

Prevalence and factors associated with rotavirus infection among infants admitted for diarrhea in the region of Mid Iraq

Wisam S. Abood* S. A. Al-Juboury** M. A. Al-Rodhan***

*College of Medicine Al-Qadisiya University ,**College of Medicine Kufa University,***College of Vet. Medicine Al-Qadisiya University

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الخلاصة

ان الفايروس الدوار (روتا فايروس) المسبب للاسهال عند الاطفال يعد احد اهم مسببات الوفيات عند الاطفال، ويكتسب اهمية كبرى في الدول النامية والمتقدمه على حد سواء. في العراق توجد شحة في الدراسات التي تهتم بالمستوى الوراثي للفايروس.

استهدفت الدراسة الحاليه تقييم انتشار الاصابات بالفايروس لدى الرضع المصابين بالاسهال من الرافدين في المستشفيات او عولجوا كمرضى خارجيين ودراسة العوامل السريرييه المصاحبه للاصابه بالفايروس في ثلاث محافظات وسط العراق.

أجريت الدراسة للفترة من حزيران 2010 لغاية نيسان 2012. تم التحري عن الفايروس A في عينات البراز باستخدام تقنية التلازن ومن ثم تأكيد التشخيص باستخدام تقنية الأليزا (ELISA).

بينت النتائج ان نسبة انتشار الاصابه كانت 42,45%. وكان أقل معدل للاصابه في الأعمار التي تقل عن شهرين كما تبين ان الفئه العمريه الأكثر تعرضا للاصابه كانت بعمر 9 و10 أشهر، وإن أعلى معدل للإصابات كان في فصل الخريف بينما انخفضت نسبة الإصابه في أشهر الصيف. إن الدراسات الوبائيه للفايروس الدوار تكتسب أهمية كبرى لغرض تبني التدابير الوقائيه وبضمنها التطعيم ضد المرض، وان المعلومات المتوفره من هذه الدراسة قد تساعد في رفد برنامج التطعيم الخاص بالفايروس في العراق.

Abstract

Rotavirus is the most common cause of severe childhood diarrhea worldwide and of diarrheal mortality in developing countries. In Iraq, few studies and analysis were executed for evaluation of the extent of rotavirus caused diarrhea among infants and its magnitude as a cause of the most common clinical attending symptoms to the daily care clinics and hospital admission..

The aim of this study was to estimate the prevalence of rotavirus caused gastroenteritis and identify the clinical factors associated with rotavirus caused diarrhea among infants admitted to the hospital or treated as outpatients in three governorates in the region of Mid-Iraq for symptoms of gastroenteritis.

This study was undertaken during the period from June 2010 to April 2012 in infants under 1 year suffering from acute gastroenteritis. Group A rotaviruses were detected in stools by latex agglutination test and the diagnosis were confirmed by ELISA test.

Of the 348 stool specimens from infants with acute gastroenteritis, 42.45% were positive for rotavirus A. Infants of 9 and 10 months of age were most frequently affected. The prevalence of rotavirus infection peaked in the Autumn season, when temperatures were low, and decreased in summer. There was no significant differences in the severity of symptoms between rotavirus caused diarrhea than and in diarrhea of other causes.

Epidemiological knowledge of rotavirus is critical for the development of effective preventive measures, including vaccines. These data will help to make informed decisions as to whether rotavirus vaccine should be considered for inclusion in Iraqi National Immunization Program.

Introduction

Rotavirus is the single most important cause of severe gastroenteritis in young children throughout the world. Globally, an estimated 702,000 children die each year due to rotavirus diarrhea [1]. This large impact of rotavirus disease has speeded the development of rotavirus vaccines. Therefore, determining the prevalence and types of rotaviruses within regions is essential to prepare for introducing a vaccine [1].

They are members of the Reoviridae family and contain a genome consisting of 11 segments of double stranded RNA (dsRNA) enclosed in a triple layered capsid [2]. The outer layer of rotaviruses contains the protein VP6 which elicits neutralizing antibody responses that enable its diagnosis by neutralizing antibodies by latex agglutination test and ELISA test.

Globally, about 30%–40% of hospitalizations and deaths due to diarrhoea among children under 5 years old, and about 5% of all child deaths, are attributed to rotavirus infection [3]. It occurs as a sporadic seasonal form, even as severe gastroenteritis of infants and younger children, mostly in the first 2–3 years of life, with a peak at age 6–24 months [3]. National cause-specific mortality rates range from 439 per 100 000 (Sierra Leone) to less than 1 per 100

000 (50 countries) [3]. Gastroenteritis due to rotavirus is characterized by vomiting, fever and watery diarrhea, and occasionally leads to severe dehydration and death in young children. Man is the only reservoir of infection, and transmission occurs by the fecal–oral route and can be attributed to poor standards of personal and environmental hygiene [4] in both developed as well as developing countries. Seasonal variation in the incidence of the disease has been noted, particularly in temperate climates where it peaks during the cooler months, while in tropical climates cases occur throughout the year [3].

In Iraq, the death rate in children <5 years of age was reported to be 130/1,000 for boys and 120/1,000 for girls in 2003 [5]. Diarrhea is a major cause of illness and death in Iraqi children; however, little information exists about the origin of childhood diarrhea. A study showed that rotavirus accounted for 24% of acute diarrhea in hospitalized children in Basrah [6]. In Iraqi Kurdistan, a study revealed that 37% of investigated children with gastroenteritis were infected with rotavirus [7]. A third study stated that 51.98% of diarrheal children showed positive results for rotavirus antigen in Najaf governorate [8].

Materials and methods

Study population: Three hundred eighty four stool specimens from infants suspected to have viral diarrhea were involved in the present study. Their ages were below one year of age. Among them one hundred seventy two infants were admitted to Maternity and Child Teaching Hospital in three governorates (Addiwaiya, Najaf and Babylon) and two hundred fourteen infants from the attendants of outpatient departments of the hospitals, some primary health care centers and some private clinics. The exclusion criteria were: Age more than

one year, symptoms for more than three days, diarrhea with blood and mucus and hospital acquired diarrhea. The period of specimen collection extended from June 2010 to April 2012. A case of diarrhea was defined with the following criteria:

1. The presence of three or more liquid evacuations per day.
2. Loss of the usual pattern of daily evacuation.
3. A change in the consistency of the evacuation from solid or semi-solid to liquid, accompanied or not by vomiting, fever and dehydration. Infants with

nosocomial or chronic diarrhea were excluded from the study.

Complete clinical examination was carried out and a questionnaire was filled for each child to collect data on demographic characteristics (e.g. age, sex) and clinical presentation (e.g. body temperature, vomiting, dehydration, duration of illness, date of admission). Fever was defined as body temperature ≥ 38 °C at the time of admission. Mild

dehydration was diarrhea and thirst; moderate and/or severe dehydration was depressed fontanel, sunken eyes, dry tongue and loss of skin turgor.

The stool samples were routinely screened for the presence of VP6 group A rotavirus antigen by latex agglutination test using a commercial kit (Biotec® UK). All rotavirus-positive samples were confirmed by ELISA (ABO Switzerland).

Results

Of the 348 fecal specimens analyzed, 163 tested positive for rotavirus by latex agglutination test. Table (1) is illustrating the distribution of the diagnosed infants to have rotaviral gastroenteritis were little difference is found and male babies constitute 43.9% of the cases while female infants were

Distribution of LAT positive cases according to the governorates

The following table (table 2) is illustrating the distribution of positive diarrheal cases for rotavirus according to LAT test in the mid Euphrates territories

Distribution of LAT positive cases according to age groups

In this study, rotavirus was detected in the stool of 42.45% (163/384) of patients studied. The highest percentage of the cases occurred in children at 9 and 10 months old (Table 3), which is the susceptible expected target age group. In slightly older children, rotavirus infection

40.5%. This slight difference may be attributed to the fact that in rural area male infants are privileged to a certain degree over females and receive more care from the parents. Otherwise, there is no facts suggested that males are more susceptible for rotavirus infection than females.

in the three governorates from which specimens collected.

The distribution of LAT positive cases among governorates was 40%, 51.6% and 44% for Addiwaniya, Najaf and Babylon respectively.

can be asymptomatic, probably because they have some degree of protection from clinical disease owing to previous infection with this agent. While in the younger groups a probable protection may come from mother milk or transplacental immunity.

Table(1). Distribution of positive and negative rotavirus LAT for diarrheic infants according to sex.

Sex	Total cases	Rotavirus +ve	Percentage
Male	221	97	43.9%
Female	163	66	40.5%
Total	384	163	42.2%

Table (2). Distribution of rotavirus LAT positive specimens according to governorates.

Source	Number of tested specimens	Number of positive	Percentage of positive %
Addiwaniya	205	82	40
Najaf	91	47	51.6
Babylon	88	34	44
Total	384	163	42.45

Table (3). Distribution of rotavirus LAT positive and negative cases in children less than one year old with diarrhea according to age groups.

Age (months)	Total cases No.	Rotavirus +ve		Rotavirus -ve	
		No.	%	No.	%
1+2	46	15	32.6	31	67.3
3+4	58	23	39.6	35	60.4
5+6	57	20	35	37	65
7+8	81	40	49.3	41	50.7
9+10	68	35	51.4	33	48.6
11+12	74	30	40.5	44	59.5
Total	384	163	41.4	221	58.6

Rotavirus infection has been observed to follow a seasonal pattern in different

Discussion

The present study described the epidemiology of rotavirus infections in hospitalized and non-hospitalized children and infants in various cities of the region of Middle of Iraq between April 2010 and June 2012. Rotavirus is the most common cause of non-bacterial gastroenteritis in children, not only in developing countries but also in developed countries. A total of 384 fecal specimens were tested for rotavirus and 42.45% were positive. These results are lower than previous findings on rotavirus prevalence in Mid Iraq (51.98%) [8]. More consistent proportion (37%) of rotavirus gastroenteritis were found in different study in Iraqi Kurdistan [7]. Arab countries like Saudi Arabia [9] and Egypt [10], but this is lower than the prevalence of rotavirus attained in Syria (61%) [11], Oman (50%) [12] and Kuwait (44%) [13]. These different detection rates may be explained by different conditions of the studies, such as the season of sampling and the sampling methods. For example, in other studies samples were collected only from hospitalized children, whereas in our study, they were collected from inpatients and outpatients, which may have affected the prevalence rates. Rotavirus was detected continuously throughout the years of study, with peak prevalence occurring in September and October. In Iraq, this is the

regions, in this study it was found that it is associated with the more temperate climate at a drier atmosphere. The seasonal distribution of this infection during Autumn months (September and October) was higher than other months of the year.

Table (4). Presenting symptoms of rotavirus positive and negative cases in infants presented with diarrhea.

Presence of	Rotavirus +ve n=163		Rotavirus -ve n=221		Statistics
	No	%	No	%	
Fever	121	75	132	60	P=0.057
Dehydration	18	11	21	9.6	p>0.05
vomiting	141	86.5	188	85	p>0.05

first study to determine the seasonal distribution of rotavirus infection. The change in the temporal distribution of rotavirus cases can be explained by the variability of mean temperature, relative humidity, and rainfall. A number of Arab and Middle East countries including Iran [14], Libya [15], Morocco [16], Oman [17], and Saudi Arabia [9] reported that the peak season for rotavirus gastroenteritis was in the winter from November to April. The exception to this is Egypt, where rotavirus infections peak from July to November [18]. It has to be mentioned that this study dealt with cases from only three cities in Iraq (in the region of Mid Iraq) and surveillance was limited to a period of about 2 years. It will be important to continue surveillance and the characterization of rotavirus strains in Iraq in order to monitor changes over time. It is equally important to initiate studies in other regions of Iraq in order to have a comprehensive picture of rotavirus distribution in the country. Severe dehydration was noticed in a slightly higher rate among patients with rotavirus infection, than diarrhea cases caused by pathogens other than rotavirus (11.1% versus 9.6%); however this was not significant (Table 4). The rate of vomiting was similar in both groups (Table 4).

Conclusions

In conclusion, the present study confirms the current burden of rotavirus gastroenteritis in younger children, especially small infants. There was a marginally higher rate of fever in the rotavirus cases than the non-rotavirus cases. The lowest rate of infection age group of 1 and 2 months of age. Continuous prospective monitoring of circulating strains of rotavirus is desirable

to detect any changes in their distribution promptly and to assess the effectiveness of active immunization programs. Future studies are needed in which systematic surveillance of gastroenteritis is done for long periods of time with consistent methods in order to find explanations for the apparent emergence of rotavirus variants in populations.

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