

## Chemistry Congress 2019 Circulating Rotavirus Types and Drug-Resistant Diarrheagenic *Escherichia coli* Causing Enteric Infection in Under-Five Children in Rural West Bengal, India

Kunal Dutta

<sup>1</sup>Department of Human Physiology with Community Health, Microbiology and Immunology Laboratory, Vidyasagar University, Medinipur-721102, West Bengal, India

### Abstract

**Background:** Acute gastroenteritis is an important cause of global morbidity and mortality. In this study, we collected 486 fecal specimens from diarrheal patients during January 2014 to December 2014. We have found G1[P8] as highest prevalent (85%) genotype of rotavirus followed by G9[P4] (9%). Furthermore, group A rotavirus (54.52%) was found as the primary causative agent of childhood diarrhea and diarrheagenic *Escherichia coli* (31.89%) as the second causative agent. A significant number of rotavirus-bacteria mixed infection was found. The antibiotic susceptibility study reveals the prevalence of multi-drug resistance diarrheagenic *Escherichia coli*. This study suggests a particular preventive measure for diarrhea during the first the two years of life.

### Introduction

Acute gastroenteritis due to enteropathogens is a leading cause of hospitalization of young children in developed countries and one of the significant causes of mortality in developing countries [1]. In developing countries, each child experience 3.5 to 7.0 diarrheal episodes during first two years of life and 2 to 5 diarrheal episodes upto 5 years of life [2]. The global morbidity and mortality due to single rotavirus infection were estimated about 110 million cases out of which 4 million children die annually [3,4]. In poorest countries, childhood death due to rotavirus gastroenteritis accounts for 85% [5]. In India, approximately 22% of the 453,000 deaths among children below five years of age are because of rotavirus gastroenteritis [6] and about 20 to 70% of hospitalizations are attributable to rotavirus [7]. Here are two surface antigens of group A rotavirus called as VP7 (Gtype) and VP4 (P-type) and they have a role in neutralization of host defense mechanism [8]. However, the etiological agents of acute gastroenteritis include a broad range of causative agents that differ significantly with geographical variation [9].

Among other causative agents of acute gastroenteritis, viral agents account for 75% out of which rotavirus account for 50% [10], and diarrheagenic *Escherichia coli* (DEC) is responsible for 30%-40% of all diarrheal illness among children <5 years of age [11]. The DEC has six major pathotypes including enteroaggregative *E. coli* (EAEC), enteropathogenic *E. coli* (EPEC), enterohemorrhagic *E. coli* (EHEC), enterotoxigenic *E. coli* (ETEC), enteroinvasive *E. coli* (EIEC), and diffusely adherent *E. coli* (DAEC). The pathotypes of DECs differ in their virulence mechanism and clinical manifestation [12]. They are the primary cause of persistent diarrhea due to their high prevalence both in the hospital, and community setting [13]. In

a hospital setting in-patients, diarrhea due to EPEC found in 25.4% of cases [14].

Study population, study site, and sample collection

Fecal samples from 486 children <5 years of age hospitalized with acute diarrhea were collected from Medinipur Medical College and There are currently different methods of 3D printing ceramics, some of the best known are light-curing technologies such as SLA and DLP, Binder Jetting, Deposition of Material (LDM – Liquid Deposition Modeling) and the most recent, Nano Particle Jetting of the Israeli company XJet. Hospital (MMC&H), Medinipur West Bengal, India. The samples were collected for 12 month period from January 2014 to December 2014. The patients were predominantly from rural areas of Paschim Medinipur and Jhargram (Jangamahala area) to take health care services at MMC&H. Written consents from each patients' guardians were taken before enrollment in this study.

### Clinical data collection

The clinical records from each patient with matched selection criteria were collected with direct supervision of the medical officer. The Vesikari clinical method of diarrheal severity scoring was used for screening the clinical data [21].

Nucleic acid extraction and polymerase chain reaction

Extraction of genomic DNA from each isolate was carried out by genomic DNA kit (QIAGEN, India). The extracted genomic DNA from each strain was then quantified at 260/280 nm using spectrophotometer (UV-1800, Shimadzu, Japan) and used as template DNA (1 µg ml<sup>-1</sup> as final conc.) in the PCR. The PCR was developed by using 2X PCR TaqMixture (HiMedia, India). The final reaction volume was 25 µl. The primer sequences and PCR program that was used is described in Table 1. The PCR products

were checked in 1.0 g% (w/v) agarose gel electrophoresis and photographed using Gel Doc XR (Gel-pDoc, Bio-Rad, USA).

#### Selective isolation and preliminary Identification of pathogenic bacteria

Selective media based method was used for preliminary identification of enteropathogenic bacteria. Eosin methylene blue (EMB) agar and MacConkey agar were used for identification and isolation of *E. coli*, *Shigella* sp. Hiosulfate-citrate-bile salts-sucrose (TCBS) agar was used for *V. cholerae* and *Vibrio* sp. *Campylobacter* agar was used for *Campylobacter jejuni*. All selective media and LuriaBertani (LB) were purchased from HiMedia Laboratory, India.

#### Reference

1. Parkin PC, Macarthur C, Khambalia A, Goldman RD, Friedman JN (2010) Clinical and laboratory assessment of dehydration severity in children with acute gastroenteritis. *Clin Pediatr* 49: 235-239.
2. Zheng S, Yu F, Chen X, Cui D, Cheng Y, et al. (2016) Enteropathogens in children less than 5 years of age with acute diarrhea: a 5-year surveillance study in the southeast coast of China. *BMC Infect Dis* 16: 434.
3. Abebe A, Tekla T, Kassa T, Seheri M, Beyene B, et al. (2014) Hospitalbased surveillance for rotavirus gastroenteritis in children younger than 5 years of age in Ethiopia: 2007–2012. *Pediatr Infect Dis J* 33: S28-S33.
4. Alkoshi S, Maimaiti N, Dahlui M (2014) Cost-effectiveness analysis of rotavirus vaccination among Libyan children using a simple economic model. *Libyan J Med* 9: 26236.