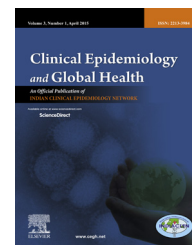


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Original Article

Rotavirus associated acute gastroenteritis among under-five children admitted in two secondary care hospitals in southern Karnataka, India



Ranjitha S. Shetty^a, Veena G. Kamath^{a,*}, Dinesh M. Nayak^b, Asha Hegde^b, Tarun Saluja^c

^a Department of Community Medicine, Kasturba Medical College, Manipal University, Manipal, India

^b Department of Paediatrics, Melaka Manipal Medical College, Manipal University, Manipal, India

^c Shantha Biotechnics Ltd., Hyderabad, India

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ABSTRACT

Background: Rotavirus infection is the common cause of severe diarrhea among under-five children. Globally it is responsible for majority of the hospital visits and admissions due to diarrhea in this age group. This hospital-based surveillance aimed to assess the burden of rotavirus diarrhea and to identify its prevalent strains among under-five children.

Methods: The study was conducted in two secondary level health care facilities of Manipal University, Manipal during November 2011 through July 2012. All under-five children admitted with acute diarrhea were recruited into the study.

Results: A total of 95 children were admitted with acute diarrhea during the study period. Of the 95 stool samples collected, 14 were inadequate and 81 samples were tested for the presence of rotavirus using commercial enzyme immunoassay kit (Premier Rotaclone Qualitative ELISA). Rotavirus positive samples were shipped to Central laboratory at CMC, Vellore for strain surveillance and characterization. Out of the 81 stool samples tested for rotavirus, 31 samples (38.3%) were positive for rotavirus VP6 antigen. Rota positivity was observed to be highest during the month of December (29.0%) and lowest in the month of June. Majority of the rotavirus positive cases (45.2%) were among children aged 13–24 months and among those who had very severe diarrhea (56.5%). The most common genotypes identified were G1P[8] and G2P[4] strains (25.8% each).

Conclusions: Though the burden of overall diarrhea among under-five children is not very high in this area, the proportion of rotavirus diarrhea among the hospitalized children is considerably high.

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* Corresponding author. Tel.: +91 9845304647.

E-mail address: veenak@manipal.edu (V.G. Kamath).

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1. Introduction

Acute diarrheal diseases (ADD) is one of the major causes of death among under-five year children in India, accounting for 13% of mortality (300,000 deaths annually) in this age group.^{1,2} About 25–50% of these cases are due to rotavirus infection leading to a large number of outpatient visits, hospitalizations, and deaths among under-five year children.^{3,4}

Globally, the prevalence of rotavirus diarrhea among under-five children ranges from 6% to 56%, whereas the incidence of rotavirus diarrhea reported in India varies from 5% to 70%.^{2,4–6} No seasonal variation in rotavirus diarrhea has been reported in tropical areas, though the frequency is observed to be higher during the initial months of the year.⁷ As per the evidence, initial infection with rotavirus offers immunity to an extent due that subsequent rotavirus infections tend to be less severe.⁸ Rotavirus infection is found to be the commonest cause of diarrhea with severe dehydration which requires hospitalization among children in India and worldwide.^{5,9} In India, stool examinations are normally not done to isolate the organisms during acute diarrheal episodes. Typically the children with rotavirus infection present with triad of symptoms, fever, projectile vomiting, and profuse watery diarrhea, which may lead to moderate to severe dehydration in the infected child. But due to the high cost involved, these cases are rarely diagnosed and are treated symptomatically with oral rehydration salts (ORS) solution or intravenous (IV) fluids.

Hence, this study was undertaken with an objective to carry out a hospital-based surveillance of rotavirus gastroenteritis among under-five children to estimate the disease burden and to identify the prevalent strains of rotavirus in the population under surveillance in southern Karnataka, India.

2. Materials and methods

The present study is a part of a larger multi centric prospective hospital based surveillance study.¹⁰ At our site, the study was conducted from November 2011 to July 2012 in a private health care set up that included two secondary health care facilities attached to a tertiary care hospital which serves as a referral center. These health care facilities located at the taluka level provide services to both urban and rural population of the local area.

As per the study protocol, all children below 5 years of age, who presented with acute diarrhea (defined as ≥ 3 looser than normal stools with or without vomiting during the preceding 24 h period) to these health facilities and required hospitalization and rehydration for at least six hours were considered eligible for the study. These children were recruited in the study following a written informed consent obtained from the parents. A diarrheal hospitalization logbook was used to count and track all the eligible children recruited into the study.

The study was time bound and all eligible and consenting children during the study period were included in the study.

2.1. Clinical assessment of the subjects

The clinical parameters such as duration and maximum number of episodes of diarrhea and vomiting, intensity of fever and dehydration were considered to assess the severity of diarrheal episodes among the recruited children. These parameters were recorded in a pre-tested case report form. Severity of diarrhea was graded using the Vesikari scoring system.¹¹ As per the grading, a child with a score between 0 and 5 was considered to have mild diarrhea, 6 and 10 moderate, 11 and 15 severe and a score of ≥ 16 was considered to be having very severe diarrhea.

2.2. Stool specimen collection

A single stool sample (approximately 5 ml) was collected in a labeled sterile screw-top container from the consenting subjects either on the day of admission or within 48 h of hospital admission. The container was checked for labeling and leakage, immediately transported in a vaccine carrier to the laboratory at Centre for Virus Research located at the study site and stored in a deep freezer at -20°C until the relevant testing was done. Care was taken to avoid freeze–thaw cycles for the stool specimens.

2.3. Detection of rotavirus

The stool samples were tested for rotavirus VP6 antigen using a commercial Enzyme Immuno Assay (EIA) kit (Premier Rota clone Qualitative EIA, Meridian Bioscience Inc., Cincinnati, USA) in duplicates and with appropriate controls. All the rotavirus VP6 antigen positive stool samples were shipped to the Central laboratory at Department of Gastrointestinal Sciences, Christian Medical College, Vellore under appropriate controlled conditions for strain surveillance and characterization.

The study was conducted as per the Code of Ethics of the World Medical Association (Declaration of Helsinki), GCP guidelines issued by the Central Drug Standards and Control Organisation, India and the ethical guidelines by Indian Council of Medical Research. The study protocol was approved by the Institutional Ethics Committee prior to the initiation of the study. The study was formally registered under the Clinical Trials Registry – India with a registration number of CTRI/2012/03/002475.

2.4. Data analysis

The data from case report forms, diarrheal log book and genotype reports was extracted into SPSS (Statistical Package for Social Sciences) version 16.0 and analyzed. The results are expressed as frequencies and proportions. Chi-square test was applied wherever applicable and a p -value of <0.05 was considered as statistically significant.

3. Results

A total of 95 under-five year children hospitalized with acute diarrhea were recruited in the study. As is observed from

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