Evaluation of rotavirus gastroenteritis in children: five years' surveillance in Alanya, Antalya

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SUMMARY: Çoban B, Topal B. Evaluation of rotavirus gastroenteritis in children: five years' surveillance in Alanya, Antalya. Turk J Pediatr 2014; 56: 280-284.

Rotavirus infection is the major cause of fatal diarrhea among children younger than five years. We aimed to determine the frequency of rotavirus infection according to age, gender and month of the year. From April 2008 through March 2013, 3,106 fresh stool specimens of children under the age of 16 years were tested for rotavirus antigen, and rotavirus antigen was detected as positive in 422 (13.6%) patients. Half of the patients (208/422, 49.3%) were younger than two years. 40.9% (173/422) of all rotavirus gastroenteritis cases were detected in winter months. The ratio of rotavirus positivity in all laboratory studies was highest (19.3%) in February.

Key words: rotavirus, children, acute gastroenteritis.

Diarrhea represents a group of diseases that can affect everyone at any age. It remains one of the leading causes of death in children under five years of age, accounting for 5-10 million deaths per year[1]. Because the majority of deaths due to diarrhea occur in low- and middle-income countries, the etiological agents responsible for diarrheal deaths among young children are unknown[2].

Rotavirus infection is the major cause of fatal diarrhea among children younger than five years, accounting for 453,000 deaths in 2008 based on recently published World Health Organization estimates[3]. In other words, every child under five years is infected at least once with rotavirus. One of 5 cases with rotavirus gastroenteritis (RVGE) visits the doctor, 1 of 65 cases is admitted to the hospital, and 1 of 293 cases dies[4].

Severe gastroenteritis with rotavirus is seen in children aged 4-24 months old. It has an incubation period of 2-4 days[5]. Fever and frequency of vomiting more than twice per day are common symptoms of rotavirus infection, which is considered the main cause of severe dehydrating diarrhea. Diarrhea may last 2-8 days[6,7]. Two rotavirus infections protect the host approximately 100% against moderate or severe gastroenteritis[8].

This report is one of the longest surveys with RVGE from Turkey. We aimed to determine the frequency of rotavirus infection according to age and gender. We also aimed to define any variation between months of the year and the laboratory results demonstrated in our patients.

Material and Methods

This study was conducted at Başkent University Alanya Research and Medical Center. Alanya is a district of Antalya. It is a southern town in the Mediterranean region of Turkey with a temperate climate and a population of 100,000. Alanya has a capacity of 2 million tourists during the summer months. From April 2008 through March 2013, patients of pediatric clinics and pediatric wards were reevaluated. Patients up to 16 years of age were included in the study. Electronic records, patient documents and records of the microbiology laboratory were reviewed. Fresh stool specimens were sent to the laboratory and examined for ova and cysts immediately. If negative, rotavirus antigen was detected using the method of monoclonal antibody in fresh stool using CerTest Rota Blister Test (CerTest, Biotec, Spain) and RIDA® Quick Rotavirus/Adenovirus Combi (r-Biopharm, Germany). The assay was performed according to the manufacturer's instructions. Sensitivity of the tests was 97.8% and 98% and specificity of the tests was 94.4%

and 99%, respectively. Biochemical and blood count results of the patients were recorded retrospectively. Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) 11.0 for Windows (SPSS, Chicago, IL). Data are given as mean ±standard deviation (minimum and maximum) if possible.

Results

Over five years, 3,106 fresh stool specimens were tested for rotavirus antigen, and rotavirus antigen was detected as positive in 422 (13.6%) patients (233 (55.2 %) boys, 189 (44.8%) girls). Mean age of the patients was 34.69 (3-157) months. Half of the patients (208/422, 49.3%) were <2 and 77% (325/422) were <4 years old. Forty-six (11%) patients were aged 10-12 months and 34 (8%) patients were aged 22-24 months old (Fig. 1).

The seasonal distribution of RVGE displayed a higher incidence in winter and early spring. The monthly distribution of all studies for rotavirus antigen in the laboratory over the five- year period is shown in Table I. Many patients with diarrhea are seen in our pediatric clinic throughout the year and in all months. In July and January, the number of studies represented 21.7% (672/3,106) of all patients. The ratio of rotavirus positivity was highest (19.3%) in February and lowest (0.3%) in July. Distribution of patients with RVGE according to month is seen in Figure 2. 40.9% (173/422) of all RVGE cases were detected in winter months. In July and August, only 20 (4.7%) RVGE cases were determined.

White blood cell counts were available in 385 (91%), and the mean count was 10511±4792/mm^3 (range: 2260-28400). C-reactive protein (CRP) was determined in 375 (89%) of 422 patients, and the mean was 12.14±18.02 (0.04-130.60; >5 mg/L positive). CRP was positive in 50.7% (190/375) patients. Liver function tests were studied in 331 (78%) of the patients. Mean aspartate aminotransferase (AST) value was 45.74±15.30 (20–111; normal <55 IU/L), and results were high in 61 (18.4%). Mean alanine aminotransferase (ALT) value was 28.67±14.56 (6–144; normal <39 IU/L), and results were high in 42 (12.7%).

Discussion

Rotavirus is the leading cause of dehydrating gastroenteritis in young children throughout the world[9]. It causes acute diarrhea in infants and children, resulting in 25 million physician visits and 2 million hospitalizations every year[10]. It is responsible for 53% of all hospitalizations due to gastroenteritis[11].

Rotavirus gastroenteritis (RVGE) represents 13.6% of all gastroenteritis cases in our medical center. Reports from Turkey about RVGE incidence are shown in Table II[12-31]. The proportion of RVGE ranges from 12.5%-41%.

With respect to outpatients, the number of total rotavirus antigen studies was 21,667. 18.4% (3988/21,667) of all cases were RVGE. Rotavirus infections are seen mostly in the winter months in Turkey. Gültepe[28] published an exceptional report, in which the majority of rotavirus cases in Van were seen in summer months, especially in June. It may be endemic, but further studies are needed.

Ogilvie[32] published a review of 38 studies from European countries. RVGE accounted for 22.0%-55.3% of all cases of acute gastroenteritis. Bosnia Herzegovina (22%) and Czech Republic (23.9%) had the lowest proportion, while Russia had the highest incidence (55.3%) of

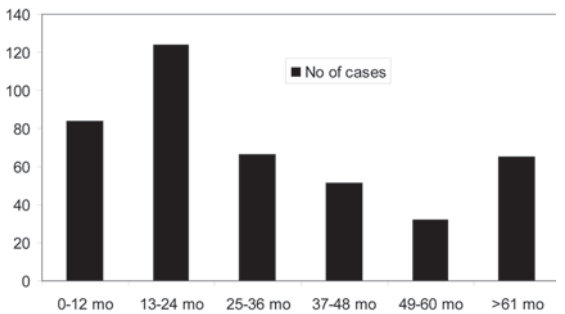

Fig. 1. Age distribution of patients.

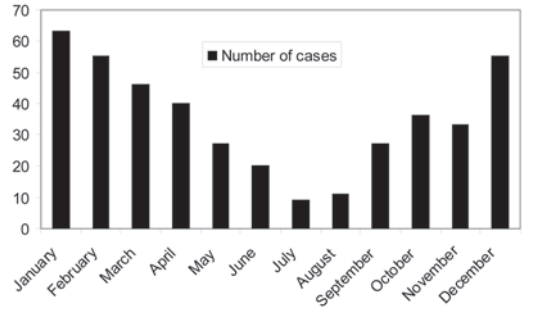

Fig. 2. Monthly distribution of rotavirus gastroenteritis.

Table I. Monthly Distribution of All Studies for Rotavirus Antigen in the Laboratory over Five Years

Month	No. of total patients	No. of lab studies	% of annual studies	Rotavirus-positive	% of monthly studies
January	8096	332	10.8	63	18.9
February	7345	284	9.2	55	19.3
March	8066	247	8.0	46	18.6
April	6645	210	6.8	40	19.0
May	6476	223	7.1	27	12.1
June	6338	231	7.2	20	8.6
July	6867	340	10.9	9	0.3
August	6530	282	9.1	11	0.4
September	6030	212	6.9	27	12.7
October	6933	254	8.1	36	14.1
November	6797	194	6.4	33	17.0
December	7681	297	9.5	55	18.5
Total	90449	3106	100.0	422	13.58

Table II. Reports from Turkey about Rotavirus Gastroenteritis

	Study location	Year	Ages (years)	Percentage of RVGE %	No. of rotavirus patients	Season
Bulut[12]	Malatya	1998-2001	0-5	21	52/250	Winter
Altındiş[13]	Afyon	1999-2000+	0-6	12.5	14/112	Winter
Kurugöl[14]	İzmir	2000	0-6	39.8	366/920	Winter
Topkaya[15]	İstanbul	2004-2005	0-12	14	46/320	Winter
Kaşifoğlu[16]	Eskişehir	2005-2011	0-16	19.9	247/1241	Winter
Adal[17]	İstanbul	2006-2007	0-2	39.6	82/207	Winter
Yüksel[18]	İstanbul	2006-2009	0-14	25	75/302	Winter
Şimşek[19]	Ankara	2007	0-6	29.1	37/127	Autumn
Biçer[20]	İstanbul	2007-2008	0-6	21.1	386/1543	Winter
Akan[21]	İstanbul	2007-2008	0-14	18.7	126/672	Winter
Sarıçoban[22]	İstanbul	2007-2008	0-16	22.2	135/609	Winter
İnci[23]	Konya	2007-2008	0-16	21	264/1258	Winter
Hacımustafaoğlu[24]	Bursa	2007	0-14	21	105/497	Winter
Gülfem[25]	İzmir	2008-2010	0-7	18.0	201/1112	Winter
Tekin[26]	Mardin	2008-2009	0-14	16.7	157/941	Autumn
Balcı[27]	Denizli	2008-2009	0-5	26.5	237/930	Winter
Gültepe[28]	Van	2009	0-5	41	74/180	Summer
Meral[29]	Ankara	2009-2010	0-5	21.1	53/251	Autumn
Balkan[30]	Erzurum	2010-2011	0-5	25.9	88/340	Winter
Iraz[31]	İstanbul	2011-2012	0-5	12.2	821/6749	Winter
Çoban*	Antalya	2008-2013	0-16	13.5	422/3106	Winter
Total				18.4	3988/21667	

RVGE: Rotavirus gastroenteritis. + Study is between winter and spring. *Our study.

rotavirus. In most countries, rotavirus was most common in winter months, although it was reported year round in Bulgaria, which the author also found unusual. The last two reports from Turkey (Iraz[31] and our study) showed an incidence of 12.6% (1243/9855),

which is the lowest for the last decade. Does RVGE decrease over time? Ogilvie[32] found that incidence in Bulgaria and Russia declined 15% and 24%, respectively, over a five-year period.

The proportion of RVGE in children under five years of age in Middle Eastern and North African countries has ranged from 16%-61%. The incidence was 16% in Saudi Arabia, 23% in Tunis and 61% in Syria. In most countries, the peak season for rotavirus is winter, except in Egypt, where it peaks July-November[33].

Rotavirus infections are not restricted to the gastrointestinal system. Ahmed et al.[34] detected rotavirus antigen in blood in 65% of all gastroenteritis cases. Pancreatitis, encephalopathy, meningitis, neutropenia, and secondary bacteremia have been reported with rotavirus[35-37]. In our patients, CRP was positive in 50.7%, and AST and ALT were high in 18.4% and 12.7%, respectively. We must be alert to extraintestinal system involvement. This report is a review of laboratory results. We did not have our patients' clinical information, hospitalization or rotavirus vaccination history.

Neonatal infections of rotavirus are commonly asymptomatic, with 69%-95% not showing overt signs of gastroenteritis. Neonates are not entirely immune to rotavirus. Viral shedding can begin as early as 2 days of life, peak at 3-6 days, and resolve by 2 weeks of age. The likelihood of acquiring an infection is related to the length of stay in the hospital after birth[38].

We must remember that rotavirus has epidemic potency including all age groups, and it may affect 10,000 people in just two weeks[39]. The high cost of rotavirus vaccine is a major problem for vaccination[40]. It is recommended that rotavirus vaccines should be fully subsidized by the government in Turkey[41].

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