months (44.0%) followed by 13-24 months (28.7%) and lowest among 0-6 months (13.3%).

#### Discussion:

Our study showed higher prevalence 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 diarrhea 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%).<sup>[15]</sup> 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.<sup>[16]</sup> Adding to the above Ghosh K et al showed higher prevalence of diarrhea 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%).<sup>[17]</sup>

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%.<sup>[18]</sup> Higher prevalence among IPD (53.4%) and OPD (47.5%) patients were found by Mullick, S et al in her study at Kolkata which is in pertinence with our study.<sup>[19]</sup>

#### Conclusion:

Diarrhoea being one of the leading causes of death among children under five years is an important public health problem in India. These results of our study suggest that rotavirus is still a highly prevalent cause of diarrhoea in rural India and is responsible for a substantial burden of diarrhoeal disease.

Continuous efforts to improve vaccination coverage, water and sanitation, and access to and quality of medical care is important to prevent Rotavirus A infection in rural India

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