

# Common Rota Virus Gastroenteritis in Children under 5 Years in Maternity and Children Teaching Hospital, western Iraq

Qaiss .A. Alani<sup>1</sup>, Salih A. Ai-Rawi, Ayad K. Salih, Saleem O.G. Al-Mawla

Lecturer, collage of medicine, Anbar University 1. Professor, Anbar Health Directorate- Maternity and Children Hospital,. Maternity and Children Hospital. PhD Med-Microbiology Consultant Microbiologist. Maternity and Children Hospital.

## Abstract

**Objective:** This study was designed to find out the incidence of rotavirus as an etiological agent in diarrheal patients under 5 years of age admitted to Al-Ramadi Maternity and Children Teaching Hospital.

**Methods:** Over a period of one year, from the 1<sup>st</sup> of January 2009 to the 1<sup>st</sup> of January 2010. 420 stool samples were collected from patients with diarrhea and sent directly to the hospital laboratory for detection of rotavirus antigen using rapid immunochromatographic assay.

**Results:** Out of 420 stool samples, rotavirus was detected in 165 (39.26%).The majorities of cases were reported in first year of age.

**Conclusion:** It appears that artificial feeding, living in rural areas and low mother education all are important factors that increase percentage of infection with this virus. Also it appears that the infection can happen in all seasons but mostly in summer. The study conclude that Gastroenteritis due to rotavirus is an important problem of diarrhea in Al-Ramadi city and recommended that the mothers need to be encouraged for breast feeding as a prophylactic measures for all types of diarrhea and also sterilization of water.

factors that increase the percentage of infection by this virus. Infection occurred in all seasons but predominantly in summer.

**Key Words:** Gasteroenteritis, Children, Rotavirs, Ramadi.

Corresponding author: Qaiss .A. Alani , E mail: qaissaa@yahoo.com

## Introduction

Diarrheal diseases account for approximately 2 million deaths annually in children under the age of 5years. Disease and death caused by diarrhea is a global problem, but is especially prevalent in developing countries. Each year rotavirus causes millions of cases of diarrhea in developing countries, almost two millions resulting in hospitalization and an estimated 611,000 resulting in death<sup>1</sup>.

Rotavirus transmission, in most cases, occurs through contact with contaminated stool. The usual way of transmission involves ingesting food or water contaminated with the virus.

The incubation period for a rotavirus lasts approximately two days.<sup>2</sup>

In temperate areas, rotavirus infections occur primarily in winter, but in the tropics they occur throughout the year, the difference is partly explained by seasonal changes in temperature and humidity<sup>3,4,5</sup>.

Rotavirus gastroenteritis is a mild to severe disease characterized by vomiting, watery diarrhea, and low-grade fever. Once a child is infected by the virus, symptoms often start with vomiting followed by four to eight days of profuse diarrhea. Dehydration is more common in rotavirus infection than in most of those caused by bacterial pathogens, and it is the most

common cause of death related to rotavirus infection<sup>6</sup>.

The aim of the present study was to find out the rotavirus as an etiological agent in children below 5 years in patients needing admission to the Maternity and Children Teaching Hospital in Ramadi and to find the associated predisposing factors for this important disease.

## Patients and Methods

This is a descriptive study of the rota viral diarrhea in Al-Ramadi Maternity and Children Teaching Hospital during a study period of 1 year (from the first of January 2009 to the first of January 2010). All patients below 5 years admitted to maternity and children teaching hospital for treatment of all types of acute diarrhea were included in the study. Stool samples were collected from patients and sent directly to the hospital laboratory to be tested for rotavirus.

The method is a commercially prepared kit manufactured by ACON company United States of America (USA) for rapid chromatographic immunoassay testing were used to detect rotavirus antigens in the patient's feces in a one-step test for qualitative detection.

Data regarding every case were collected and include patient's name, age, sex, residency, and water supply, type of feeding, housing condition, maternal education, and clinical manifestations.

## Results

Stool samples from 420 patients under 5 years of age complaining of diarrhea admitted to maternity and children teaching hospital in Al-Ramadi city in a study period from the 1<sup>st</sup> of January 2009 to the 1<sup>st</sup> of January 2010 were examined for diagnosis of rotavirus infections.

Out of 420 stool samples of the patients suffering from diarrhea, 165 (39.26%) were positive for rotavirus including 85 male and 80 females with a M/F ratio of 1.06/1.

Table (1) shows the distribution of the studied cases according to the age of patients. The majority of the cases were found between 7-12 months age followed by less than 6 months.

Table (2) shows the distribution of certain variables in relation with the Rota virus infected patients. Most of the cases were associated with bottle feeding, rural residence and less than 12 years maternal education.

Regarding the seasonal variation, the majority of the cases were noticed in July and August months of the study year, Figure (1).

Figure (2) shows the clinical manifestation of Rota virus diarrhea. All the cases presented with moderate to severe dehydration, followed by fever (95.7%), then vomiting (89.6%). While convulsion presented in only 4% of the cases.

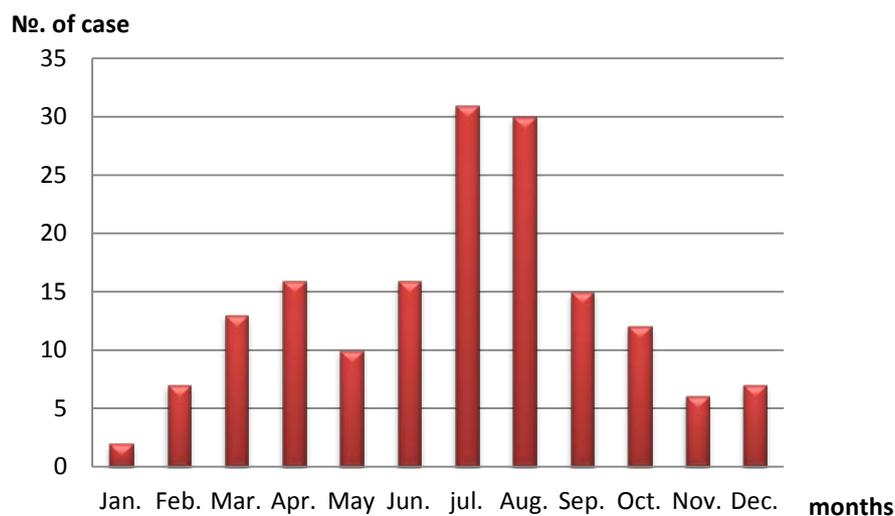
Results of the general stool examination showed pus cells in only 14 (8.4%) of cases and RBCs in 6 (3.5%), while the rest of examinations were of normal findings.

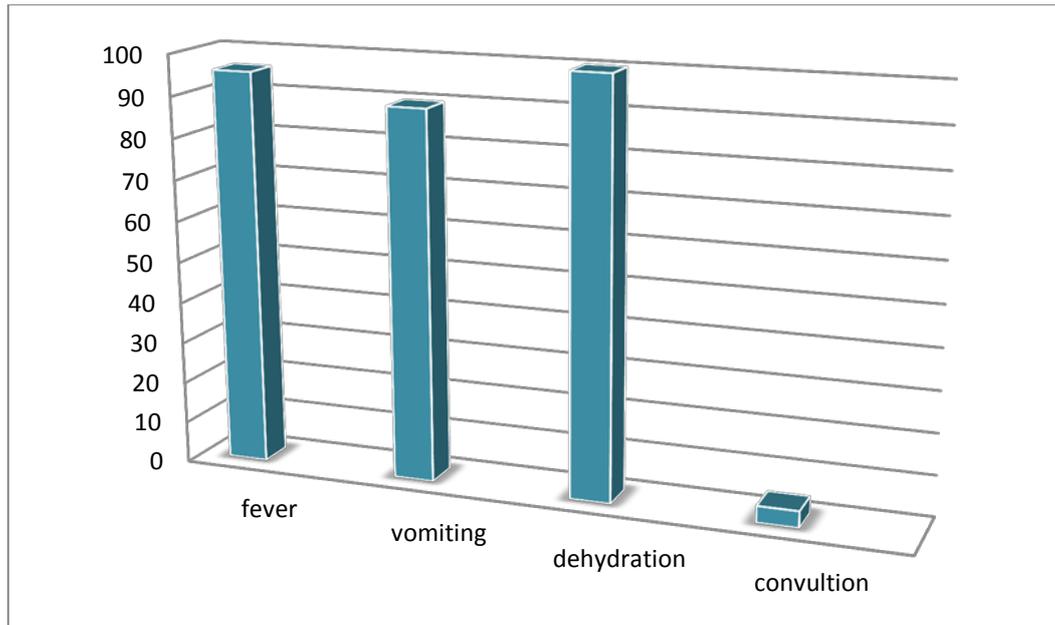
**Table 1.** Distribution of patients with Rota virus diarrhea according to the age groups in months

Age groups (Months)	Number tested	Positive		Negative	
		Number	%	Number	%
≤ 6	85	48	56.5	37	
7-12	125	85	68	40	32
13-24	79	20	25.3	59	74.6
25-36	77	10	12.9	67	87
37-60	54	2	3.7	52	96.2
Total	420	165	39.26	255	60.74

**Table 2.** Distribution of type of feeding residency, maternal education , housing and water supply on the Rota virus patients.

Character	Variables	Number	%
Type of feeding	Breast	40	24.3
	Bottle and others	125	75.7
Residency	Rural	120	72.7
	Urban	45	27.3
Maternal education (years)	>12Year	57	34.6
	<12Year	108	65.4
Housing condition	crowded	72	43.6
	Not crowded	93	56.4
Water supply	Pipe	79	47.8
	Other source	86	52.2

**Fig.1/** monthly variation of Rota virus diarrhea



**Fig. 2;** The clinical manifestation in patients with rotavirus diarrhea.

## Discussion

The main factors that increase percentage of infection are:

- 1-The virus is zoonotic infect the human and animals through the feces of human and animals, the virus goes to Al-Furat river and without suitable sterilization of water it reaches to human.
- 2- Unsuitable treatment of water cycle the virus will reach to the river.
- 3- The nature of the virus ( nonenveloped and double layer capsid ) make it resistant to environment so it remains intact in water and food.

Rota virus infections are the most common cause of sever gastroenteritis among infants and young children world wide<sup>7,8</sup>.

In the present study, the incidence of gastroenteritis caused by rotavirus was found to be (39.26%) of all cases of diarrhea.

This result is higher than that found in Ramadi (by Al-Ani) (24.1%)<sup>9</sup>, and in Basrah (24%)<sup>10</sup>. Such increased incidence of rota virus infection in our study may be related to the bad health facilities which

include pooling of rivers water and bad managements of sewage disposal following the wars and bombings happened in the city after the 2003 occupation of Iraq, in addition, the rotavirus is zoonotic virus (human and animal) and had 11segments leads to antigenic shift.

Our result was in agreement with that reported in Erbil Kurdistan (37%)<sup>11</sup>, Iran (41%)<sup>12</sup>, Jordan (32.5%)<sup>13</sup>, Kuwait (40.2%)<sup>14</sup>.

This study showed that the males and females were found to be almost equally affected. Similar results were reported in Ramadi (by Al-Ani).<sup>9</sup> Baghdad<sup>15,17</sup> and India<sup>16</sup>. Meanwhile many authors from India<sup>18,19,20</sup> and Bangladesh<sup>21</sup> reported that males are more affected than females.

In the present study, it was noticed that the majority of patients were between 7-12 months. It appeared that infants below 4 months of age were initially protected to some extent by maternal antibodies against severe diarrhea due to rotavirus, and between 12 and 16 months of age they

seem to have acquired adequate immunity<sup>22</sup>.

The occurrence of rotavirus diarrhea in this age group is probably due to the absence of breast feeding. Similar results were obtained in Nigeria<sup>23</sup>, Brazil<sup>24</sup> and Spain<sup>25</sup>. Most seroprevalence studies throughout the world showing that all children have been infected with rotavirus by the age of 3 years<sup>34</sup>.

Regarding clinical status of the patients in our study, dehydration is the most presenting signs followed by vomiting and fever. In general, dehydration is the most common condition associated with rotavirus diarrhea leading to high morbidity and mortality in developed and developing countries<sup>30</sup>. Only 4% of studied patients developed seizure concomitant with their diarrhea, and all of them were between 6 months to 5 years, this may be due to fever or due to effect of rotavirus itself. This finding was similar to that reported in Germany by Schumacher and Johannes Forster<sup>32</sup> who found that 4.1% of rotavirus diarrhea causes seizure, while it was lower than that reported in Taiwan by Ting-Fang chiu et al<sup>31</sup> who found that 7.6% of rotavirus diarrhea had caused seizure.

In the present study, the microscopical examination of stool samples revealed that 8.4% of all cases containing significant number of pus cells and 3.5% of them containing red blood cells (RBCs), however, pus cells and RBCs are characteristic of bacterial infection<sup>35</sup> but rotavirus can also produce these changes<sup>33</sup>.

Bottle and mixed feeding, rural areas and educational state of mothers were found to be important factors for causing rotavirus diarrhea. Breast milk may contain antirotavirus immunoglobulin A (IgA) and trypsin inhibitors which limits the acquisition of rotavirus infection. Many reports support the role of breast milk in decreasing the overall rates of diarrhea in infants in developed<sup>26, 27</sup> and developing<sup>28,29</sup> countries.

Children who live in rural areas and those of mothers who were not well educated were found to be more exposed to rotavirus gastroenteritis than others. This finding is different from Ramadi by Al-Ani that showed the educational level of mother and residence had no effect on occurrence of rotavirus gastroenteritis<sup>9</sup>. The possible causes may be due to bad sterilization of feeding bottles and improper preparation of milk.

Regarding the seasonal variation, it was noticed that rotavirus diarrhea can occur in all seasons but it was more frequent in summer season especially in July and August. Similar results obtained in Nigeria<sup>23</sup> and Kuwait<sup>14</sup>.

However, different results reported from Ramadi by Al-Ani<sup>9</sup>, Spain<sup>25</sup> who all found that rotavirus infection is predominant in winter. These findings of our study may be due to the fact that the hot climate and humidity may facilitate the transmission of human rotavirus infection.<sup>31</sup>

## Conclusions

The study concluded that Rotavirus cause diarrhea in about (39.26%) in children below 5 years. The majority of cases of diarrhea due to rotavirus were below 1 year.

Rural areas, bottle and mixed feeding and educational state of mothers are significant predisposing factors for rotavirus infections.

Diarrhea due to rotavirus can occur in all seasons but the majority occurs in July and August. Other methods for diagnosis of Rotavirus infection are needed to be encouraged e.g. direct immunofluorescent, PCR and immunoelectron microscope.

## References

1. Bishop RF. "Natural history of human rotavirus infection". *Arch. Virol. Suppl.* 1996 12:119–28.
2. Dorsey m. bass. Rotaviruses, Caliciviruses, and Astroviruses. In: Kliegma RM, Behrman RE, eds. *Nelson textbook of pediatrics*, 18<sup>th</sup> Ed. Philadelphia WB Saunders, 2007, 1399-1401.
3. Cook SM, Glass RI, LeBaron CW, Ho MS. Global seasonality of rotavirus infections. *Bull World Heal Organ.* 1990;68(2):171-7.
4. Kyaw Moe<sup>1, 3</sup> and G. J. Harper<sup>2</sup> The effect of humidity and temperature on the survival of bovine rotavirus in aerosol springerLink-journal March 31, 2005
5. Moe K, Shirley JA. The effects of relative humidity and temperature on the survival of human rotavirus in faeces. *Arch Virol.* 1982;72(3):179-86
6. Maldonado YA, Yolken RH (1990). "Rotavirus". *Baillieres Clin. Gastroenterol.* 4 (3): 609–25.
7. De Zoysa I, Feachem RG. Intervention for the control of diarrhoeal diseases among young children: Rota virus and cholera immunization. *Bull world health organ* 1985;63:569-83.
8. Glass RI, Killgore PE, Holman RC. The epidemiology of Rota virus diarrhea in the united states: surveillance and estimates disease burden. *J Infect Dis* 1996;174(suppl 1):s5-s11
9. Al-Ani Z.R. Rotavirus in gastroenteritis of infants and children under 3 years of age hospitalized in Al-Ramadi Maternity and Children Hospital. *Anbar Med. J.* 2005;V5(1):69-71.
10. Mahmood DA, Feachem RG. Clinical and epidemiological characteristics of rotavirus- and EPEC-associated hospitalized infantile diarrhea in Basrah, Iraq. *J Trop Pediatr.* 1987;33:319–25.
11. Ahmed HM, Coulter JBS, Nakagomi O, Hart CA, Zaki JM, Al-Rabaty AA, Dove W, et al. Molecular characterization of rotavirus gastroenteritis strains, Iraqi Kurdistan. *Emerg Infect Dis* [serial on the Internet]. 2006 May [date cited].
12. Khalili B, Cuevas LE, Reisi N, Dove W, Cunliffe NA, Hart CA. Epidemiology of rotavirus diarrhoea in Iranian children. *J Med Virol.* 2004 Jun;73(2):309-12.
13. Youssef M, Shurman A, Bougnoux M, Rawashdeh M, Bretagne S, Strockbine N. Bacterial, viral and parasitic enteric pathogens associated with acute diarrhea in hospitalized children from northern Jordan. *FEMS Immunol Med Microbiol.* 2000 Jul;28(3):257-63.
14. Sethi SK, Al-Nakib W, Khuffash FA, Majeed HA. Acute diarrhoea and rotavirus infections in young children in Kuwait. *Ann Trop Paediatr.* 1984 Jun;4(2):117-21.
15. Findukly FM. Rota virus infection in Iraq: partial characterization of the virus and epidemiology. M.S Thesis, Al-Mustansyria University 1986.
16. Saba MR., Sen D, Dattap, Datta D, Pal Sc. Role of rota virus as the cause of acute pediatric diarrhea in Calcutta. *Transe Roy Soc Trop Med Hyg* 1984;78:818-820.
17. Abbas NI AL-Hadithi TS, AL-Attar A, Omer AR, AL-Obaidi S. Incidence of rota virus gastroenteritis among infants and young children in Baghdad. *J Comm Med Iraq* 1988;1:39-45.
18. Ram S, Khurana S, Khurana SB, Sharma S, Vadehra DV, Broor S. Bioecological factors & rotavirus diarrhoea. *Indian J Med Res.* 1990 May;91:167-70.
19. Chakravarti A, Kumar S, Mittal SK, Broor S. Clinical and epidemiological features of acute gastroenteritis caused by human rotavirus subgroups. *J Diarrhoeal Dis Res.* 1992 Mar;10(1):21-4.
20. Kelkar SD, Purohit SG, Simha KV. Prevalence of rotavirus diarrhoea among hospitalized children in Pune, India. *Indian J Med Res.* 1999 Apr;109:131-5.
21. Fun BN, Unicomb L, Rahim Z, Banu NN, Podder G, Clemens J. Rotavirus-associated diarrhea in rural Bangladesh: two-year study of incidence and serotype distribution. *J Clin Microbiol.* 1991 Jul;29(7):1359-63.
22. Mata L, Simhon A, Urrutia JJ, Kronmal RA, Fernandez R, Garcia B. Epidemiology of rotaviruses in a cohort of 45 Guatemalan Mayan Indian children observed from birth to the age of three years. *Infect Dis* 1983;148:452-461.
23. N. E. Gomwalk\*, L. T. Gosham and U. J. Umoh. Rotavirus Gastroenteritis in Pediatric Diarrhoea in Jos, Niger Journal of Tropical Pediatrics 1990 36(2):52-55;
24. Linhares A.C. Rotavirus Infections in Brazil: epidemiology, immunity and potential vaccination. *Braz J Infect Dis* 1997;1:284-93.
25. Luquero FJ, Eiros JM, Sanchez-Padilla E, Castrodeza Simón-Soria F, Ortiz de Lejarazu R. Rotavirus in Spain (2000-2004): a predictive model for a surveillance system. *Euro Surveill.* 2007;12(2):pii=686.
26. Dewey KG, Heinig MJ, Nommsen-Rivers LA. Differences in morbidity between breast-fed and formula-fed infants. *J Pediatr* 1994; 126:696-702
27. Cunningham AS. Morbidity in breast-fed and artificially fed infants. *J Pediatr* 1977; 90:726-729.
28. Howie PW, Forsyth JS, Ogsten SA, Clark A, du V Florey C. Protective effect of breast feeding against infection. *Br Med J* 1990; 300:11-16
29. Rubin DH, Leventhal JM, Krasilnikoff PA, Kuo HS, Jekel JF, Weile B. Relationship between infant feeding and infectious illness: a prospective study of infants during the first year of life. *Pediatrics* 1990; 85:464-471.

30. C D Brandt, H W Kim, W J Rodriguez, J O Arrobio, B C Jeffries, and R H Parrott. Rotavirus gastroenteritis and weather. *J Clin Microbiol.* 1982 September; 16(3): 478-482.
31. Ting-Fang chiu, Chin-Nan Lee, Ping Ing Lee, Chuan-Liang Kao, Rotavirus gastroenteritis in children. Department of pediatrics, National Taiwan University Hospital; School of Medical Technology, Taiwan University, Taipie, Taiwan, ROC. 2000; 33: 181-186.
32. Richard F. Schumacher, Johannes Forster, The CNS Symptoms of Rotavirus infections under the age of two, *Klin Padiatr* 1999; 211(2): 61-64 DOI: 10.1055/s-2008-1043766.
33. Rodriguez W J, Kim HW, Arrobio JO, Brandt CD, Chanock RM, Kapikian AZ, Wyatt RG, Parrott RH. Clinical features of acute gastroenteritis associated with human reovirus-like agent in infants and young children. *J Pediatr* 1977; 91: 188-93
34. Yolkin R, Wyatt R, Zisis G. Epidemiology of human Rotavirus types 1 and 2 as studied by enzyme-linked immunosorbent assay. *N Engl J Med* 1978; 299: 1156-61.
35. James R. Murphy Gloria P. Heresi Shahida Baqar . *Campylobacter* In: Kliegma RM, Behrman RE, eds. *Nelson textbook of pediatrics* , 18<sup>th</sup> Ed. Philadelphia WB Saunders, 2007 , 1199-1201.