

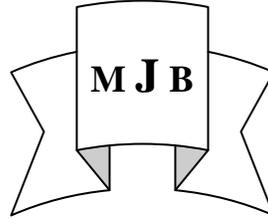
## Detection of Adenovirus Type F and G in Children Less Than Five Years Suffering from Acute Gastroenteritis in Hilla Province

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### **Abstract**

The current study was performed on two hundred fifty children infected with acute watery diarrhea admitted to Babylon maternity and children hospital during 10 months from June 2012 to February 2013. The age ranged between 2 months - 5 years. The virus was determined in stool and serum using the CerTest Adenovirus Card Test (stepcoloured chromatographic immunoassay) for the qualitative detection of Adenovirus in stool samples and ELISA for the qualitative determination IgM antibodies against adenovirus in human serum. The viruses were determined in 109 (43.6%) of patients.

Adenovirus were detected in 41(16.4%) and Rotavirus in 68(27.2%). The adenovirus associated with gastroenteritis was mostly seen between the age (2-24) months. The positive cases dominated in rural patients which depending on the mixed feeding while the breast feeding infants less infected. The frequency of adenovirus in girls and boys was similar. The study revealed that the infections with these viruses were spread predominantly from person to person with a duration from 3-10 days and an illness lasting approximately one week. Diarrhea is more prominent than vomiting or fever, and respiratory symptoms are often present.

### **الخلاصة:**

تم إجراء الدراسة على مائتان و خمسون طفل مصاب بالإسهال المائي الحادّ الراقدين في مستشفى الولادة والأطفال في بابل خلال ١٠ شهور من يونيو/حزيران ٢٠١٢ إلى فبراير/شباط ٢٠١٣ تراوحت أعمارهم بين شهرين - ٥ سنوات وتم الكشف عنها في البراز والمصل باستخدام ELISA وال CerTest Adenovirus Card Test

الفايروس الغدي كشف في ٤١(١٦%) في ١٠٩ (٤٣,٦%) مريض تم الكشف عن الفايروسات

والفايروس الدوار في ٦٨(٢٧,٢%) الفايروس الدوار المرتبط بالالتهاب المعوي لوحظ في الغالب في الاعمار بين (٢-٢٤) شهر. اغلب الاصابات في الفايروس الغدي ظهرت في مرضى الريف الذين اعتمدوا على الرضاعة المختلطة بينما حديثي الولادة المعتمدين على رضاعة الثدي أقل اصابة. حدوث الفايروس الغدي في البنات والاولاد كانت متشابهة. الاصابة بهذه الفايروسات يكون انتشارها دائما من شخص الى اخر بفترة من ٣-١٠ أيام والمرضى يبقى تقريبا اسبوع واحد. الإسهال سائد اكثر من التقى أو الحرارة والاعراض التنفسية تكون عادة موجودة.

### **Introduction**

**D**iarrhea is the third causative case leading to cause of death related to infectious diseases all over the world, the rate of death due to

diarrheal diseases is estimated as two million a year [1]. Viral pathogens are the most common cause of gastroenteritis in developed countries [2-4]. Human rotavirus and adenovirus

infections are major causes of acute outbreaks and sporadic cases of gastroenteritis, occurring primarily among children less than 2 years of age. Patient hospitalization is often required, with enormous infection control implications. Adenoviruses are one of the most important etiological agents of serious gastroenteritis among infants and young children. Adenoviruses are second only to rotavirus as the most important causative agents of acute infantile gastroenteritis [5].

Group F of adenovirus including types 40 and 41 are the main etiologies of 1-20% of acute gastroenteritis [6] and 50% of all adenoviruses found in stool specimens are types 40 and 41 [7]. Since prevalence of adenovirus type 40 and 41 was not determined in Babylon. The aim of current study was to clarify the significance of these viral agents in diarrhea patients living in Hilla province.

### **Materials and Methods**

The current was a hospital- based prospective study included children attending the Babylon maternity and children hospital .A single stool sample was collected from 250 children under 5 years old who presented to the Children's Ward with diarrhea.

Questionnaires were used to obtain information from the parents or guardians accompanying the child to hospital .Information included signs and symptoms of illness (abdominal cramps, diarrhea and vomiting, respiratory symptoms, elevated temperature etc).The stool sample directly tested by rapid test for detection adenovirus infection and then frozen at -20°C after collection to perform the other tests and before analysis thawed once. The CerTest Adenovirus card is a qualitative

immunochromatographic assay [E-50018 Zaragoza (SPAIN)] for the determination of Adenovirus in stool samples( Cukor G., and Blacklow N. R., 1984).

During testing, the sample is allowed to react with the coloured conjugate (anti-adenovirus mouse monoclonal antibodies-blue microspheres) which was pre-dried on the test. The mixture then moves upward on the membrane by capillary action. As the sample flows through the test membrane, the coloured particles migrate. In the case of a positive result the specific antibodies present on the membrane will capture the coloured conjugate. The mixture continues to move across the membrane to the immobilized antibody placed in the control band region.

### **Results**

Among 250 cases which were assessed in this study, 41 cases (16.4 %) were adenovirus positive. These fecal samples tested with CerTest Rotavirus-Adenovirus Card Test positivity of these forty one samples was confirmed by ELISA. Tow samples reveal positive by ELISA test detects for IgM antibodies against adenovirus (Table 1).

The majority of infected cases were seen among children under 12 months old. The highest number was seen among children between 3 and 12 months and the lowest number were seen in children older than 4 years (Table 2).

In this study probable correlation between the incidence rate of adenovirus infection and different seasons of year were examined (Table 3). The adenovirus (Ad40, Ad41) related episodes of diarrhea in children according to clinical features (Table 4). The study of clinical manifestations in adenovirus (Ad40, Ad41) gastroenteritis

cases showed that most children with infection had fever (92.3%), vomiting (92.1%), abdominal pain (91.6%) and dehydration (92.5 %).

**Sensitivity**

The detection of Adenovirus showed a 95.3% of concordance in sensitivity of CerTest Adenovirus .

**Specificity**

The detection of Adenovirus showed 83.6% of concordance in specificity CerTest Adenovirus.

**Table 1** Adenovirus serotype 40 and 41 detected by rapid test and ELISA test

Type of test	No. of patient	positive cases		negative cases	
		No.	%	No.	%
Rapid test*	154	41	16.4	113	45.2
ELISA test**	96	2	0.8	94	37.6
<b>Total</b>	<b>250</b>	<b>43</b>	<b>17.2</b>	<b>207</b>	<b>82.8</b>

\*The CerTest Adenovirus card

\*\*Enzyme Linked Immuno Sorbent Assay

**Table 2** Frequency distribution of patients with positive adenovirus according to age (months) by rapid test\* and ELISA test

Age groups (months)	No. of patients	No. of adenovirus positive	Percent of adenovirus Positive %
<b>0-6</b>	<b>100</b>	<b>21</b>	<b>21</b>
<b>7- 12</b>	<b>90</b>	<b>20</b>	<b>22.2</b>
<b>13-24</b>	<b>40</b>	<b>0</b>	<b>0</b>
<b>25-36</b>	<b>10</b>	<b>0</b>	<b>0</b>
<b>36-60</b>	<b>10</b>	<b>0</b>	<b>0</b>
<b>Total</b>	<b>250</b>	<b>41</b>	<b>43.2</b>

\* CerTest Rotavirus-Adenovirus Card Test

**Table 3** Distribution of adenovirus positive patients in different seasons by CerTest Rotavirus-Adenovirus Card Test

Seasons	Examined cases	Positive cases	Percent of positive cases %
Spring	75	0	0
Summer	50	10	20
Autumn	75	20	26.7
Winter	50	11	22
<b>Total</b>	<b>250</b>	<b>41</b>	<b>68.7</b>

**Table 4** Clinical symptoms of children with adenovirus (Ad40, Ad41) diarrhea.

Symptoms	No. of patient	Episode of diarrhea	
		No.	Rate (%)
Fever	39	36	92.3
Vomiting	38	35	92.1
Abdominal pain	36	33	91.6
Dehydration	40	37	92.5

**Discussion**

Gastroenteritis is one the commonest disease in children especially in developing countries [8]. More than 20 types of viruses cause this illness [8]. The medically most important enteric viruses are, group A rotaviruses, caliciviruses, adenoviruses and astroviruses [9]. Adenovirus enteritis occurs in children younger than two years old through the year with no seasonality restriction[0-6 months 21%], [7-12 months 22.2], [13-24 months0%]. [25-36 months 0%],[36-60 months 0%] (10). In this study, Rapid test and ELISA could detect 16.4 % and 0.8 % of positive gastroenteritis cases respectively. Prevalence of group F adenovirus gastroenteritis was determined by ELISA test in some countries including in Thailand 9% [11], Korea 2.8% [12], Bangladesh 14% [13], Australia 3.1% [14], Italy 2.6% and USA 4.8% [15].

In most parts of the world, the adenovirus (Ad40, Ad41) is present throughout the year, similar results were obtained during the period of the present study infection occurred throughout the year, but our data indicated that the outbreaks of adenovirus (Ad40, Ad41)

infection were in the Autumn 26.7% ,winter 20% ,summer 22% and spring ,so more than 20.5% occurred in these seasons. These results are in accordance with the finding of others[16, 17].

During this study, fever 92.3%, vomiting92.1% , abdominal pains 91.6, watery diarrhea and dehydration 92.5% were the most common specific signs and symptoms in children with adenovirus (Ad40, Ad41) infection, therefore, the clinical features of these patients are similar to those previously described [18,19].

In the current work the comparison were due to evaluate the efficiency CerTest to predict the acute cases of diarrhea due to Adenovirus so the positive cases of ELISA IgM test are less than the positive in case of rapid test .So we can concluded that rapid test give poor result for detection of acute diarrhea cases .(i.e IgM ELISA)and the positivity was due toIgG to Adenovirus .

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