Rota virus Association diarrhea among children less than 5 years in Mosul city

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Abstract :

In a survey of rotavirus induced diarrhea in 150 child less than 5 years referred to Ibn-Al-Atheer pediatric Hospital in Mosul city from 5th July 2007 to 5th August 2007. The stool specimens were investigated by Latex agglutination test (slidex – Rota kit, France) for the presence of RV antigen. The incidence of RV infection among children hospitalized with acute diarrhea was studied . Rotavirus was detected in 28.7% (43/47) of children with acute diarrhea. The peak incidence of RV diarrhea was seen in children aged 25-36 months (40%), furthermore, the present study shows the impact of different demographic variables on the positivety of rotavirus among children.

Key words : diarrhea , Rotavirus

Introduction :

The name Rota virus (RV) was suggested for the group on the basis of the wheel-like appearance (Latin Rota=wheel) of complete virions shown by electron microscopy. It can be distinguished on the basis of morphology and other characteristics from true reoviruses and orbiviruses and have been variously termed in earlier description human reovirus – like agents or orbivirus , duovirus and gastroenteritis virus [1,2]

Rotavirus is a genus in the family Reovridae , have three important antigenic specificity group , subgroup and serotype [3]. Based on immunological and biochemical characteristics it is subdivided into seven distinct sero-group (A-G) each group can be differentiated by polyacrylamide gel electrophoresis, mobility. Group (A-C) are human pathogens group A being the major viral agents of gastroenteritis and most important causing of deaths every year worldwide. With exception of gastroenteritis outbreaks caused by group B in China , most identified non group A appear to belong to group C [4,5].

The clinical presentation is comparison to gastroenteritis produced by other viruses. The combination of vomiting and a seasonal occurrence in the winter months has led to name the condition winter vomiting disease [6].The comparative features of group A, subgroup 1 and 2 led to: infants with subgroup 1 strains developed fever up to 39 C significantly more often than those with subgroup 2 , infants who had subgroup 2 infections were more sick, hospitalized more frequently and more likely to have respiratory symptoms. The frequency of diarrhea and vomiting in the two subgroups was similar. Chronic RV infection may occur in immunocompromised children. Rotaviruses are the leading cause of severe dehydration diarrhea in infants and young children and contribute to some adult diarrheal disease. In adult, RV infection is usually asymptomatic. Rotavirus causes nosocomial infection, including epidemics in children [6]. Neonates less than 1 month of age often exhibit minimal symptoms of RV infection result from maternal antibodies. Diet and nutrition, breast feeding, intestinal flora and ages may all participate in host resistance [7.

Tools and Methods:

From the 5th July until the 5th August 2007, in patients having acute diarrhea were recruited from the pediatric emergency department and outpatients of Ibn- Alatheer pediatric Hospital , which is major referral hospital for pediatric diseases in Mosul . A total of 150 infants and young children male and female with acute diarrhea were selected . The stool specimens were used to detect for RV antigen. 5 to 10 ml or 3 to 5 gm of freshly passed diarrhea stool was sufficient for RV antigen detection . The stool specimens were examined macroscopically, to determine the color and the consistency of the stool , and the presence of visible blood or mucus. The stool for microscopic examination was chosen from an area with blood or mucus if present. For virological examination , the samples were purified by filtering through glass wool or filter paper then filterate was treated with by 0.5 mM of EDTA to remove the outer capsid layer producing single shell particle [8]. The latex agglutination test (Slidex – Rota Kit – BioMe- rieux , France) were used for rotavirus antigen detection .

Results :

Stool samples from 150 child sought medical care for acute diarrhea collected at Ibn- Al-Atheer Pediatric Hospital in Mosul , for a daily mean of (3 consult / day).

Rotavirus was recovered from 47 (31.3 %) out of 150 stool samples of patients with acute diarrhea , whereas pathogenic bacteria was detected in (28.7 %), protozoa in (36.7 %) and other combined pathogen detected in 3.3 % (Table1).

The higher rate of rotavirus infection 40% was found in age group 25 – 36 months, while the lower rate 25 % was found in age group37 – 60 months (Table2). As shown in (Table3), acute RV diarrhea occurred with similar frequency in males 31.8 % (27/85), and in females 30.8 % (20/65). The incidence of acute RV diarrhea in relation to residence is shown in (Table 4). A different proportion 39.2 (31/79) of patients living in the Urban area but 22.5 (16/71) living in the Rural area. Signs and symptoms associated with diarrheal illness that RV and non- RV were compared as shown in (Table5) dehydration (95.7%, 45/47 while non RV 90.3%, 93/103), vomiting (80.9%, 38/47 while non RV 67%, 69/103), fever (74.5%, 35/47 while non RV 80.6%, 83/103), abdominal pain (68.1%, 32/47 while non RV 79.6%, 82/103). The hospitalization rate was (93.6, 44/47) while the out patients was (6.4% 3/47). The difference was also found among the non RV children group (86.4% , 89/103) and outpatients was (13.6% ,14/103).

Macroscopic examination (Table 6) shows stool of liquid and pasty consistency was passed by children with acute RV diarrhea with around percentages as (51.1%, 24/47, and 49%, 23/80) for liquid and pasty respectively. Stool passed by patients with acute diarrhea have different colors .Most of the children in both RV and non-RV

acute diarrhea passed yellowish stool (44.7%, 21/47 while non-RV 71.8%, 74/103), greenish (19%, 9/47 while non-RV 16.5%, 17/103), pale yellow (34%, 16/47 while non-RV12.6%, 13/103). No patient with acute RV diarrhea passed macroscopic blood in the stool , while (16.5, 17/103) of non-RV acute diarrhea patients had gross bloody stool.

The presence of mucus in the stool was less often (25.5%, 12/47) than non –RV diarrhea (37.9%, 39/103). The presence of fat in the stool was recorded in (51%, 24/43) than in those with non-RV diarrhea recorded 18.4%, 19/103).

The stool from patients with acute diarrhea was examined microscopically (Table 7), mainly to determine the presence or absence of RBCs and WBCs in the stool of patients with acute diarrhea. No fecal leukocytes was seen in (72.3%, 34/101), and (65%, 67/101) of patients but non-RV acute diarrhea showed absence of fecal leukocytes. The higher rate of leukocytes > 25 was found in (2.1%, 1/5) of patients with RV and (3.9%, 4/5) of patients with non-RV. According to the presence of RBCs in the stool of patients with acute diarrhea (76.6%, 36/102) of them had no fecal RBCs, compared to (64%, 66/102) of non-RV patients.

Table (1) : Distribution of cases among children with diarrhea according to etiological agents .

Total NO. examined	+ve for rotavirus	+ve for pathogenic bacteria	+ve for protozoa	+ve for combined pathogens
150	47 31.3%	43 28.7%	55 36.7%	5 3.3%

Table (2) : distribution of acute rotavirus diarrhea in relation to age groups

Age groups (months)	+ve for rotavirus		-ve for rotavirus	
	NO.	%	NO.	%
0-6	18	29	44	71
7-12	19	32.7	39	67.3
13-18	4	30.8	9	69.2
19-24	3	37.5	5	62.5
25-36	2	40	3	60
37-60	1	25	3	75

X= 30.51
P > 0.05

Table (3) : Detection of acute rotavirus diarrhea according to sex

Sex	NO.tested	RV+ ve		RV-ve	
		NO.	%	NO.	%
Male	85	27	31.8	58	68.2
Female	65	20	30.8	45	69.2
Total	150	47	31.3	103	68.7

X=30.47
P<0.05

Table (4) : Distribution of rotavirus diarrhea according To the place of residence .

Residense	NO. of samples tested	RV+ ve		RV-ve	
		NO.	%	NO.	%
Urban	79	31	39.2	48	60.8
Rural	71	16	22.5	55	77.5
Total	150	47	31.3	103	68.7

X=30
P<0.05

Table (5) : Clinical characteristics of infants and children < 5 years of age with rotavirus and non- rotavirus diarrhea .

Main clinical characteristics of diarrhea	RV+ ve		RV-ve	
	NO.	%	NO.	%
Dehydration	45	95.7	93	90.3
Vomiting	38	80.9	69	67
Fever	35	74.5	83	80.6
Abdominal pain	32	68.1	82	79.6
Outpatients	3	6.4	14	13.6
Inpatients	44	93.6	89	86.4

X= 112.4

P>0.05

Table (6) : Macroscopic examination of stool specimen from patients with acute diarrhea .

Characteristics	NO.of tested	RV+ve (n = 47)		RV-ve (n = 103)	
		NO.	%	NO.	%
1- consistency					
Liquid	85	24	51.1	61	59
Pasty	65	23	49	42	40.8
2- color					
Yellowish	95	21	44.7	74	71.8
Greenish	26	9	19	17	16.5
Pale yellow	29	16	34	13	12.6
Bloody	17	0	0	17	16.5
3- Mucus in stool	51	12	25.5	39	37.9
4- Fat in stool	43	24	51	19	18.4

Table (7) : Results of the microscopic examination of the stool in children < 5 years with acute diarrhea .

characteristics	No.tested	RV+ ve		RV-ve	
		NO.	%	NO.	%
Pus / HPF					
0	101	34	72.3	67	65
1-5	33	11	23.4	22	21.4
6-10	7	1	2.1	6	5.8
11-25	6	1	2.1	5	4.9
> 25	5	1	2.1	4	3.9
RBC / HPF					
0	102	36	76.6	66	64
1-5	43	11	23.4	32	31
6-10	4	0	0	4	3.9
11-25	1	0	0	1	1
> 25	1	0	0	1	1

Discussion :

Rotaviruses are transmitted by fecal oral route. However water borne or airborne routes have also been suggested [3]. Incubation period of RV diarrhea illness was estimated to be less than 48 hours. Large numbers of virus particles are shed in the stool following multiplication in epithelial cells of the small intestine. Shedding may persist for10days or more after the illness[3]. Large numbers of infectious particle (> 10/g) can be shed in feces [9].

The study shows that the distribution of diarrhea causes among children with diarrhea according to different etiological agents due to rotavirus is (31.3%), pathogenic bacteria (28.7%), protozoa (36.7%) and combined pathogen (3.3%). The pattern of etiological agents varies widely in different countries [8, 10].

In Iraq, the first study found RV in 40.2% of children less than 5 years [11], the second study recorded the incidence of RV gastroenteritis among children below 3 years to be 23% [12] .Other study from Italy found that RV gastroenteritis in 29.3% of children , less than 3 years of age (13) and 58% of children less than 3 years of age in Sweden . A similar observation was obtained in this study , the higher rate of RV infection (40%) was found in age group (25-36 months) , and the lower rate (25%) was found in the age group (37-60 months). It was interesting to note that RV infection occurred equally in both sexes. The results reported similar observation with other [11,14].

The incidence of acute RV diarrhea in relation to residence is shown in (Table 4). A different proportion (39.2%, 31/79) of patients living in the urban area, but (22.5%, 16/71) living in the rural area.

Rotavirus induces a clinical illness characterized by vomiting diarrhea, abdominal discomfort, fever, and dehydration [3].As shown in Table(5)Rotavirus illness was more severe and significantly more frequently associated with hospitalization, (93.6%), dehydration (95.7%), vomiting (80.9%), fever (74.5%), abdominal pain (68.1%). Among the large number of viral, bacte] rial, and parasitic enteropathogens associated with diarrhea, RV is the most frequent cause (93.6%) for hospitalization in contrast to (6.4%) for outpatients of diarrhea, this percentage is similar to that from other areas of the world [15,16].

According to the stool examination (Table6), pale yellow, fatty stool has been associated with viral diarrhea, suggesting that, RV infection may interfere with digestion of fats and pigmentation of feces[17]. This study also proved that children with RV diarrhea passed stool, which does not contain visible blood. Other reported that, bloody stools are usually found in diarrhea of bacterial etiology [18] .Other reports described tha , the patients stools in most cases of RV diarrhea as watery, yellow or green not obviously bloody, and rarely contain mucus but in our study the mucus was seen in the stool of RV diarrhea less than in non-RV patients [19].

The microscopic examination of the stool (Table 7) showed that , there is significant difference in patients with RV than in those of non- RV patients in the number of leukocytes, and RBCs passed in their stools. These results disagree with other studies that RV gastroenteritis patients usually don't contain blood or leukocytes in their stools [20], and agree with the results, which found the presence of blood in the stools was significantly more often than non-RV diarrhea patients[21].

References :

1- Wallace R,B.Doebbeling B,N. Last JM.14th ed. USA: Appleton and lang Asimon and Schuster company, 1998: 196.

2- Ambrose MW . Illustrated guide to diagnostic tests, USA : springhouse corporation , 1994,9: 540.

3- Kapikian A,Z. shope RE. Rotaviruses, reoviruses, coltiviruses, and orbiviruses. Med Micro chapter 63. www.gsbs.utmb.edu / microbook / cho63.htm.

4- Herrmann, JE. Rotaviruses and other reoviridae. In Gorbach Baetlett A, Blacklow NR. Infectious diseases 2nd ed. USA. W.B. Saunders , 1998 : 2193-2199 .

5- Nilsson, M. sigstam G, Svensson L. Antibody prevalence and specificity to group C rotavirus in Swedish sera. J Med. Virol.2000 , 60 : 210-215 .

6- Koneman EW, Aiien E,D. Schreckenberger P,C. Color atlas and text book of diagnostic microbiology . 5th ed. USA : Lippincott- Raven publisher , 1997 : 1178-1293 . `

7- Mackow, E. Rotavirus lecture. www.uhmc.Sunysb.edu/ microbiology/ schedule 2003.htm.

8- Cohen J,o,Laporte j, Charpilienne A. and Scherrer R, Activation of rotavirus RNA polymerase by calicicurn chelating . Arch.Virol.1979,60,177,186 .

9- Bishop, R,F, Bugg HC , Masendycz PJ, Lund JS , Gorrell RJ , Barnes G,L.Serum,fecal, and breast milk rotavirus antibodies as indices of infection in mother infant pairs .J.Infect Dis .1996,174(suppl 1) : S22-9 .

10- Halvorsrud J, Orstarikt, An epidemic of rotavirus gastroenteritis in a nursing home for the elderly . Scand J . Infect.Dis , 1980,12,161-164.

11- Abbas NI, Al-Hadithi TS , Al-Attar A. Incidence of rotavirus gastroenteritis among infants and young children in Baghdad . J comm. Med . 1988, 1(1): 39.

12- Metti F. Rotavirus infection in Iraq partial characterization of the virus and epidemiology . Thesis submitted to the College of Medicine/ University of Mustansiria in partial fulfillment of requirement for the degree of master in science of Medicine . 1986 .

13- Donelli ,G, Ruggeri FM, Tinari, A, et al . A three-year diagnostic and epidemiological study viral infantile diarrhea in Rome . Epidem Infect. 1988, 100: 311-320 .

14- Al- Nakshabandy, T,Y . Rotavirus gastroenteritis among infants and young children in Mosul. Thesis submitted to the College of Medicine / University of Mosul in partial fulfillment of requirement for the degree of master in science of Medicine 1993 .

15 Unicomb, L,E, Kilgore, P,E, Faruque SG, Hamadani, J,D, Fuchs G,J, Albert, M,J. Anticipating rotavirus vaccines :hospital based surveillance for rotavirus diarrhea and estimated of disease burden in Bangladesh. Pediatr Infect. Dis. J. 1997, 16: 947-51 .

16- Midthun, K,J, Kapikian A,Z. Rotavirus vaccines: an overview . Clin. Microbiol. Rev. 1996, 9 : 423-434 .

17- Thomas M,E,M, Luton, P, Matimer, T,Y. Virus diarrhea associated with pale fatty feces. J Hyg (Lond.) 1981,87:313 .

18- Ellis M,E, Watson B, Mandai, B,K, et al. Microorganisms in gastroenteritis. Arch Dis. Child . 1984 , 59: 848.

19- Tallet, S. Mackenzie, P. Kerzner B, Hamilton, R. Clinical laboratory and epidemiological features of viral gastroenteritis in infants and children . pediatr. 1977, 60: 217 .

20- Middleton P,J. Szymanski M,T, Petric M. Viruses associated with acute gastroenteritis in young children. Am J Dis. Child. 1977, 131:733.

21 Perez-Schael, I, Gonazlaez, R, Fernandez, R, Alfonzo, E , Inaty, D, Boher, Y, et al. Epidemiological features of rotavirus infection in Caracas, Venezuela: Implications for rotavirus immunization programs. J Med. Virol. 1999, 59: 520- 526.

علاقة الاسهال بفايروس الدوار البشري بين الاطفال الاقل من خمس سنوات في مدينة الموصل

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الملخص :

تضمنت الدراسة لفايروس الدوار البشري المسبب للاسهال لدى١٥٠ طفل بعمر اقل من خمسة سنوات والراقدين في مستشفى ابن الأثير للأطفال في مدينة الموصل للفترة من الخامس من حزيران٢٠٠٧ وحتى الخامس من اب ٢٠٠٧ وكذلك التحري عن وجود حمة الدوار في نماذج البراز بأستخدام فحص التلازن (لاتكس). ان نسبة الاصابة بحمة الدوار في الاطفال دون سن الخامسة والذين يعانون من اعراض الاسهال الحاد هي٢٨،٧ %.وان قمة حدوث الاصابة بحمة الدوار كانت في عمر٢٥-٣٦ شهر(٤٠ %). بالاضافة الى ذلك اظهرت الدراسة الاصابة بحمة الدوار وعلاقتها بالعديد من المتغيرات.