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Rotavirus and Enteric Adenovirus Detection Among Diarrheic Outpatients in a Tertiary Hospital

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Abstract

Background: *Rotavirus and enteric Adenovirus are the most common agents of acute gastroenteritis.*

It was aimed to determine the frequency of rotavirus and enteric adenovirus among patients admitted to our hospital with acute gastroenteritis.

Method: *A total of 4230 outpatients with acute gastroenteritis were enrolled in this study. Rotavirus and enteric Adenovirus antigens were detected in stool samples of the patients by immunochromatographic method (Rota-Adeno Virus Combo Rapid Test, DIMA GmbH, Germany). Clinical data were obtained from patient records retrospectively.*

Results: *Rotavirus antigen was detected in 426 (10,1%) stool sample. Of the Rotavirus-infected patients, 297 (69,7%) were younger than 2 years. There was a significant difference ($p<0.05$) between patients younger than 2 years and those older than 2 years. Among Rotavirus-infected patients, 279(65,5%) were male and 147(34,5%) were female. There was no significant difference ($p>0.05$) between genders in terms of rotavirus infection. Enteric Adenovirus antigen was detected in stool samples of 170(4%) patients. Of the Adenovirus-infected patents, 96(56,5%) were male, 74(43,5%)were female and 88(51,8%) were younger than 2 years old. There was no significant difference between genders and ages.*

Conclusion: *Rotavirus should be considered in diarrhea of children under 2 years. Rapid and properly diagnosis of viral gastroenteritis is crucial in prediction of clinical implications and reduction of unnecessary antibiotic usage.*

Keywords*: Rotavirus, Enteric Adenovirus, acute gastroenteritis*

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Introduction

Gastroenteritis is the inflammation of gastrointestinal tract mucus membranes which is characterized by diarrhea with or without vomiting[1]. Viruses are the most common causes of acute gastroenteritis; Rotavirus and Enteric Adenovirus are the leading viruses[2] .

Rotavirus is a member of Reoviridae family, possessing segmented double-stranded RNA[3]. Rotavirus gastroenteritis is an important problem for both developed and developing countries. It causes watery diarrhea, often accompanied by vomiting and fever and is usually seen in temperate climatic regions, especially in autumn and spring[4]. Rotavirus was reported to be responsible for approximately 39% of hospitalizations due to acute gastroenteritis[5,6].

Adenoviruses are enveloped double-stranded DNA viruses. There are at least 51 different serotypes in six subgenuses. Adenoviruses causing acute gastroenteritis belong to subgenus F usually with serotypes 40 and 41[7]. Adenovirus is the second most common cause of acute and prolonged diarrhea in children. Adenovirus gastroenteritis occurs in a way similar to rotavirus and can be seen in all months of the year. Adenovirus causes a mild gastroenteritis which may be accompanied by respiratory symptoms such as cough and nasal discharge[8]. Adenovirus infections cause serious public health problems and epidemics as they have been thrown away for a long time after healing[2].

Oral rehydration therapy is the first line therapy in childhood diarrhea[1] . Properly diagnosis of viral gastroenteritis is important in order to reduce unnecessary antibiotic usage.

Materials and Methods

Stool samples of patients diagnosed as acute gastroenteritis were included in the study. Acute gastroenteritis was defined as assing at least 3 or more watery stool per day. Only one stool sample per patient was enrolled in the study. Non-watery stool samples were excluded from the study. Rotavirus and Adenovirus 40/41 antigens were investigated by immunochromatography method in fresh faeces samples. The stool samples were examined by Rota-Adeno Virus Combo Rapid Test®, (DIMA GmbH, Germany) kit according to manufacturer's recommendation.

Fresh stool samples were suspended in buffer solution. After five minutes, 3 drops of suspension were put onto the strips containing antibodies against group A Rotavirus and Adenovirus 40 and 41 antigens. In the presence of the agent in the stool sample, antigen binds to the specific antibody and a line appears in the relevant part of the strip. The tests were performed and recorded by certified

laboratory technicians of microbiology laboratory according to laboratory test book.

Statistical analysis

Statistical analyses were performed by SPSS 18.0 software package programme. Categorical variables were displayed as frequencies (%) and statistical significance was determined as $P < 0.05$.

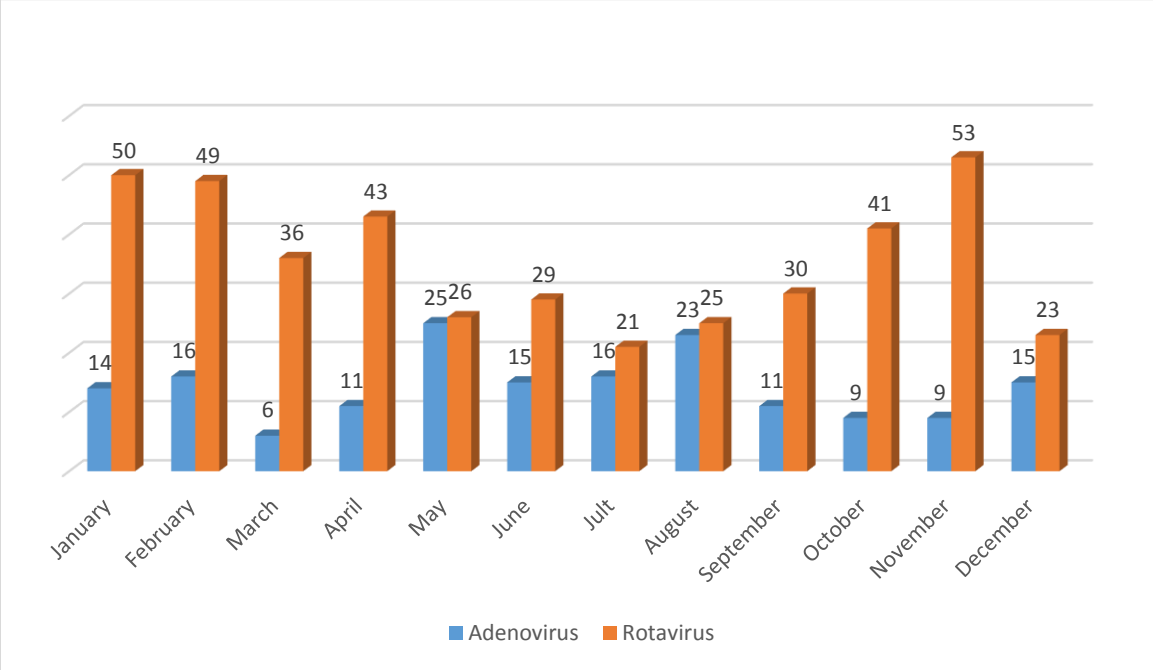
Results

A total of 4230 stool samples were examined for both Rotavirus and Adenovirus 40 and 41 antigens in six years' time. The majority of the patients (3284 person,77,6%) were under the age of sixteen. Among all patients, 2456 (58%) were male and 1774 (42%) were female.

Rotavirus antigen was detected in 426 (10,1%) stool samples of all age groups. Rotavirus antigen positivity rate was 12,5% (412/3284) among children. The majority of antigen-detected patients (308 patients, 72,3%) were under 2 years old. The difference between age groups –younger and older than 2 years- was statistictically significant ($p<0.05$). Among rotavirus-infected patients 279 (65,5%) were male and 147 (34,5%) were female. The gender difference was not statistically significant ($p>0.05$) among rotavirus-infected patients. Seasonal distribution of rotavirus infection was as follows: 124 cases (29,1%) in autumn, 122 cases (28,6%) in winter, 105 cases (24,7%) in spring and 75 cases (17,6%) in summer. Rotavirus infected cases were most commonly detected in November (53 cases) and January (50 cases).

Adenovirus 40-41 antigens were detected in 170 (4%) stool sample. Adenovirus positivity rate among children was 4,3% (142 of 3284 patients). Of the antigen-detected patients, 88 (51,8%) were under 2 years of age. Among Adenovirus-infected patients, 96 (56,5%) were male and 74 (43,5%) were female. There was no significant difference between age and gender among Adenovirus-infected patients. Seasonal distribution of Adenovirus gastroenteritis was as follows; 54 cases (31,8%) in summer, 45 cases (26,5%) in winter, 42 cases (24,7%) in spring and 29 cases (17%) in autumn. Adenovirus-infected cases were most commonly detected in May (25 cases) and August (23 cases) (Table I).

Table I. Monthly distribution of Adenovirus and Rotavirus infections



Discussion

Although much has been learned about infectious gastroenteritis, infectious agents cannot be found in about half of the cases[9]. Viruses were first described as gastroenteritis agents in 1972. They remain to be the leading causes of acute gastroenteritis[2]. Viruses are the most common causes of newborn and childhood gastroenteritis. Especially Rotavirus is the leading cause of acute viral gastroenteritis worldwide in children under 5 years of age[9,10]. It is estimated that 440,000 children die each year due to rotavirus gastroenteritis. In developing countries, 5% of infant mortality rates under 5 years are reported to be due to rotavirus gastroenteritis[6]. Rotavirus positivity in acute gastroenteritis patients under five years of age has been reported as 4-20% of outpatients and 20-50% of inpatients[11,12,13,7]. In Tanzania, Rotavirus antigen was detected in 62 (20%) of 300 children with acute watery diarrhea [13]. Roman et al., reported the detection of Rotavirus alone in 35,2% and as coinfectious agent in 6,3% of stool samples[11]. Rotavirus prevalence among children was reported as 65,5% in Riyadh Saudi Arabia between 2008 and 2010[7]. Enteric viruses were screened by ELISA and RT-PCR from stool samples of 480 children <5 years of age with acute diarrhea in

Venezuela. Viruses were detected in 43% (250/480) stool samples and Rotavirus was the most frequently (21%) identified enteric virüs in that study [14].

In a study conducted in the middle Anatolian region of Turkey, Rotavirus positivity was reported as 14,8% by Tüzüner et al[15]. In another study among 0-5 years aged children, Rotavirus was detected in 25.7 % (38/148) of patients[16]. In our study, Rotavirus was detected in 10,1% of all age groups and 12,5% (412/3284) among children. The study included all age groups but the majority of Rotavirus detected patients (308 patients, 72,3%) were less than 2 years old age. Patients with mild gastroenteritis are usually referred to primary health care centers. Since our hospital is a tertiary hospital, patients requiring hospitalization with severe diarrhea are often referred to our hospital. This may explain the low detection rate of rotavirus in our hospital. In a study conducted in the western region of Turkey, Biçer et al reported Rotavirus antigen positivity as 25% among 0-5 years aged children[17]. In a study including 2962 patients diagnosed with AGE, Rotavirus antigens were detected in 483(16,3%) stool sample[18]. Bayraktar et al., reported rotavirus and both rotavirus and adenovirus positivity rates as 23,7% and 0,4% respectively [19].

Adenovirus 40-41 antigens were detected in 170 (4%) stool sample of all ages and 142 (4,3%) of children patients. These results are consistent with other studies in our country. Tüzüner et al. reported adenovirus positivity as 2.3% among 5156 pediatric patients[15]. In another study, Gül and colleagues detected adenovirus type 40/41 antigen in 4.7% of 0-5 years aged patients with latex agglutination test[16]. Biçer et al reported adenovirus type 40/41 antigen positivity as 8.6% among 0-5 years aged pediatric patients[17]. In a study conducted in İstanbul, the incidence rate for adenovirus was established as 1.5% among 1358 pediatric patients[19].

Adenovirus was detected in 5% (24/480) stool samples in a large pediatric hospital of Valencia, Venezuela[14]. Enteric viruses were detected in 59% (129/217) stool samples of German children with acute diarrheae. Among virüs-detected samples, 79% (102/129) had Rotavirus and 14% (18/129) had enteric adenovirus[20]. According to the reports of a study among hospitalized children in the U.S.A, rotavirus, astrovirus and enteric adenovirus were detected in 6.8%, 5.2% and 0.8% stool samples of children less than 6 years old age [2].

Conclusion

The aetiologic determination of acute gastroenteritis is crucial for the treatment and prognosis of the disease. Viral gastroenteritis may lead severe epidemics and hospitalisations. Rotavirus is most common in children less than 2 years old age while Adenovirus can be detected in all age groups.

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