

Viral gastroenteritis in Saudi children

Mohammed Arif, PhD,
Malak M. El-Hazmi, MD, KSFPATH.

Viral gastroenteritis (GE) is one of the most common illnesses of children throughout the world. Human rotavirus is the leading cause of severe GE in infants and young children worldwide. A safe and effective vaccine providing early specific immunity would be the primary means for adequate control of this disease. Each country that consider using rotavirus vaccine may want to review the prevalence of rotavirus disease in their setting. Therefore, our primary goal was to determine the prevalence of viruses causing acute GE among children at King Khalid University Hospital (KKUH) in Riyadh, KSA. In addition, our secondary goal was to examine the association of prevalence of viral GE in relation to gender, age, and seasonal distribution pattern in this population.

This was a retrospective study carried out between January 1998 to December 2003 at the Virology laboratory at KKUH, KSA. A total of 614 stool samples were collected from children under the age of 12 years, who were seeking medical care for acute GE. They were either hospitalized in this hospital or seeking treatment as out patients. The studied children were classified into 5 groups according to their age as follows: 0-6 months, >6-12 months, >1-2 years, >2-5 years, >5-12 years. All stool samples were tested for the presence of rotaviruses group A antigen, enteric adenoviruses and astroviruses, using DAKO EIA kits (DAKO Ltd, Cambridgeshire, United Kingdom). The chi-square test (X^2) was used to compare the prevalence rate of rotaviruses in relation to age and gender in the studied groups. A test of linear trend was conducted to determine whether positivity tended to change with age.

Of the 614 children involved in this study, 350 were boys (57%) and the rest 264 were girls (43%). Group A rotaviruses were detected in 156 samples (25.4%) whereas enteric adenoviruses were detected in 7 samples (1.1%). Of the 485 stool samples

Table 1 - Prevalence of rotavirus categorized by gender and age.

Factors	n of samples	Rotavirus +ve (%)	p-value
Gender			<i>p</i> =0.93655
male	350	89 (25.4)	
female	264	67 (25.4)	
Age groups*			<i>p</i> <0.00001
0-6 months	161	38 (23.6)	
>6-12 months	114	47 (41.2)	
>1-2 years	141	50 (35.5)	
>2-5 years	112	14 (12.5)	
>5-12 years	86	7 (8.1)	
Total	614	156 (25.4)	

p = 0.00016 by Chi-square for linear trend, +ve - positive

processed for astroviruses only 4 samples were found to be positive (0.8%). The difference in the number of processed samples for rotaviruses, enteric adenoviruses and astroviruses was due to the late introduction of astrovirus test in our virology laboratory. This test was introduced in April 1999. Co-infections were found only in 2 samples. Both were positive for rotaviruses and adenoviruses. Since the number of positive samples for enteric adenoviruses (7) and astroviruses (4) were small, the distribution of viral gastroenteritis according to gender, age and season was limited only to rotavirus infection. The prevalence of rotavirus infection among male and female children was statistically not significant (*p*>0.05), as shown in Table 1. However, the prevalence of rotavirus infection among the 5 age groups was statistically significant. The prevalence was 41.2% in the 6-12 months group, 35.5% in the 1-2 years group, and decreased dramatically in the children greater than 5 years to 8.1% (X^2 -linear trend=14.235; *p*=0.00016) (Table 1). The monthly distribution of rotavirus infection was irregular, showing no seasonal variation, which indicated that rotavirus infection occurs all the year round. This study was concentrated on studying the prevalence of viral gastroenteritis in Saudi children under the age of 12 years over a period of 6 years. The low number of tested samples (614) in this study might be attributed to the fact that children with mild to moderate diarrhea were treated directly by the general practitioner or family pediatrician without confirmation from the laboratory. In this study, the overall prevalence of rotavirus infection was 25.4%, indicating it is the major cause of acute viral GE in children. This finding was in total agreement with that reported by other hospitals in Riyadh area, for example 14.1% at King Faisal

Specialist Hospital.¹ High prevalence rates of rotavirus infection have also been reported in other Saudi cities, 41.3% in Al-Taif and Jeddah.² Rotavirus infection also appears to be a major health problem all over the world. Prevalence rate of 15.3% in Iran,³ 13.9% in Bahrain,⁴ 42.3% in Indonesia,⁵ 17.3% in France⁶ and 6.8% in United State of America⁷. Since viral GE is not a disease of obligatory notification, the above variation in the prevalence rates of rotavirus infection appears to be dependent on the study design. In which this discrepancy may be explained by the difference in the duration of the stool samples collection for each study, whether the number of samples collected during year round or during the peak season. In addition to age dependence, the possibility of technical variation from laboratory to another, as well as the difference in the sensitivity of the methods used for the detection of rotavirus in each study may also contribute to the wide prevalence rates and should be carefully taken into consideration. In this study, the prevalence rate of rotavirus infection between male and female children was not significant. Similar results were reported in Iran³ and Indonesia⁵. Also, we found a significant relationship between age and rotavirus infection. The highest incidence was in infants aged between 6-12 months, and the lowest was in the 5-12 year age group. This data clearly indicated that rotavirus infection acquired early in life. Therefore, older children become resistant to infection due to previous exposures.

The minimal number of rotavirus diarrhea cases observed in infants younger than 6 months might be attributed to maternal immunity, breast feeding or age-dependent physiological factors. When the seasonal distribution of rotavirus diarrhea was investigated, we found no significant seasonal variation exists. Rotavirus infection occurred all year round. This observation has been supported by other studies carried out in Riyadh.¹ However, our finding did not agree with that reported in Jeddah and Al-Taif,² which reported higher incidence of rotavirus infection in cooler and warmer months, respectively. Since the climate in Riyadh city is characterized by high temperature for most of the year, dryness and low amount of rain falls, the effect of these environmental factors on the prevalence of rotavirus infection appears to be minimal. In contrast to the high prevalence rate of rotavirus infection (25.4%), the incidence of enteric adenoviruses was 1.1% and 0.8% astroviruses. Several studies have similarly shown that enteric adenoviruses and astroviruses came second to rotaviruses as a cause of viral gastroenteritis.^{6,7} Low prevalence rates of 5.2% and 6.8% have been reported with astroviruses infection in USA⁷ and France⁶. Enteric adenoviruses were found in acute diarrheal cases in Bahrain (0.6%)⁴, Indonesia (4%)⁵

and KSA (5.3%). Although, the prevalence rates of adenoviruses (1.1%) and astroviruses (0.8%) reported in the above mentioned studies were higher, it is clearly supported our finding that adenoviruses and astroviruses are the secondary causes of viral gastroenteritis in children.

Received 11th January 2005. Accepted for publication in final form 25th March 2005.

From the Department of Pathology / Microbiology, King Khalid University Hospital, Riyadh, Kingdom of Saudi Arabia. Address correspondence and reprint requests to Dr. Mohammed Arif, Associate Professor and Consultant Virologist, Department of Pathology / Microbiology (32), College of Medicine, King Saud University and King Khalid University Hospital, PO Box 2925, Riyadh 11461, Kingdom of Saudi Arabia. Tel. +966 (1) 4672693 / 4671010. Fax. +966 (1) 4672462. E-mail: virology2005@yahoo.com

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