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ORIGINAL ARTICLE

Frequency of Rotavirus and Enteric Adenoviruses among children with acute gastroenteritis in a district hospital

Türkan Toka Özer[1], Erkan Yula[1], Özcan Deveci[2], Alicem Tekin[3], Süleyman Durmaz[4], Mustafa Gülenç[5], Keramettin Yanık[6]

[1]Kiziltepe General Hospital, Microbiology Laboratory, Mardin, Turkey
[2]Dicle University, Faculty of Medicine, Department of Infectious Diseases, Diyarbakir, Turkey
[3]Dicle University, Faculty of Medicine, Department of Medical Microbiology, Diyarbakir, Turkey
[4]Erciyes University, Faculty of Medicine, Department of Medical Microbiology, Kayseri, Turkey
[5]Caycuma General Hospital, Department of Infectious Diseases, Zonguldak, Turkey
[6]Amasya General Hospital, Microbiology Laboratory, Amasya, Turkey

ABSTRACT

Objective: Rotavirus and Enteric Adenoviruses (EA) are most important viral enteric agents which cause acute infectious gastroenteritis. Little is known about the epidemiology of Rotavirus and EA gastroenteritis in our city. In this study, it was purposed to determine of the frequency of Rotavirus, EA, and to detect of the seasonal distribution among pediatric patients with acute gastroenteritis in Kiziltepe General Hospital, Mardin-Turkey.

Materials and methods: The records of acute infectious gastroenteritis cases caused by Rotavirus and EA were reviewed retrospectively. In a total of 426 pediatric patients admitted between May 2010 and March 2011 were diagnosed as acute gastroenteritis. Rotavirus and EA antigens were examined in the fresh stool specimens with immunochromatographic assay method by a commercial rapid diagnostic kit (RIDA, QuickRota-Adeno-CombiR-Biopharm AG, Germany).

Results: A total of 426 pediatric patients with acute gastroenteritis were followed during the study between May 2010 and March 2011. The eight (1.9%) stool samples were favorable for EA, 40 (9.4%) stool samples were favorable for Rotavirus and in ten (2.3%) stool samples were favorable with both Rrotavirus and EA. The high-positivity-rates were detected on average of 24.7% for Rotavirus between October 2010 and January 2011. The high-positivity-rates of EA were determined on average of 8.4% between October and November 2010, and on average 7.9% between May and August 2010. Viral antigen-positive cases were observed in autumn and winter months with most common 0-2 month age-group.

Conclusion: Rotavirus is foremost viral enteric agent among children with acute infectious gastroenteritis. The antigens of Rotavirus and EA should be performed regularly in fresh fecal samples among children ≤5 years of age, especially in the autumn and winter months. *J Microbiol Infect Dis 2011;1(2): 64-67*

Key words: Rotavirus, Enteric Adenoviruses, acute gastroenteritis, children, frequency.

Bir devlet hastanesinde akut gastroenteritli çocuklarda Rotavirüs ve Enterik Adenovirüs sıklığı

ÖZET

Amaç: Rotavirüs ve Enterik Adenovirüsler (EA), enfeksiyöz gastroenteritlerin en önemli viral enterik etkenleridir. Ülkemizdeki Rotavirüs ve Enterik Adenovirüslerin epidemiyolojisi çok iyi bilinmemektedir. Bu çalışmada; Kızıltepe Devlet Hastanesi'ne başvuran akut gastroenteritli çocuk hastalarda Rotavirüs ve Enterik Adenovirüslerin sıklığının ve aylara göre dağılımının belirlenmesi amaçlandı.

Gereç ve yöntem: Rotavirüs ve Enterik Adenovirüslerin neden olduğu akut enfeksiyöz gastroenteritlere ait kayıtlar retrospektif olarak gözden geçirildi. Mayıs 2010 ile Mart 2011 tarihleri arasında hastanemize başvuran toplam 426 çocuk hasta akut gastroenterit tanısı aldı. Rotavirüs ve Enterik Adenovirüslerin antijenleri taze dışkı örneklerinde immünokromatografik test yöntemi ile bir ticari hızlı tanı kiti (RIDA, Quick Rota-Adeno-Kombi R-Biopharm AG, Germany) kullanılarak araştırıldı.

Bulgular: Mayıs 2010 ile Mart 2011 tarihleri arasında gerçekleştirilen çalışma sırasında toplam 426 akut gastroenteritli çocuk hasta takip edildi. Sekiz dışkı örneğinde (% 1,9) Enterik Adenovirüsler, 40 dışkı örneğinde (% 9,4) Rotavirüs, on

Correspondence: Türkan Toka Özer
Kiziltepe General Hospital, Microbiology Laboratory, Kiziltepe, Mardin, Turkey, Email: tozer10@gmail.com
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dışkı örneğinde (% 2,3) ise Rotavirüs ve Enterik Adenovirüsler birlikte pozitif bulundu. Rotavirüs için yüksek pozitiflik oranları Ekim 2010 ile Ocak 2011 tarihleri arasında ortalama % 24,7 olarak saptandı. Enterik Adenovirüsler için yüksek pozitiflik oranları ise Ekim ile Kasım 2010 tarihleri arasında ortalama olarak % 8,4 ve Mayıs ile Ağustos 2010 tarihleri arasında ortalama olarak % 7,9 olarak tespit edildi. Viral antijeni pozitif vakalar en sık 0-2 ay-yaş grubuyla sonbahar ve kış aylarında görüldü.

Sonuç: Çocukluk çağı akut enfeksiyöz gastroenteritlerinde en önemli viral enterik ajan Rotavirüstür. Özellikle sonbahar ve kış aylarında taze dışkı örneklerinde Rotavirüs antijeni rutin olarak araştırılmalıdır.

Anahtar kelimeler: Rotavirüs, Enterik Adenovirüsler, akut gastroenterit, çocuklar, sıklık.

INTRODUCTION

The acute gastroenteritis is one of the most common illnesses also in Turkey as all over the world. At the same time, the acute gastroenteritis is one of the major reasons of high mortality and morbidity. Especially among ≤5 years of age children, nearly 700 million cases with the acute gastroenteritis are estimated every year throughout the world. The acute gastroenteritis is responsible of approximately four millions deaths per year. Rotavirus and Enteric Adenoviruses (EA) are the main reasons of severe infectious diarrhea among children under 5 years of age. Around the world, Rotavirus and EA lead to roundly 150 million acute infectious gastroenteritis episodes and approximately 800,000 deaths every year. The incidence of acute infectious gastroenteritis depend on Rotavirus and EA varies from 1 to 8% in industrialized countries, where as in developing countries numbers of 2-31% have been reported.1 Some studies showed that viral agents are important causes for acute gastroenteritis cases among children.[1-3] A study from South-Eastern Anatolia, Mardin province, reported the frequency of Rotavirus as 16.7%, and EA as 1.0% among ≤5 years of age children with acute gastroenteritis.[2]

The studies performed about the incidence of viral enteric pathogens are meager in developing countries, while time consumer and expensive viral laboratory tests are usually not worked.[3] In this respect, viral laboratory tests which are cheap and easily implemented for detection of viruses are considered necessary both to avoid needless and potentially damaging antimicrobial drug treatment and to recover the information on the epidemiology of childhood acute gastroenteritis.[4] There is a number of commercially accessible immunochromatographic assay kits for detection of viral enteric pathogens such as Rotavirus, EA, and Noroviruses in fresh stool specimens.[5]

The aim of the present study was to determine the epidemiology of Rotavirus, EA, and to detect of the distribution by months among pediatric patients with acute infectious gastroenteritis in Kiziltepe with immunochromatographic assay method by a commercial rapid diagnostic kit.

MATERIALS AND METHODS

The records of acute gastroenteritis caused by Rotavirus and EA were reviewed retrospectively. A total of 426 pediatric patients aged 0-14 years who admitted to Kiziltepe General Hospital in Mardin-Turkey between May 2010 and March 2011 was diagnosed as acute gastroenteritis and requested Rotavirus and EA antigens test in fresh stool specimens were included in this study. The watery stool at macroscopic examination and parasite-free stool samples at direct microscopic examination were included the study. Reported to be hemorrhagic, and parasites (*Giardia intestinalis*, *Entamoeba histolytica* antigen adhezin and so on.) detected in fresh stool specimens were excluded from evaluation. Rectal swab samples are not considered as a study material. In this study, the presence of Rotavirus and EA antigens in fresh fecal samples were investigated. Rotavirus and EA antigens were investigated with immunochromatographic assay method by commercial rapid diagnostic kit (RIDA, QuickRota-Adeno-CombiR-Biopharm AG, Germany) in the fresh stool specimens of 426 acute gastroenteritis cases applied to pediatric service of our hospital between May 2010 and March 2011.

RESULTS

A total of 426 pediatric patients with acute gastroenteritis were followed during this study between May 2010 and March 2011. The eight (1.9%) stool samples were favorable for EA, 40 (9.4%) stool samples were favorable for Rotavirus and in ten (2.3%) stool samples were favorable with both Rotavirus and EA.

The different positivity-rates were seen both Rotavirus and EA according to months (Table 1).

Viral antigen- favorable stool samples were observed in autumn and winter months with most common 0-2 month age-group in Graphic 1.

Table 1. The distribution of positivity-rates of Rotavirus and EA antigens detected according to months.

Time	Rotavirus positivity-rates (%)	Enteric Adenoviruses positivity-rates (%)
May 2010	0.2%	9.5%
June 2010	0.2%	4.7%
July 2010	0.2%	10.0%
August 2010	3.7%	7.4%
September 2010	0.0%	0.0%
October 2010	30.0 %	10.0%
November 2010	40.8%	6.8%
December 2010	14.9%	2.1%
January 2011	13.0%	2.2%
February 2011	8.3%	5.0%
March 2011	4.8%	2.9%

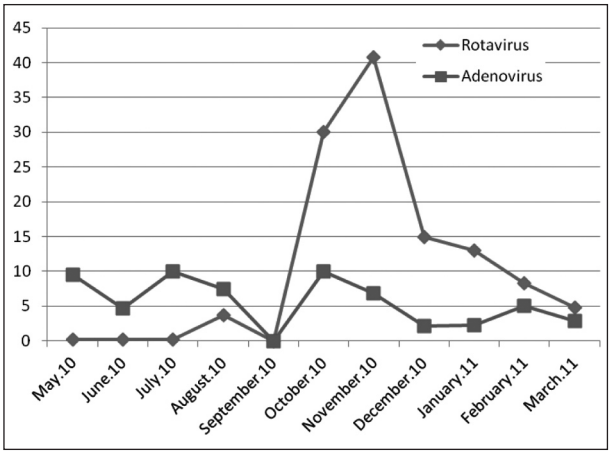

Figure 1. This is distribution of positivity-rates (%) for Rotavirus and EA antigens detected according to months.

DISCUSSION

The acute gastroenteritis is one from the most common diarrheal illnesses among children all over the world. Notably among children, viruses are documented as a most important reason of the acute infectious gastroenteritis. Rotavirus and EA are the most common reasons of diarrheal illnesses among children ≤5 years of age. Additionally, EA is also other important viral etiologic agent of childhood acute infectious gastroenteritis.[6]

Weitzel et al.[4] performed with immunochromatographic test by commercial rapid diagnostic kit (Rida-Quick-rotavirus/adenovirus-Combi) under pretty bad circumstances among children with acute gastroenteritis in Ghana. They compared with PCR results; sensitivity and specificity of rapid diagnostic kit were found as 75% and 95% for Rotavirus and 22% and 84% for EA, respectively. In conclusion, they reported that rapid diagnostic kit might help to overcome difficulties in the diagnosis of Rotavirus infection.

Kurokawa et al.[8] performed by Real-Time PCR, ELISA and rapid immunochromatographic test kit for detection of diarrheagenic viruses such as Rotavirus, EA, and Norovirus in fresh stool specimens of children with diarrhea collected in Kathmandu, Nepal and in Kobe, Japan in summer of 2004. They reported that viral enteric pathogens were not common during summer season in both Nepal and Japan. They also reported that rapid immunochromatographic test kit was simple, easy, and requiring less time (three hours for ELISA, 15 minutes for rapid immunochromatographic test kit). In addition, they said that rapid immunochromatographic test kit was appeared to be practical and helpful for rapid diagnosis of viral enteric pathogens especially in underdeveloped and developing countries.

By Tran et al.[9] prospectively obtained a total of 973 stool samples from children with diarrhea. They reported that the prevalence rates for Rotavirus and EA were 21% and 5%, respectively. They reported that there was need to put into practice the rapid diagnostic test for determine of Rotavirus and EA.

In Mersin (situated at Mediterranean shore of Turkey), a total of 363 stool samples collected from children 0-6 years of age were included the study. In study, the presence of Rotavirus and EA antigens in fecal specimens were investigated with ELISA method by the commercial rapid diagnostic kit (R-Biopharm RIDASCREEN, Germany). Viral antigen positivity-rates for Rotavirus and EA in fecal specimens were detected as 32.2% (117/363) and 10.5% (38/363), respectively. In conclusion, Rotavirus was the most frequently

detected as a viral agent in children with acute gastroenteritis.10

Tekin[2] investigated the Rotavirus and EA antigens in the fresh stool samples by the qualitative immunochromatographic test kit. In a total of 170 stool samples, Rotavirus was established in 157 (16.7%), EA in 9 (1.0%), with both Rotavirus and EA in 4 (0.4%). Tekin reported that the viral antigen positivity-rates were most frequently seen during autumn and winter months in children between 5-24 months of age.

Bayraktar et al.[7] detected the viral antigens in 348 (25.6%) of 1,358 fecal samples. They established that the positivity-rates were 23.7% for Rotavirus, 1.5% for EA, and 0.4% for both Rotavirus and EA, respectively. The highest Rotavirus antigen positivity-rate was detected in the <2 age group with 51%. Additionally, Rotavirus positivity-rates were frequently obtained during winter (46%) and spring (39%) months.

In another study, Rotavirus and EA antigens investigated by rapid immunochromatographic test kit in stool samples of 838 children with acute gastroenteritis. Investigator said that they were detected as 268 (32%) for Rotavirus and 136 (16.2%) for EA antigens. Rotavirus positivity-rates was highest in February, January and December and EA positivity-rates was highest in July, May and September. [11]

Bicer et al.[12] screened for Rotavirus and EA antigens with ELISA method in stool specimens of children with acute gastroenteritis. They reported that the positivity-rates were detected as12.5% for Rotavirus, 4.5% EA, and 1% for both Rotavirus and EA. They emphasized that viral enteric agents must be analyzed among children with diarrhea in winter session.

Shimizu et al.[13] performed for rapid detection of Rotavirus and EA with immunochromatographic method by commercial rapid diagnostic kit (Rapidtest Rota-Adeno, Daiichi Pure Chemicals Co. Ltd., Japan) in fecal samples of children. Rapidtest Rota-Adeno test kit is able to simply and rapidly determine the Rotavirus and EA antigens.

In conclusion, data of the present study found as similar with other studies that performed in our country and in different countries. Rotavirus is foremost viral enteric agent among children with acute gastroenteritis. The antigens of Rotavirus and EA should be performed routinely in fecal samples among children ≤5 years of age, especially in the autumn and winter months.

REFERENCES

1. Wilhelmi de Cal I, Roman E, Sánchez-Fauquier A. Viruses causing gastroenteritis. Clin Microbiol Infect 2003;9:247-262.
2. Tekin A. The frequency of rotavirus and enteric adenovirus in children with acute gastroenteritis in Mardin. J Clin Exp Invest 2010;1:41-45.
3. Cheng AC, McDonald JR, Thielman NM. Infectious diarrhea in developed and developing countries. J Clin Gastroenterol 2005;39:757-773.
4. Weitzel T, Reither K, Mockenhaupt FP, et al. Field evaluation of a rota- and adenovirus immunochromatographic assay using stool samples from children with acute diarrhea in Ghana. J Clin Microbiol 2007;45:2695-2697.
5. Forman MS, Valsamakis A. Specimen collection, transport, and processing: virology. In: Murray PR, Baren EJ, Pfaller MA, Jorgensen JH, and Yolken RH (ed.). Manual of Clinical Microbiology 2003:1227-1241.
6. Wilhelmi de Cal I, Mohedano del Pozo RB, Sánchez-Fauquier A. Rotavirus and other viruses causing acute childhood gastroenteritis. Enferm Infec Microbiol Clin 2008;26:61-65.
7. Bayraktar B, Toksoy B, Bulut E. Detection of Rotavirus and Adenovirus in Children with Acute Gastroenteritis. Klimik Derg 2010;23:15-17.
8. Kurokawa M, Ono K, Ishiyama S, Rai SK. Evaluation of rapid diagnostic methods for pediatric viral diarrhea using samples collected in Nepal and Japan. Nepal Med Coll J 2004;6:78-82.
9. Tran A, Talmud D, Lejeune B, et al. Prevalence of rotavirus, adenovirus, norovirus, and astrovirus infections and coinfections among hospitalized children in northern France. J Clin Microbiol 2010;48:1943-1946.
10. Özdemir S, Delialioğlu N, Emekdaş G. Investigation of rotavirus, adenovirus and astrovirus frequencies in children with acute gastroenteritis and evaluation of epidemiological features. Mikrobiyol Bul 2010;44:571-578.
11. Biçer S, Bezen D, Sezer S, et al. Rotavirus and Adenovirus Infections in Acute Gastroenteritis Cases in Pediatric Emergency Service. ANKEM Derg 2006;20:206-209.
12. Altındiş M, Başţepe G, Çeri A, Yavru S, Kalaycı R. Frequency of rotavirus and enteric adenovirus infection in children with acute gastroenteritis. SDÜ Tıp Fakültesi Dergisi 2008;15:17-20.
13. Shimizu H, Li L, Mitamura K, Okuyama K, Hirai Y, Ushijima H. Evaluation of immunochromatography based rapid detection kit of rotavirus and adenovirus. Kansenshogaku Zasshi 2001; 75:1040-1046.