

Investigation of Group A Rotavirus Antigen Frequency in Children Who Have Acute Gastroenteritis with Immunochromatographic Methods

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ABSTRACT

Rotavirus is the major cause of acute gastroenteritis in infants and young children worldwide and is the important agent of child deaths. Rotavirus infections represent in different clinical pictures ranging between mild diarrhea to serious cases requiring hospitalization. In addition to causing morbidity and mortality in children, rotavirus gastroenteritis creates a major economic burden on health care systems and families. To investigate the epidemiology of rotavirus infections in children with acute gastroenteritis in our region. Feces samples of 0- to 14-year-old children who were admitted to emergency department with acute gastroenteritis were examined in terms of rotavirus A antigen with the immunochromatographic method, using the manufacturer's instructions. Viral antigens were detected in 318 of 3102 samples (10.2%). Of the patients, 179 (56.3%) were male and 139 (43.7%) female. The highest rate of rotavirus antigen positivity was observed in patients younger than 2 years (44.3%; n = 141). Positivity rate peaked in the January-February-March, especially in winter months, rotavirus is an important agent in children with acute gastroenteritis. Diarrhea due to rotavirus, the most common cause, can be detected from serogroup A antigen in the feces. It is possible to detect with the immunochromatographic method, which is a rapid testing method. immunochromatographic methods that can detect antigens from feces and diagnose diarrhea in a short time period is important. We believe that when patients present with diarrhea, diagnosed the viral factor accurately and quickly, which could also prevent unnecessary use of antibiotics.

Keywords: Acute gastroenteritis; immunochromatographic; rotavirus.

Akut Gastroenteritli Çocuklarda Grup A Rota Virus Antijen Sıklığının İmmünokromatik Yöntemle Araştırılması

ÖZ

Rotavirüs dünyadaki çocuk ölümlerinin önemli bir faktörüdür ve çocukluk çağında görülen akut gastroenteritin en büyük sebebidir. Rotavirüs enfeksiyonları yatış gerektiren ağır enfeksiyonlar şeklinde görüldüğü gibi hafif enfeksiyon şeklinde de seyredebilir. Mortalite ve morbidite yanında bir takım ekonomik kayıplarda sebep olabilir. Bu çalışma çocuklarda görülen rotavirüs gastroenteritinin bölgemizdeki epidemiyolojisinin tespiti amacıyla yapılmıştır. Akut gastroenterit şikayeti ile acil kliniğine başvuran 0-14 yaş arası çocuklardan elde edilen dışkı örnekleri rotavirüs açısından değerlendirildi. Üretici firmanın talimatlarına göre Rota virüs A antijeni immünokromatografik yöntemle incelendi. 3102 örnekten 318'inde viral antijenler saptandı (%10.2). Hastaların 179'u (%56.3) erkek, 139'u (%43.7) kadındı. Rotavirüs antijeni en yüksek olarak 2 yaşından küçüklerde gözlemlendi (%44.3; n = 141). Pozitif oran özellikle Ocak, Şubat, Mart ta en yüksek düzeyine ulaşmıştır. Özellikle kış aylarında görülen gastroenteritlerde Rota virüs önemli bir faktör olarak karşımıza çıkmaktadır. Gastroenteritin en büyük sebebi olan rota virüs, dışkıdaki serogrup A antijeninden saptanabilir. İmmünokromatografik yöntemle antijeni hızlı bir şekilde belirlemek mümkündür. Çok kısa sürede dışkıdan antijenin belirleyen ve ishali teşhis eden immünokromatografik yöntemler son derece önemlidir. Gastroenteritli çocuklarda viral faktörlerin hızlı bir şekilde teşhis edilmesinin gereksiz antibiyotik kullanımının önüne geçeceğine inanıyoruz.

Anahtar Kelimeler: Akut gastroenterit; immünokromatografik; rotavirüs.

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INTRODUCTION

Diarrhea has emerged as a major health problem all over the world, especially in developing countries. Gastroenteritis is located among the top three causes of death due to infection (1). Rotavirus (RV) is a virus that is a member of the Reoviridae family that is double stranded and contains segmented RNA. Rotaviruses are known as the most important factor in gastroenteritis in newborns throughout the world. Each year, 2 million children younger than 5 years die due to gastroenteritis. Up to 600,000 of these deaths result from rotavirus gastroenteritis (2,3). Diarrhea due to rotavirus Rotavirus diarrhea is a problem of both developed and developing countries around the world. Despite some differences in epidemiology, RV diarrhea is seen in similar frequency in both developed and developing countries. Although it causes mortality in developing countries, in developed countries it causes morbidity, hospitalization, and economic losses. In the European Union, it is estimated that 3.6 million episodes of diarrhea affect about 23.6 million children younger than 5 each year (4). RV infection is responsible for hospitalizations due to acute gastroenteritis is 39%. Rotavirus disease is estimated to have an economic impact of more than \$1 billion annually in the United States (5). The clinical spectrum of rotavirus infection in children is accompanied by dehydration and varies from asymptomatic infection to severe diarrhea leading to death. The incidence of severe diarrhea in rotavirus gastroenteritis infections is more than that of other forms of gastroenteritis (6). Viruses associated with human rotavirus gastroenteritis are classified as group A rotaviruses. Rotaviruses infect cells in the intestinal villi. They multiply in the cytoplasm of enterocytes and cause damage to the transport mechanism. Enterotoxin encoded in the rotavirus induces secretion by stimulating signals (2,7). Vomiting and fever are accompanied by severe gastroenteritis caused by the virus. Therefore, patients must be hospitalized because of the risk of seizures and lack of oral rehydration (8). Both can cause death due to the fact that someone has failed to develop effective treatments. The scope of the fight against viral gastroenteritis epidemiology must necessarily be followed by surveillance work.

In the present study in our region, we determine the incidence of rotavirus gastroenteritis in children and aim to shed light on the frequency of periodic vaccination and surveillance work to be done in the future” or “In the present study we determine the incidence of rotavirus gastroenteritis in children in our region and aim to shed light on the frequency of [something] and periodic vaccination and surveillance work to be done in the future.

MATERIALS AND METHOD

Between January 2013 and December 2013, feces samples of 0- to 14-year-old children who were admitted to emergency department of Isparta Pediatrics Hospital with acute gastroenteritis were examined in terms of rotavirus A antigen with the immunochromatographic method (RIDA Quick Rotavirus, R-Biopharm, Germany) using the manufacturer’s instructions. The distribution of antigen-positive patients, their connection with demographic data,

and the distribution of seasons were investigated retrospectively from patient files.

Statistical analysis

The data obtained were recorded in the SPSS 18 program. Data were presented as frequencies and percentages. The Pearson chi-square test was used to compare the average value of the two different groups. It was used to compare between antigen positivity and age groups, seasonal rates.

RESULTS

Viral antigens were detected in 318 of 3102 samples (10.2%). Of the patients, 179 (56.3%) were male and 139 (43.7%) female. Two hundred fifty-two (79.2%) of the patients were younger than 5 years. The highest rate of rotavirus antigen positivity was observed in patients younger than 2 years (44.3%; n = 141). It was statistically significant ($X^2=18.19$ P=0.001). The lowest rate was observed in patients 12 years and older (Table 1). In addition, 33.3% of patients were admitted in winter, and 27.3% of patients were admitted in spring (Figure 1). The highest incidence of rotavirus was observed in the winter season, especially in December. This result was statistically significant ($X^2=46.06$ P=0.001).

Table 1. The distribution of cases by ages groups

According to the age groups of cases

Groups of ages (Year)	Number (n)	Percentage (%)
0-2	141	44.3
2-5	111	34.9
6-11	48	15.1
12->	18	5.7
TOTAL	318	100

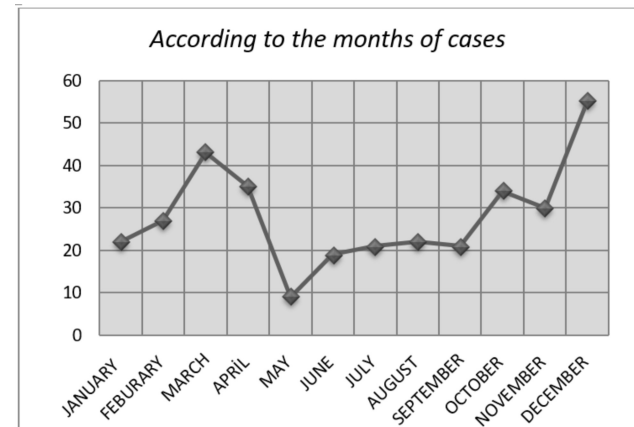


Figure 1. The distribution of cases by month

DISCUSSION

Infectious diarrhea is still a major health problem in the world. Especially in childhood among cases of infectious diarrhea, viral gastroenteritis has an important place. Recently, viruses are in first place among gastroenteritis factors, Recently, viruses have been identified as the leading factor in gastroenteritis and rotavirus continues to be isolated as the most common cause of acute viral gastroenteritis (1,9).

Diarrhea due to rotavirus, the most common cause, can be detected from serogroup A antigen in the feces. It is possible to detect with the immunochromatographic method, which is a rapid testing method. This method is preferred because antigen results are consistent with those of the ELISA in 10 minutes, can easily be studied in a small amount of sample, and have high sensitivity (93-100%). In our study, the test was able to determine group A antigens; viral antigens were detected in 318 (10.2%) of the 3102 samples. Rotavirus positivity rates in children with acute gastroenteritis have been reported in studies conducted in several countries at rates ranging from 14% to 62% (12-15). Akıncı et al (16) reported rotavirus antigen A positivity in 13.7% of patients in their study. Another study by Altındış et al (17) reported rotavirus antigen positivity of 12.5%. Kurugöl and colleagues (18) reported that rotavirus was among the most common acute gastroenteritis agents detected in stool samples, found in 39.8% of samples. Our results were relatively low compared to the results of studies conducted throughout the world and in our country. The World Health Organization's research on the results of rotavirus epidemiology and vaccines did not report on the rates of Turkey (19). People of all ages can be affected by rotavirus infection. Studies have shown that the highest rate of infection is seen in patients younger than 2 years old (20). Rosenfeldt et al (21) reported that in 52% of cases in which viral antigens were detected, patients were between 1 and 2 years old. In our study, the highest percentage (44.3%) of rotavirus group A specific antigen positivity was seen in children younger than 2 years. In studies performed in our country of patients younger than 2 years, the rate of Rotavirus infections ranges from 44% to 80% (16-18, 22). Rotavirus infections in developed countries show seasonal pattern and tend to peak in cold seasons (7). Rotavirus infections are often predominant during the winter season: 70% to 95% of gastroenteritis due to rotavirus is seen in winter seasons, whereas 0% to 20% is seen in summer seasons. In the United States and Europe, the highest frequency of Rotavirus infections is between December and March (23). Studies conducted in our country considering seasonal distributions showed that rotavirus positivity is most frequently seen in winter (16,17,22). In our study, the highest incidence of rotavirus was observed in the winter season, especially in December.

One of the most common causes of diarrhea in children is rotavirus, and it should be examined in all childhood diarrhea cases. Rotavirus gastroenteritis in children is an important factor especially in the winter months and should be investigated routinely. In conclusion, our study showed that rotavirus is the most common cause of diarrhea in children and should be investigated in children, especially those younger than 2 years. In light of the data on the detection of rotavirus positivity, the factor should be studied so that its clinical course and treatment strategy can be predicted and epidemiological data can be contributed. Despite progress in recent years in our health system, empirical antibiotic therapy in gastroenteritis cases has still emerged as a problem. Microbiological agents are being investigated in general, but viral agents that are responsible for a significant portion of gastroenteritis have not been

investigated because of insufficient infrastructure and the technical requirements needed in most of our hospitals. Antimicrobial resistance due to unnecessary usage is still a problem that must be solved. We believe that methods like immunochromatographic methods that can detect antigens from feces and diagnose diarrhea in a short time period is important. After evaluating the data obtained from the results of this study, we believe that when patients present with diarrhea, we can diagnose the viral factor accurately and quickly, which could also prevent unnecessary use of antibiotics.

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