

# Human Rota Virus Infection in Children up to the Age of Five Years

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## ABSTRACT

**Background:** Acute diarrhea is considered to be a leading cause of morbidity and mortality in children all over the world and Rota virus is the most common cause of severe diarrhea among infants and children.

**Objectives:** To determine the risk factors, symptoms and the proper way of management of Rotavirus gastroenteritis.

**Methods:** This work was conducted on 235 children who were less than five years of age. They were attending the Central Teaching Hospital of Pediatrics in Baghdad for acute diarrheal diseases, in the period between the 1<sup>st</sup> of September 2011 and the 10<sup>th</sup> of February 2012. History, physical examination, stool analysis and culture and identification of Rotavirus are done for each of these patients using Rotavirus diagnostic Kit produced by (Bio- Kit).

**Results:** The growth of microorganisms (viral, bacterial, parasitic and mixed organisms) were notified in 146 patients (62.11%), the remaining 89 patients (37.9%) revealed no growth in their stool samples. Human Rotavirus infection was detected in 45 (19.1%) of our patients. Regarding human Rotavirus infection, the most vulnerable age group was 6-12 months (51.1%). Male to female ratio was 1.2:1 the majority of patients were from rural areas (68.8%). Bottle feeding was used in (32.5%) of cases while breast feeding were in (5.9%). Tap water supply was used for drinking in (23.7%) of patients, most of them use water without boiling (21.3%). The symptoms included the followings: diarrhea which is found in (62.1%) patients, vomiting found in 43(95.5%) patients, fever found in 40 patients (88.8%), abdominal colic in 23 patients (51.1%), symptoms of upper respiratory tract were found in 33 patients (73.3%) and rectal prolapsed in one patient (2.2%).

**Conclusion:** Rotavirus is the most common cause of gastroenteritis in young children and significantly more common among infants 6-12 months. The most important potential risk factor that increasing the incidence of gastroenteritis, was bottle feeding preference.

**Keywords:** Gastroenteritis, Rotavirus infection.

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Acute diarrhea is one of the most important causes of morbidity and mortality among children<sup>(1)</sup>. Rota viruses are the main responsible pathogens worldwide especially in developing countries particularly in children between the ages six months and two years<sup>(2)</sup>. Bishop identified Rota virus for the first time by electron microscopy in 1972, its size 70 nm, has the shape of a wheel (wheel = Rota in Latin). It is round and double shelled and includes a genome of 11 segments of double stranded RNA and belong to the Reoviridae family<sup>(3)</sup>.

Virus can be detected coincident with or slightly before the onset of illness, and in 94% of specimens 1 to 4 days after onset and in severe episodes of diarrhea shedding of the virus in stool may be as long as 25 to 30 days<sup>(4)</sup>. Asymptomatic excretion of Rota virus in stool has been described in both adults and children and may play a role in transmission particularly in Nosocomial setting<sup>(5)</sup>.

The virus directly damage the small intestinal villi furthermore produce an enterotoxin that contribute to watery diarrhea without blood or mucous<sup>(6)</sup>. In children admitted to hospital, fever and

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vomiting persist for 2-3 days, diarrhea for 4-5 days and dehydration is commonly isotonic<sup>(2)</sup>. The incubation period 1-3 days and the recovery is usually complete<sup>(7)</sup>. Rotavirus is transmitted by fecal-oral route<sup>(8)</sup>. Studies in different regions in Iraq show that Human Rotavirus infection occurs mainly during winter<sup>(9,10)</sup>.

Diagnosis is made by detecting the virus in stool sample or suspension of rectal swab. ELISA is the most widely used which detect the antigen late in the course of the illness. PCR has very good accuracy. For a rapid diagnosis Latex agglutination test may be used although its specificity is weak<sup>(11)</sup>.

Education is the most important factor for the prevention and treatment. Proper ORS prevent dehydration and proper hygiene and food preparation practice prevent infection and its spread<sup>(12)</sup>.

Two vaccines were shown to be safe and effective taken orally<sup>(13)</sup> in prevention of this infection.

Prognosis is very good with proper management. Death is caused predominantly by dehydration and secondary malnutrition from protracted course<sup>(14,15)</sup>. So we conducted this work to detect Human Rotavirus infection, determine the potential risk factors that predispose to this infection and evaluation of clinical presentation among Iraqi children suffering from acute diarrhea.

## Methods

Two hundred and thirty five patients attending the Central Teaching Hospital of Pediatrics in Baghdad from the 1<sup>st</sup> of September 2011 to the 10<sup>th</sup> of February 2012 with acute diarrhea which defined as the passage of unformed stool with at least twice the usual daily frequency for more than two consecutive days<sup>(2)</sup>.

Those who used antibiotics within 3 days were excluded from the study. Stool samples were collected in plastic containers, each sample was divided into three parts: one was used for stool analysis and stool culture, the second was kept for determination of Rota virus and the third

was used for determine the PH and reducing substances (PH less than 5.5 regarded acidic<sup>(4)</sup>). Stool sample examined within half an hour after collection. Direct smear were prepared by mixing a small amount of freshly passed fecal materials with saline to detect RBCs, pus cells and trophozoites.

Stool sample cultured on MacConkey agar, shigella-salmonella agar and tetrathionate broth, incubated aerobically for 18-24 hours at 37°C. Bio-kit was used to diagnose the presence of human Rotavirus in the stool.

## Results

From the 235 diarrheal specimens collected, 146 (62.1%) revealed growth of organism as showed in table 1, while the remaining 89 (37.9%) did not detect any growth. Human Rotavirus was found to be responsible for 45 patients (19.1%) of acute diarrhea, while E. coli was responsible for 41 of patients (17.4%), Salmonella was responsible for 11 patients (4.6%), Shigella for 8 (3.4%) and Enterobacter for 13 patients (5.5%) who suffered from diarrhea.

Entamoeba histolytica was detected in 10 cases (4.2%) and mixed infection in 18 cases (7.6%).

Table 2 shows that breast feeding reduce the risk of human Rotavirus infection. It was detected in 6 patients (5.9%) among breast fed infants and in 26 patients (32.5%) in bottle fed infants and in 10 patients (29.4%) use mixed feeding and the infection detected in another 3 patients (15%) who are on solid food.

Table 3 shows the frequency, duration and the type of diarrhea. Frequency was less than five times per day in 27 patients (22.5%). Duration less than seven days detected in 37 patients (27.4%). Watery diarrhea was found in 45 patients (22.2%).

Table 4 shows the clinical features that are associated with Rotavirus infection: vomiting was found in 43 patients (95.5%), fever found in 40 patients (88.8%), abdominal colic in 23 patients (51.1%), symptoms of upper respiratory

tract were found in 33 patients (73.3%) and rectal prolapsed in one patient (2.2%).

Table 5 shows that the most vulnerable age group to get Rotavirus infection was in late infancy (6-12 months) which account for 23 patients (51.1%), from 1-3 years of age accounts for 14 patients (31.1%), while

the least affected group was from 3-5 years, one patient infected (2.2%).

There is no significant sex difference between male with acute diarrhea 128 cases (54.4%) and females 107 cases (45.1%). Regarding Rotavirus infection 25 males (55.5%) were affected in compares to 20 females (44.4%) as shown in table 6.

**Table 1: Distribution of pathogens causing acute diarrhea in patients below five years.**

Pathogen isolated	No. of patients	Percent
Rotavirus	45	19.1
E.coli	41	17.4
Salmonella	11	4.6
Shigella	8	3.4
Enterobactor	13	5.5
Entamoeba histolytica	10	4.2
Mixed infection	18	7.6
No growth	89	37.9
Total	235	100%

**Table 2: Distribution of Rotavirus in relation to the type of feeding.**

Type of feeding	No. of patients	Rota V. positive	percent
Breast feeding	101	6	5.9
Bottle feeding	80	26	32.5
Mixed feeding	34	10	29.4
Usual diet	20	33	15
Total	235	45	100%

**Table 3: Distribution of Rotavirus cases in relation to frequency, duration and type of diarrhea.**

Frequency ,duration, type of diarrhea		No. of patients	Rotavirus positive	%	P value
Frequency	5 times/ day	120	27	22.5%	0.05
	5 times/day	115	18	15.65 %	
Duration	7 days	135	37	27.40 %	0.001
	7 days	100	8	8 %	
Type	watery	202	45	22.27 %	0.01
	bloody	23	0	0%	

**Table 4: Clinical features associated with Rotavirus infection.**

Clinical features	Rotavirus cases	Percent
Vomiting	43	95.5
Fever	40	88.8
Upper respiratory tract infection	33	73.3
Abdominal colic	23	51.1
Rectal prolapse	1	2.2
Convulsion	0	0

**Table 5: Age distribution of patients with Rotavirus infection.**

Age in months	Rotavirus cases	Percentage
Birth - 2	2	4.4
2 - 6	4	11.1
6 - 12	23	51.1
12 - 36	14	31.1
36 - 60	1	2.2
Total	45	99.9%

**Table 6: Sex distribution of patients with acute diarrhea.**

Sex distribution	No. of patients	Percentage	Rotavirus	Percentage	P. value
Male	128	54.46	25	55.55	0.05
Female	107	45.53	20	44.44	
Total	235	99.99	45	99.99	

## Discussion

In this study, we found out that 62.1% of diarrheal cases in infant were caused by enteropathogen. This result is in agreement with the study done by Ali Almarzooqi<sup>(9)</sup>, who found out that enteropatho-gens causing 75.5% of diarrheal cases.

In this study, the incidence of Rotavirus infection in breast fed infants was 5.9% while its incidence in bottle feeding was 32.5%; these results are similar to the finding of studies in breast fed infants in Bangladesh 8.3%<sup>(17)</sup>, in Argentina 6.9%<sup>(18)</sup>, in Istanbul 4.8%<sup>(19)</sup> and in Barcelona 4.9%<sup>(20)</sup>. This data confirms the role of breast feeding in protection against Rotavirus gastroenteritis due to its well known immunological properties. Most of infected children in our study had diarrhea for less than 7 days (62.1%), watery in majority (85.9%), (Table 3). This was similar to other studies in Bangladesh (67.3%, 88.8%)<sup>(17)</sup>, Iran (63.6%, 89.2%)<sup>(21)</sup>. The low rate of the disease in infants under 6 months of age has been attributed to higher rate of breast feeding and our result similar to studies in Philippines (6.4%)<sup>(22)</sup>, Iran (7.1%)<sup>(21)</sup>.

So we concluded that the Rota Virus is the most common cause of gastroenteritis among Iraqi young children and it is most commonly affect infants from 6-12 months of age. The most important risk factor that increases the incidence of Rota Virus infection was bottle feeding preference.

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