

Rotavirus and adenovirus prevalence at Tepecik education and research hospital (Turkey)

Prevalenza di rotavirus e adenovirus nell'Ospedale Universitario di Tepecik (Turchia)

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INTRODUCTION

Microorganisms that cause gastroenteritis can lead to morbidity, particularly in infants and young children and also large outbreaks globally [1]. Infectious gastroenteritis may occur due to bacteria, parasites and viral agents.

Gastroenteritis caused by viral pathogens show an increment especially in more developed countries (MDCs): all the progress made in sanitation has had little impact on viral gastroenteritis cases [2].

Rotaviruses and adenovirus types 40 and 41 are the most prevalent viruses causing childhood gastroenteritis in MDCs.

Rotavirus is the most common agent for diarrhoea world wide [3]. Rotaviruses belong to the *Reoviridae* family and have a non-enveloped icosahedral structure.

They are wheel-shaped under an electron microscope. The capsid layer has a double protein layer and the outer part of the capsid contains VP7 and VP4 structural proteins and the inner portion has mainly VP6 protein.

Rotavirus groups A, B and C cause infection in humans [4].

Adenovirus causes 5% of all infectious diseases in infants and 3% in the age of 2-4 years [5], and is known to be the second most common agent in infantile gastroenteritis [6].

Belonging to the *Adenoviridae* family, most Adenoviruses are from the subgroup F.

They are DNA viruses with an icosahedric symmetry that has a protein capsid composed of

252 capsomers. The serotypes commonly causing gastroenteritis are 40 and 41, and they belong to subgroup F [7].

Rotavirus, norovirus, adenovirus 40/41 and astrovirus are the four major categories of enteric viruses that may cause gastroenteritis [8].

In children, group A rotavirus is the major aetiological agent of viral gastroenteritis, accounting for 29 to 45% of hospitalizations worldwide [9, 10].

Diarrhoeal infections affect millions of people worldwide and have the biggest effect on children, especially in developing countries.

The aim of this study was to determine the prevalence of rotavirus and adenovirus from the stool samples obtained at the Infectious Diseases and Clinical Microbiology Laboratory of Tepecik Education and Research Hospital.

MATERIALS AND METHODS

Tepecik Education and Research Hospital is a tertiary care centre with 900 beds and receives a large number of patients with low socioeconomic status.

The faecal samples collected from these patients were screened for rotavirus and adenovirus by commercially available immunochromatographic enzyme immunoassay kit (Rotavirus/Adenovirus Combo Rapid Test Device) (San Diego, CA, USA).

The assay was performed according to the manufacturer's instructions.

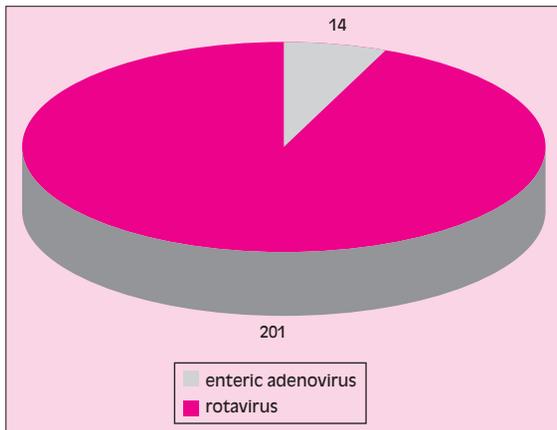


Figure 1 - Rotavirus vs adenovirus prevalence.

RESULTS

A total of 1112 stool samples were collected from May 23rd 2008 to May 25th 2010 at Tepecik Education and Research Hospital Infectious Diseases and Clinical Microbiology Laboratory. Of these 1112 faecal samples, 201 (18.07%) were positive for rotavirus and 14 (1.2%) were positive for adenovirus antigen (Figure 1). 610 were male and 502 were female.

The age ranged between 0-85 (mean of 42.5) years. A total of 821 faecal specimens were received from paediatric patients with an age range of 0-3 years.

DISCUSSION

Acute gastroenteritis is still a major cause of morbidity and mortality globally. More than 700 million cases of acute diarrhoea occur in children under five years annually. The mortality rate is 3-5 million cases per year, with most occurring in developing countries [11].

Bulut et al. performed a study to detect the positivity of rotavirus in stool specimens in children with acute gastroenteritis [12]. Rotavirus antigen was detected by latex agglutination assay in stool specimens of 250 children. Rotavirus was found in 21% of patients' specimens and the infection rate reached the peak level in winter time.

Bicer et al. reported rotavirus and adenovirus prevalence by using the immunochromatographic method in 838 acute gastroenteritis cases from the paediatric emergency department in one year [13].

Rotavirus and adenovirus antigens were detected in 268 (32%) and 136 (16.2%) cases. Bayraktar et al. investigated the incidence of rotavirus group A and enteric adenovirus serotype 40 and 41 in pediatric patients with acute gastroenteritis symptoms [14].

In 1358 stool specimens of acute gastroenteritis cases, admitted to the paediatric outpatient clinic in September 2008 to July 2009, viral antigens were detected in 25% of the specimens. The incidence was 23.7% for rotavirus, 1.5% for adenovirus and 0.4% for both rotavirus and adenovirus.

The authors detected the highest rotavirus antigen in patients under two years of age and observed most during winter and spring. Altindis et al. reported an incidence of gastroenteritis due to rotavirus and adenovirus in children, applying to their hospital with fever, vomiting, abdominal pain and diarrhoea [15]. Ninety-four healthy children from different day centres were included in the study as the control group.

All children were 0 to 6 years old. Stool samples were obtained from all children and screened for rotavirus antigen and adenovirus antigen.

Rotavirus was detected in 14 children (12.5%) and adenovirus in five (4.5%) children and both viruses in one child.

In the authors' opinion, rotavirus and adenovirus should be investigated in children with diarrhoea in winter. Inci et al. determined the seasonal and age distribution of rotavirus gastroenteritis in patients applying to the Parasitology Laboratory of Konya Research and Education Hospital between November 1st 2007 and October 31st 2008.

The rotavirus antigen was investigated by RIDA Quick Rotavirus kit in patients with diarrhoea, abdominal pain, vomiting and fever. Rotavirus was detected in 21% of stool samples and the prevalence was highest in children under one year old.

Also the prevalence was highest in winter [16]. Wiegeling et al. reviewed a large cohort of hospitalized children affected by gastroenteritis. 650 patients with pathogen-proven diarrhoea between April 2005 and May 2008 in the children's hospital of the University of Wurzburg were taken into the study.

Rotavirus was the most frequently detected pathogen and nosocomial infections were caused most commonly by norovirus. Rotavirus infections had a higher incidence of di-

arrhoea and elevated liver enzymes. The authors also stated seasonal distribution with the peak for rotaviruses in winter [17].

Rimoldi et al. performed a 22-month study on 273 patients admitted with gastroenteritis to the Paediatric Unit of the L. Sacco University Hospital in Milan.

Stool samples were evaluated for rotavirus, norovirus, adenovirus, sapovirus, enterovirus, astrovirus and bocavirus: 38.3% incidence of infection was detected for rotavirus; norovirus (16.2%), bocavirus (13.6%) and adenovirus (2.6%) came next [1].

Ospino et al. reported the epidemiological profile of viruses associated with acute gastroenteritis in children younger than five years of age in Colombia. The median detection rate of rotavirus was 35.2% and for calicivirus, astrovirus and adenovirus 40/41 were 10.4%, 2.7% and 1.35% [18].

Tran et al. reported 973 stool specimens collected in January to December 2007 from children hospitalized for gastroenteritis signs in two French hospital settings.

They were tested by rapid enzyme immunoassay (EIA) analyses for rotavirus and adenovirus and by two commercially available ELISA tests for the detection of norovirus and astrovirus. The overall rates of prevalence for rotavirus, norovirus, adenovirus, and astrovirus were 21, 13, 5, and 1.8%, respectively [19].

Palumbo et al. determined the aetiology of diarrhoea in children younger than five years that are hospitalised for acute enteritis.

A total of 402 children with acute diarrhoea were taken into the study between February 2003 and December 2006 in the Paediatric Department of Sondrio Hospital.

In all, 77.1% of the patients were infected by rotavirus, and 22.9% were infected by *Salmonella* spp.

The authors emphasized the epidemiological and clinical importance of rotavirus in hospitalised children younger than five years with acute diarrhoea [20].

Bicer et al. investigated the incidence of acute gastroenteritis cases of rotaviral/adenoviral aetiology in patients admitted to the emergency room of a teaching hospital.

In 2007, there were 1543 patients with gastroenteritis between 0-5 years of age whose stool samples were tested for rota and adenovirus: 25% were positive for rotavirus and 8.6% for adenovirus serotype 40-41.

Most of the rotavirus (74.6%) and adenovirus

(73%) cases were between 0-2 years of age. The peak season for rotavirus was January (44%) and February (50.6%).

According to the authors, there is a seasonal predisposition for viral gastroenteritis. Rotavirus infections are mostly detected in winter whereas adenoviral infections take place in the summer [21].

Crotti et al. investigated 523 stool specimens (330 children, 193 adults) of patients with recent diarrhoea. *Salmonella* spp was detected in 12.8% of cases, *Campylobacter* in 9.9% (11.5% and 7.3%), *C. difficile* toxin A in 11.3%; other bacteria generally in 2.4%, and protozoa were in 2.7% of the patients.

Among children rotavirus was shown in 41.4% of cases, and adenovirus in 3.6%. Enteritis occurred in children that were aged between 1 and 6 years.

According to the authors, the above pathogens were reported throughout the seasons, but rotavirus infections were detected during winter [22].

In our study a total of 1112 stool samples were collected from May 23rd 2008 to May 25th 2010 at the Tepecik Education and Research Hospital Infectious Diseases and Clinical Microbiology Laboratory.

Of these 1112 faecal samples, 201(18.07%) were positive for rotavirus and 14 (1.2 %) were positive for adenovirus antigen: 610 were male and 502 were female.

The age ranged between 0-85 (mean of 42.5) years. In all, 821 faecal specimens were received from paediatric patients with an age range of 0-3 years. Most of the patients with these infections were from the Paediatrics department.

Infective diarrhoea causes high morbidity in infants. It also leads to high mortality in infants and children in developing countries [23]. Acute gastroenteritis is considered one of the most common reasons for admission to health centres.

The most common cause of viral gastroenteritis is rotaviruses and enteric adenoviruses are the second most common cause. In our study the most common agent detected was rotavirus which is consistent with the literature. Viral antigen analysis in stool specimens is important for diagnosis. Detection of the viral aetiology in gastroenteritis cases will prevent unnecessary antibiotic consumption.

Keywords: gastroenteritis, adenovirus, rotavirus.

SUMMARY

Diarrhoea affects many people globally. Rotaviruses and enteric adenovirus types 40 and 41 are the most common viruses causing childhood gastroenteritis.

The aim of this study was to determine the prevalence of rotavirus and adenovirus from the faecal samples obtained at the Infectious Diseases and Clinical Microbiology Laboratory of Tepecik Education and Research Hospital. The faecal samples were screened for rotavirus, and adenovirus by commercially available immunochromatographic

EIA kit (Rotavirus/Adenovirus Combo Rapid Test Device) (San Diego, CA, USA). A total of 1112 stool samples were collected from May 23rd 2008 to May 25th 2010. Of these faecal samples, 201 (18.07%) were positive for rotavirus and 14 (1.2%) for adenovirus antigen.

In our study the most common agent detected was rotavirus. Viral antigen analysis in stool specimens is important for diagnosis. Detection of the viral aetiology in gastroenteritis cases will prevent unnecessary antibiotic consumption.

RIASSUNTO

La diarrea ad eziologia infettiva è ampiamente diffusa in tutto il mondo. In età infantile, la gastroenterite riconosce nei rotavirus e negli adenovirus enterici tipo 40 e 41 gli agenti eziologici virali più frequenti. Questo studio è stato condotto allo scopo di determinare la prevalenza di rotavirus e adenovirus in campioni di feci raccolti nel reparto di Malattie Infettive e analizzati presso il Laboratorio di Microbiologia dell'Ospedale Universitario di Tepecik, Turchia. La ricerca di adenovirus e adenovirus nei campioni fecali è stata effettuata

con metodo immunocromatografico EIA (Rotavirus/Adenovirus Combo Rapid Test Device) (San Diego, CA, USA). Complessivamente, nel periodo compreso tra il 23 maggio 2008 e il 25 maggio 2010 sono stati raccolti 1112 campioni di feci, di cui 201 (18,07%) positivi per l'Ag di rotavirus e 14 (1,2 %) per l'Ag di adenovirus. La ricerca degli antigeni virali nelle feci è importante per la diagnosi; inoltre, determinare l'eziologia virale dei casi di gastroenterite previene l'inutile somministrazione di antibiotici.

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