

## Studying the Outbreak of Cholera among children in Kirkuk Central Pediatric Hospital in 2007.

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### Abstract

This is a cross sectional study done during the epidemic of cholera in Kirkuk city during the period between First of August 2007 to the end of October 2007. All cases with diarrhea were sent for stool culture to rule out cholera .There were 326 cases with positive stool culture for *vibrio cholerae* out of 6399 cases of diarrhea , majority of cases were having *Inaba* serotype. Only 5 cases have died. Large number of cases were from Kirkuk city. Most of them had mild dehydration when they attended the hospital. In regard to patients age, most of affected children between (1-5) years which constitute (41.7%). There was no significant relationship between patient's gender and contracting specific serotype (*Inaba* or *Ogawa*).

### Introduction

The word cholera is derived from a Greek term that means "flow of bile." Cholera is caused by *Vibrio cholerae*, the most feared epidemic diarrheal disease because of its severity. Dehydration and death can occur within hours of infection. The organism has since been designated *V. cholerae* O139 Bengal. Currently, in most regions of south-east Asia, *V. cholerae* serogroup O1 remains dominant, whereas in other regions serogroup O139 periodically re-emerges . *V. cholerae* serogroup O1 is most common cause of cholera epidemics. In endemic areas, the disease is more common in the summer and autumn months<sup>(10)</sup>. Robert Koch discovered *V. cholerae* in 1883 during an outbreak in Egypt. *V. cholerae* O1 is classified into 2 major biotypes: classic and El Tor. Currently, El Tor is the predominant cholera pathogen. Organisms in both biotypes are subdivided into serotypes according to the structure of the O antigen, as follows:

- Serotype Inaba - O antigens A and C
- Serotype Ogawa - O antigens A and B
- Serotype Hikojima - O antigens A, B, and C<sup>(1)</sup>

Iraq is at risk of epidemics spreading from neighboring countries because it lies on the routes of pilgrimage to Mecca and contains a number of holy shrines. During the epidemic of 1820, when cholera first spread to Basrah, there were a great number of deaths and many sectors of the city were completely depopulated<sup>(2)</sup>. The disease spread to Baghdad, with similar consequences. After that, cholera continued to appear in several epidemic forms during the years 1871, 1889, 1894, 1899 and 1917<sup>(3)</sup>, after which the disease completely disappeared from Iraq to reappear again in August 1966 as a part of the 7th pandemic spread<sup>(4)</sup>. After subsidence of the 7th pandemic in Iraq, occasional outbreaks of cholera continued in Iraq; Figure (1) shows the registered cholera cases in Iraq from 1991–99. However, there was no official announcement of another epidemic until the year 1999. During 1991, a third of the total number of reported cases were in Baghdad city (602) whereas in the inter-epidemic period 1990–98, Baghdad has a smaller proportion of the total (197)<sup>(6)</sup>.

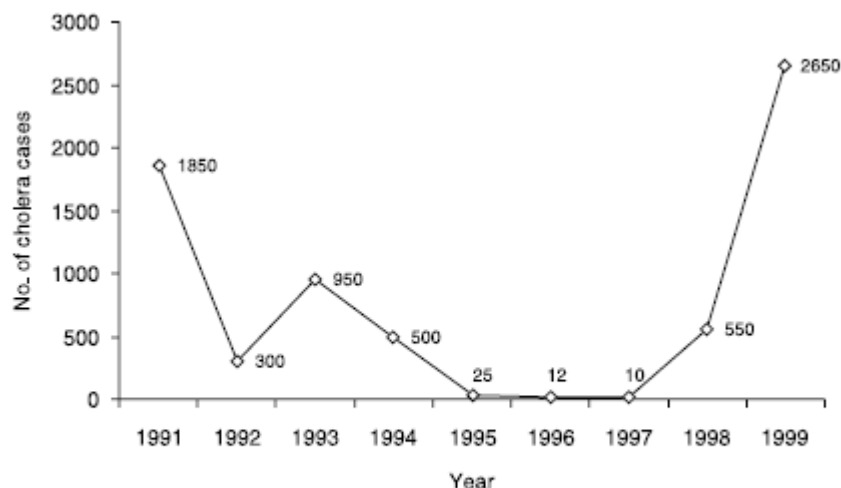


Figure 1 Annual number of reported cholera cases in Iraq, 1991–99 (Source: Department of Community Disease Control, Ministry of Health, Iraq)

### Methodology

The current work represents a cross sectional study which was conducted during the period extended from the First of August 2007 to the end of October 2007. The diagnosis of cases of cholera was done depending on clinical features regarding signs and symptoms of cholera and confirmed by laboratory investigation by taking stool

specimen for stool culture. Description of the method of isolation and culturing stool to detect *v. cholerae* is attached in appendix (I)<sup>(12)</sup>.

We have studied the isolated cases of cholera, a total of 326 in Kirkuk Pediatric Hospital (which is the only pediatric hospital in this city) during the outbreak of cholera in 2007 and the data were analyzed and charted.

Information from the records of all cholera cases were taken regarding the age of the child, gender, severity of the disease and type of the strain of *vibrio cholerae* in the stool culture.

### Results

During the 4 months study period from August to October 2007 a total of 326 patients diagnosed with

cholera were admitted Kirkuk Central Pediatric Hospital. They were 157 males and 169 females with a male:female ratio of 0.92:1.

Table (1) shows the age and sex distribution of the patients; the age group most affected was between 1-5 years which constituted (41.7%) in comparison with those under one year (10.4%).

**Table (1) : age and sex distribution of admitted patients.**

Age (years)	Admitted				Total	
	Male		Female			
	No.	%	No.	%	No.	%
under 1 year	14	41	20	59	34	10.4
1-5	65	48	71	52	136	41.7
6-10	59	51	57	49	116	35.6
11-15	19	48	21	52	40	12.3
Total	157	48.2	169	51.8	326	100

When distributing the serotypes according to age and gender, the results showed approximate figures in most age groups, except (11-15) years which showed that males (86%) affected more than females (14%). While in

case of Ogawa serotype, males predominate females in all age groups, but this may be due to the small number of cases due to this serotype. Statistically the result is not significant. P value is > 0.05. Table (2).

**Table(2): Distribution of serotypes by age and gender according to age groups.**

Age	Serotype of cholera							
	Inaba				Ogawa			
	Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%
Under 1 year	14	(42)	19	(58)	1	(100)	0	(0)
1-5	57	(44)	74	(56)	4	(80)	1	(20)
6-10	46	(40)	68	(60)	1	(50)	1	(50)
11-15	32	(86)	5	(14)	2	(66.7)	1	(33.3)
Total	149	(47.3)	166	(52.7)	8	(72.7)	3	(27.3)

\* *p* value for gender differential > 0.05.

In regard to residency of patients, it was demonstrated that 261 (79.1%) were urban inhabitants, whereas 65 (19.9%) were from rural areas, as displayed in table (3).

**Table(3): Frequency distribution of cholera cases according to residency.**

Residency	No.	%
Urban	261	80.1
Rural	65	19.9
Total	326	100

When distributing the cases according to severity of dehydration, the findings are as follows, 278 (85.3%) cases have mild dehydration, 32 (9.8%) have moderate dehydration and 16 (4.9%) patients have severe dehydration, as in table (4).

**Table(4): Distribution of cases according to severity of dehydration.**

Severity	No.	%
Mild	278	85.3
Moderate	32	9.8
Severe	16	4.9
Total	326	100

### Discussion

WHO reported that cholera outbreak first detected in Kirkuk in northern Iraq on 14 August 2007 has spread to 9 out of 18 provinces across the country. WHO estimates that >30 000 people have contracted acute watery diarrhea, among whom 3315 have tested positive for *Vibrio cholerae*. A total of 14 individuals are known to have died of the disease<sup>(5)</sup>.

During the study period, the total number of patients admitted with diarrheal diseases was (6399), the cholera cases were (326), and the proportion of cholera was (5.12%). Number of cases died was 5 with a percentage of (1.5%), which is similar to that of AL-Abbassi research done in 1999 when the mortality rate was (1.3%)<sup>(6)</sup>.

The present study showed that all pediatric age groups were affected, but most of them (41.7%) were between (1-5) years. These results agrees with other studies which showed that the highest incidence of clinical cholera is usually observed among toddlers and pre-school children<sup>(6,7)</sup>.

The isolation of serotypes of *vibrio cholerae* in this work showed that the predominant serotype was *Inaba* (96.6%), while *Ogawa* was comprising (3.4%), this finding is in agreement with a study done in Pakistan, which showed that *Inaba* become the predominant serotype in 2005 outbreak (before, the *Ogawa* was the predominant serotype)<sup>(8)</sup>. However, this result may be not in agreement with a study done in Baghdad during 1999 outbreak which showed that *Ogawa* serotype is the predominant one<sup>(6)</sup>.

The results showed that there was no significant relationship between gender of patient and the causative serotype of *v. cholerae*, this finding was in agreement in a study carried in India which showed that there was a similar distribution of cholera cases in relation to patient's gender<sup>(11)</sup>.

It was found that most of patients are urban inhabitants, this may be due to the fact that this work is a hospital-based study, so most of the patients who live in Kirkuk attend this hospital, while those who live in rural areas can attend other hospitals in the governorate. However, this finding is similar to that found in a study done in Ghana, Ashanti region

where the results showed that high urbanization, high overcrowding and neighborhood with Kumasi metropolis are the most important predictors of cholera in Ashanti region<sup>(9)</sup>.

In Kirkuk city, areas that showed high number of patients are (Al-aaskary quarter, AL Oroba, AL Wasity, Tareeq Baghdad, Wahid huzairan, AL-Nasir quarter, Shorjah and AL-Qadisiya ) other areas showed lower numbers, this finding may be of benefit if an epidemic breakthrough in the future, so we can compare between the areas.

In this study, most of the cases were of mild dehydration, this result is similar to that of a research done on the epidemic of 1991 of Iraq in which most of cases were mild or subclinical. However, in 1999, most of the cases were of severe dehydration<sup>(6)</sup>.

#### Conclusions and recommendations

The study had shown that most of patients were (1-5) years and there was no difference in the distribution of cases according to gender. Serotype *Inaba* was the predominant one isolated from patients with cholera, and most of cholera cases were from urban areas. Majority of patients with cholera had mild degree of dehydration. It is recommended to carry out more studies on the level of the governorate and

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Iraq as whole. More health education campaigns are required by mass media to prevent such epidemics from breaking in the future.

#### Appendix (1): Description of method of isolation of *V. cholerae*.

- 1-Take the stool sample in a transporting media (Cary and Blair) if the lab is far away.
- 2- Keep the sample (about one gram) in (alkaline peptone water) and left in incubator for 6—8 hours.
- 3- Take the superficial layer of media to another special media for cholera called (TCBS) to be kept in 37°C for 24hs.
- 4- The *vibrio cholerae* will appear as yellow colonies while the green or green to yellow represent *vibrio parahaemolyticus* which is infective but not epidemic (causing simple gastroenteritis)
- 5- The doubtful colonies will transfer to KLEGLER MEDIA or MACCONKY Agar and keep the temperature 37°C for 24hs for final biochemical tests (antisera), this step is not valid if the TCBS is used, as this media contains high salt concentration which will give FALSE positive or FALSE negative with the ANTISERA.

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## دراسة ميدانية للكوليرا بين الاطفال المرضى في مستشفى كركوك خلال عام ٢٠٠٧

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#### المخلص

هذه دراسة مقطعية انجزت اثناء فترة وباء الكوليرا في مدينة كركوك ما بين الاول من اب ٢٠٠٧ ولغاية نهاية شهر تشرين الاول ٢٠٠٧. تم ارسال عينات من الخروج لجميع المرضى اللذين كان لديهم اسهال لاستبعاد الإصابة بالكوليرا. تبين ان هناك ٣٢٦ عينة ايجابية الفحص للكوليرا من عينات زرع الخروج من اصل ٦٣٩٩ حالة اسهال، وان غالبيتهم لديهم فصيلة (اينابا). من بين جميع حالات الكوليرا توفي ٥ مرضى فقط. ان اغلب الاصابات كانوا من مدينة كركوك. وان معظمهم كان لديهم جفاف خفيف عند الفحص الاول لدى دخول المستشفى. اما فيما يخص العمر فقد كان معظم الاطفال المصابين يقعون في الفئة العمرية (١-٥) سنوات ويشكلون (٤١,٧%). لم تكن هناك علاقة مهمة بين جنس المريض والاصابة بنوع معين من فصائل الكوليرا (اينابا او اوكاوا).