

Rota virus diarrhea in children under five admitted to Basrah General Hospital

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ABSTRACT

Background: This study is a retrospective record-based study involving all children aged less than five years admitted to Basrah General Hospital with acute gastroenteritis during study period 2008-2013.

Objectives: To measure the prevalence of rotavirus infection and to relate the infection to selected epidemiological variables.

Methods: All children less than five years old admitted to pediatric ward in Basrah General Hospital with acute gastroenteritis over the period 2008- 2013 were included. They were 942 in number. The data were collected through special form (diarrhea case report form). It included two parts, the first part about patient's information and clinical information while the second one was about the laboratory information.

Results: The overall prevalence of rotavirus infection among the study children was 43.7%. The highest prevalence rate was in 2009 (53.0%) and the lowest rate was in 2010 (33.6%). The infection increased in the colder months of the year. The infection was more among age group 6-12 months (58.7%) affecting males and females in similar degree and no statistical significance could be found. All the positive rotavirus cases complained from diarrhea (100%), vomiting (74.5%) and fever (70.1%).

Conclusions: Rotavirus a common cause of acute gastroenteritis in children under five years old. The prevalence was higher in infant between 6-11 months.

Key words: Rotavirus, Diarrhoea, gastroenteritis, infant

اسهال الفيروس العجلي بين الاطفال دون سن الخامسة الراقدين في مستشفى البصرة العام

خلفية البحث: شملت هذه الدراسة جميع الاطفال المصابين بحالات الاسهال، الاقل من خمسة سنوات الراقدين في ردهة الاطفال في مستشفى البصرة العام للفترة من ٢٠٠٨ ولغاية ٢٠١٣ وهي دراسة استرجاعية اعتمدت على المعلومات المدونة في الاستمارة الخاصة لكل حالة اسهال.

الهدف من الدراسة: لمعرفة مدى انتشار الإصابة بمرض فايروس الروتا (العجلي) للأطفال الاقل من الخمسة سنوات المصابين بالإسهال، وعلاقة المرض بعدة عوامل (العمر، الجنس، اختلاف الاشهر)

طريقة الدراسة: شملت الدراسة جميع الاطفال المصابين بحالات الاسهال (٩٤٢) الاقل من خمسة سنوات والراقدين في ردهة الاطفال في مستشفى البصرة العام للفترة من ٢٠٠٨ ولغاية ٢٠١٣ واعتمدت الدراسة على المعلومات المدونة في الاستمارة الخاصة لكل حالة اسهال والتي تشمل جزئين، الجزء الاول يشمل معلومات عن المريض والعلامات السريرية اما الجزء الثاني فيشمل معلومات عن نتائج الفحوصات المختبرية.

نتائج الدراسة: لقد اظهرت الدراسة التي اجريت على ٩٤٢ اقل بان معدل انتشار الإصابة بمرض فايروس الروتا (العجلي) للأطفال الاقل من الخمسة سنوات المصابين بالإسهال هي ٤٣,٧% وان اعلى معدل للإصابة في سنة ٢٠٠٩ واطهرت النتائج بان هناك علاقة بين توزيع الاصابات حسب الاشهر حيث سجلت أكثر الاصابات في الاشهر الباردة . وكذلك اظهرت النتائج بان الاصابات بمرض الفايروس العجلي يشمل كل الاعمار وبالخصوص الاطفال من عمر ٦-١١ شهر وعدم وجود علاقة احصائية واضحة بين الاصابات والجنس.

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واظهرت الدراسة ان جميع الاطفال المصابين بهذا الفيروس يعانون من ارتفاع درجات الحرارة، وقد تم دراسة العلاقة بين الاصابات ومعدل البقاء في المستشفى وكانت هناك علاقة حقيقية بينهما وكان معدل الرقود هو ٣ أيام.

الكلمات المفتاحية: فايروس الروتا، الإسهال، التهاب المعدة والامعاء، الرضع

INTRODUCTION

Diarrhea is defined by the World Health Organization (WHO) as the passage of 3 or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection, which can be caused by a variety of bacterial, viral and parasitic organisms. Infection spreads through contaminated food or drinking-water, or from person to person as a result of poor hygiene.^[1] Diarrheal diseases represent a major health problem in developing countries.^[1] Rotaviruses (RV) are the leading cause of severe diarrheal disease and dehydration in infants and children under the age of 5 years worldwide ^[2] and accounts for up to 50% of hospitalizations for severe diarrhea in infants and children.^[3] Rotavirus infection can also occur in adults,^[4] especially in institutionalized or hospitalized elderly patients.^[5] Its importance is still not widely known within the public health community, particularly in developing countries.^[6] Rotavirus constitutes approximately 39% of all severe diarrhea cases across the world, and is responsible for the deaths of more than 600,000 people annually. A sudden onset of symptoms typically manifests in children 1 to 2 days after infection with RV. The clinical picture of Rotavirus Gastroenteritis (RVGE) is characterized by 4 to 7 days of acute febrile illness, vomiting, and watery, non-bloody diarrhea. This combination can lead to rapid dehydration without appropriate intervention. Secondary infections with RV are clinically milder or asymptomatic.^[4,7] The most widely available method for confirmation of rotavirus infection is detection of rotavirus antigen in stool by enzyme immunoassay (EIASA). Several commercial test kits are available that detect an antigen common to human rotaviruses.

These kits are simple to use, inexpensive, and very sensitive.^[8] Other techniques are also in use such as electron microscopy, reverse transcription polymerase chain reaction, nucleic acid hybridization, sequence analysis, and culture.^[9] Rotavirus antigen has also been identified in the serum of patients 3–7 days after disease onset^[10,11] but at present, routine diagnostic testing is based primarily on testing of fecal specimens. There are no methods for the prevention or control of infection or illness with rotaviruses. Although improved hygiene is of course generally desirable, it does not appear that such measures would markedly affect transmission of rotavirus infection. Therefore, the development of rotavirus vaccine is of primary importance. In February 2006, the United States Food and Drug Administration (FDA) approved RotaTeq. RotaTeq administration has been recommended for children as 3 separate oral doses at ages 2, 4, and 6 months. In April 2008, the FDA approved Rotarix, another oral vaccine, for prevention of rotavirus gastroenteritis. Rotarix administration is currently recommended as 2 separate doses to patients at ages 2 and 4 months.^[10,11] Rotarix was efficacious in a large study showing that it protected patients against severe rotavirus gastroenteritis as well as decreasing the rate of severe diarrhea or gastroenteritis of any cause.^[12] Two rotavirus vaccines against Rotavirus infection are safe and effective in children.^[13] Rotarix by GlaxoSmithKline.^[14] and RotaTeq by Merck.^[13] Both are taken orally and contain attenuated live virus.^[12]

PATIENTS AND METHODS

This is a retrospective record-based study covered the years 2008-2013 inclusive. Children aged less than 60 months admitted with acute

gastroenteritis to pediatric ward in Basrah General Hospital who were notified to the surveillance unit at the department of public health in Basrah were included. Data were collected through special form (diarrhea case report form) designed for data related to rotavirus surveillance system. It included two parts. The first part included questions that covered patient information including name, age (by months) and sex and questions related to clinical information such as symptoms (fever, diarrhea and number of episodes of diarrhea, vomiting and number of episodes of vomiting during twenty four hours, degree of dehydration status, duration of hospitalization and outcome. The second part of the form was about the laboratory information that covered the following aspects:

- 1- Stool specimens collected, either yes or no.
- 2- Date of stool collected.
- 3- Date of sending the specimen to laboratory.
- 4- Date of receiving laboratory results.
- 5- Rotavirus EIASA results.
- 6- Genotyping result: G.....P.....

The stool samples were collected from each suspected case during the acute illness within 24

hours of hospital admission and sent to the Central public health laboratory in Baghdad for investigation by an enzyme-linked immunosorbent assay (ELISA) technique according to the manufacturer's recommendations. This is part of the surveillance system in Iraq. Analysis of the data obtained was made by using SPSS (Statistical Package for Social Sciences) version 19 and the data were analyzed by Chi squared test and P value of less than 0.05 was considered significant. Calculation of mean values were made for age and duration of stay in hospital.

RESULTS

Prevalence of rotavirus over year:

The overall rotavirus prevalence rate among the 942 patients less than five year old admitted to the Basrah General Hospital with acute diarrhea was 43.7% as detected by Enzyme-linked immunosorbent assay technique (ELISA). During 2008-2013.(Table-1). The highest prevalence rate was in 2009 (53.0%) and the lowest prevalence rate was in 2010 (33.6%). A statistical significant association was demonstrated among prevalence rate and time (P= 0.032).

Table 1. Prevalence rates of rotavirus infection among patients over the years 2008-2013.

Years	Total no. Studied (a)	No. Positive for rotavirus (b)	Prevalence rate (%) B/a
2008	252	116	46.0
2009	115	61	53.0
2010	137	46	33.6
2011	191	77	40.3
2012	112	54	48.2
2013	135	58	43.0
Total	942	412	43.7

$\chi^2=12.189$

df=5

P=0.032

Seasonal pattern:

The rotavirus was detected throughout the year and exhibited some magnitude of seasonal variation. Low rates are seen during the months of April-July as compared to all other months. The variation in seasonal pattern was statistically significant (P=0.001), (Table-2).

Table 2. Seasonal pattern of rotavirus infection among children with diarrhea admitted to hospitals over the years 2008-2013.

Month	No. Admitted (a)	No. +ve rotavirus (b)	Prevalence rate (%) (b/a)
January	36	20	55.6
February	69	36	52.2
March	65	33	50.8
April	72	29	40.3
May	108	41	38.0
June	148	43	29.1
July	121	46	38.0
August	73	38	52.1
September	54	31	57.4
October	53	26	49.1
November	78	33	42.3
December	65	36	55.4
Total	942	412	43.7

$\chi^2 = 32.146$ $df = 11$ $P = 0.001$

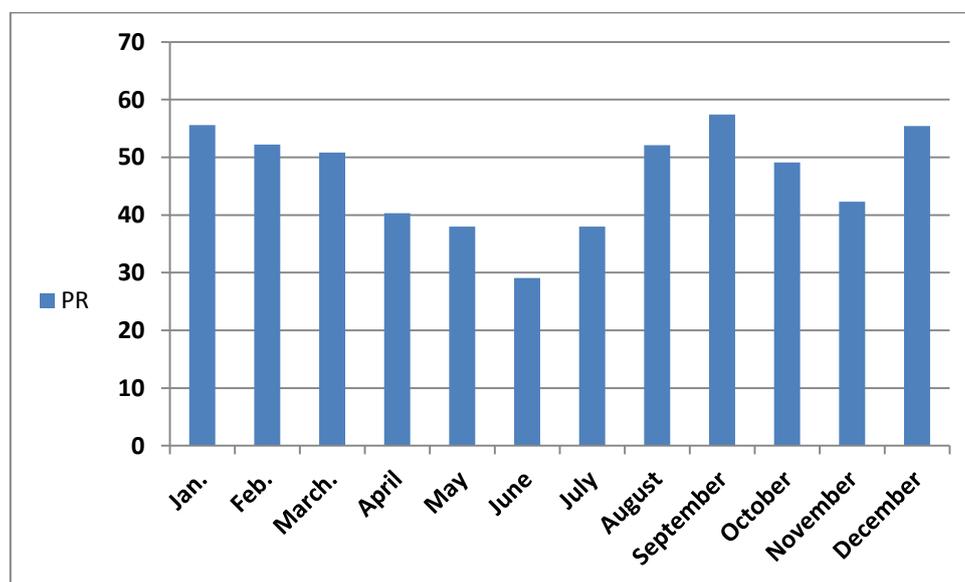


Fig 1. Seasonal pattern of rotavirus infection among children with diarrhea

Age and sex:

The prevalence rate by age (Table-3) and sex (Table-4) indicate that rotavirus was found in all age groups. The prevalence rate was the highest among children aged 6-11 months (49.9%). Low rates are noticed in older children 18 months and older. The pattern of prevalence and age was statistically significant. Regarding sex, the prevalence rate was very close in male and female children, (Table-4).

Table 3. Prevalence rate of rotavirus by age.

Age	No. of children studied (a)	No. Positives for rotavirus (b)	Prevalence rate(%) (b/a)
0-	185	70	37.8
6-	485	242	49.9
12-	169	73	43.2
18-	48	12	25.0
24-60	55	15	27.3
Total	942	412	43.7

$\chi^2=19.719$ $df=4$ $P=0.001$

Table 4. Prevalence rate of rotavirus by sex

Sex	No. Of children studied (a)	No. Positives for rotavirus (b)	Prevalence rate (%) (b/a)
Male	560	246	43.9
Female	382	166	43.5
Total	942	412	43.7

$\chi^2=.021$ $df=1$ $P=0.886$

Clinical features:

The prevalence rates of rotavirus infection in relation to selected symptoms, are shown in (Table-5). Diarrhea was universal symptom among patients and therefore it was not possible to examine the relationship of diarrhea to infection. Prevalence rate was significantly higher among children with vomiting (46.3%) compared to the prevalence rate among children without vomiting (37.6%). No

significant difference in the prevalence rate could be detected in relation to fever. Prevalence rate was different in different dehydration grades of severity but does not carry quantitative relationship. None of the children free from dehydration showed positive result for rotavirus. The highest prevalence rate was among children with some degree (non-severe) dehydration.

Table 5. Prevalence of rotavirus infection in relation to selected symptoms.

Symptoms	No. of children studied (a)	No. Positives for rotavirus (b)	Prevalence rate (%) (b/a)
Vomiting			
Yes	663	307	46.3
No	279	105	37.6
$\chi^2=5.999$		$df= 1$	$P=0.014$
Fever			
Yes	669	289	43.2
No	273	123	45.1
$\chi^2=0.271$		$df=1$	$P=0.602$
Dehydration			
Severe	13	4	30.8
Some	917	408	44.5
None	12	0	0.0
$\chi^2=9.563$		$df=2$	$P=0.008$
Total	942	412	43.7

DISCUSSION

Acute gastroenteritis is one of the most common causes of visiting health centers, and viral diarrhea is a major cause of morbidity and mortality in developing countries.^[15,16] This study showed that rotaviruses are important etiological agents of acute gastroenteritis in children less than 5 years of age in Basrah. Rotavirus gastroenteritis represented 43.7% in children with acute gastroenteritis, a result that was in agreement with the results found by other studies done in Basrah^[17] and in Baghdad.^[18] A similar prevalence (45.4%) was obtained in study performed in selected hospitals in Jordan during 2007-2008.^[19] This prevalence rate of rotavirus gastroenteritis in the present study was also within the world range (29%-45%).^[20] The prevalence rate in the present study was less than the prevalence rate reported in study carried out in Nicaragua in the central America (67%).^[21] While this rate was higher than the 29.5% in Ahvaz, Iran in 2005.^[22] and 19.7% in United State of America during 2001-2003.^[23] The previous results indicated that variation was exist in the prevalence rate of rotavirus gastroenteritis among various populations.^[24] These variations may be related to the variation of personal and community hygiene, anti-infective properties of breast-milk, sanitation measures and vaccination coverage. All these are highly effective in preventing rotavirus infection. Geographical location seems to be important for determining the seasonal variability of rotavirus-related gastroenteritis. Seasonal variation was not observed in countries with tropical climates.^[25] Iraq is one of the subtropical climate countries where the virus may present year around.^[26] This concept is similar to other studies about rotavirus prevalence from Turkey,^[27] Malawi^[28] Uganda^[29] and Bangladesh.^[30] Studies in America,^[31] Italy,^[32] Taiwan,^[33] and China^[34] have shown that the peak is in winter. Other studies showed that peaks of infection were in

dry months in Brazil^[35] and summer and winter in Japan.^[36] Rotavirus was found in all age groups studied, but the highest prevalence was found in children aged 6-11 month (58.7%). This age pattern goes with the results of other studies done in selected hospitals during the period May 2007-April 2008 in Jordan.^[19] and in Abuzar Hospital in Ahvaz in Iran.^[37] The present study showed no sex variation in prevalence rate of infection with. This result was inconsistent with other study carried out in Karbala which found that the percentage of infection among males was higher than females.^[38] Clinical presentation of patients with rotavirus gastroenteritis was not different from that associated with other enteric pathogens.^[39-43] In this study the rotavirus positive gastroenteritis was significantly different from rotavirus negative gastroenteritis in respect to vomiting, while no such difference observed in respect to fever. These results agree with other study carried out in Dastgheib Hospital, Shiraz, Iran, from September 2008 to February 2010.^[44] There was a statistical significant difference regarding dehydration status between positive rotavirus cases and negative cases, and these results disagree with other study carried out in Jordan which found that here was no statistical significant difference.^[19]

In conclusion, Rotavirus was a common cause of acute gastroenteritis in children under five years old. The prevalence was higher in infant between 6-11 months. We recommend that Latex test is simple, inexpensive and sensitive to detect rotavirus antigen in stool, so it should be available in primary health centers and hospitals in order to be used as a screening test and to decrease the abuse of antibiotics for diarrheal cases and Enzyme-Linked immunosorbant assay (ELISA) test should be available in all pediatric hospitals and also used as a confirmatory test for positive cases.

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