
A Study of *Vibrio Cholerae* Infection in Children

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Abstract:

Objective: To study clinical presentation and antibiotics susceptibility pattern of *Vibrio cholerae* in children.

Methods: Cases included in this study were 460 children aged from few days up to 12 years. These children were admitted to Central Teaching Hospital in June 2001 due to sudden onset of watery diarrhea that led to various degrees of dehydration. Full examinations of each child were done to assess the degree of dehydration. Stool examinations were done macroscopically followed by culture of the stool in selective media for *Vibrio* then further identification by biochemical and serological tests were done to confirm the diagnosis. Antibiotic susceptibility tests to different antibiotics were done to every case. Another stool samples were taken 7 days after starting treatment and cultured as well.

Results: According to the degree of dehydration, these 460 patients were divided into 4 groups, of which 47.8% have severe dehydration, 40% have moderate dehydration, 9.1% have mild dehydration and only 3% are not dehydrated. On macroscopical stool examination 90% were watery in consistency and 2.6% contain blood and mucus. Out of these 460 cases having diarrhea, 160 cases (34.8%) were diagnosed as cholera cases, of which 54.4% are male and 45.6% are female. The percentage according to age of the patients were 16.3% <1 year of age, 62.5% of 1-5 years and 21.3% >5 years. Regarding residency of the patients, the highest percent were from Al-Mahmoodyyah district (37.5%) followed by Abu-Graib district (20%). In addition to dehydration, 50% of the admitted cases have vomiting, 31% have fever which presented mainly in children below 5 years of age, 3% of the cases develop convulsion and 4.4% have stupor. Antibiotic susceptibility tests were done using the following antibiotics with their percentage of sensitivity as follows: Ampicillin (49.4%), Tetracycline (5%), Gentamycin (31.2%), Trimethoprim (68.8%), Erythromycin (38.7%) and Nalidixic acid (69.4%). Lastly 2nd culture and sensitivity test were done 7 days after the 1st one and noted that *Vibrio cholerae* were isolated from 20 patients (12.5%).

Conclusion: *Vibrio cholerae* is one of the important causes of watery diarrhea that lead to severe dehydration and various complications if untreated. In children, the highest percent of the disease is in patients of 1-5 years of age with the highest percent were in people living in the periphery of Baghdad.

Key word: Diarrhea, *Vibrio*.

Introduction: -

Cholera is a serious pandemic diarrheal disease that has killed millions of people^[1], and most developing countries have faced a cholera outbreak, with the unpreventable introduction and spread within a country; however it can be contained by appropriate control measures^[2].

Many cases were recorded in Iraq as early as 1820 during the 3rd pandemic, spreading from Persia, and since then cholera continued to appear in an epidemic form^[3].

Man is the only known host for cholera infection with all ages are affected^[4]. Approximately one million organisms must be ingested to cause illness; with net result is a voluminous outpouring of electrolyte rich fluid^[5].

In endemic areas, malnourished children and those under 2 years of age run a high risk of having cholera with prolongation of the duration of diarrhea by 30-70% in malnourished children^[6,7].

In children cholera should be expected when profuse watery diarrhea occurs resulting in severe dehydration^[4,6,8]. Vomiting occurs early and abruptly, and it occasionally develops before diarrhea, but usually before the appearance of dehydration and acidosis, with temperature is often raised in children^[9]. Complication is more common and serious in children than adult, as prolonged

stupor, coma, convulsion, cardiac arrhythmia and arrest due to hypokalaemia^[7].

Early diagnosis must be done then proper treatment with correction of dehydration by intravenous fluid, oral rehydration and antibiotic therapy, which can be started 1-2 hours after initiating rehydration^[4].

During epidemics, the ultimate control of cholera is based on high level of sanitation and personal hygiene to assure that faecally shed organisms are not ingested in sufficient number to cause disease, this is achieved by adequate water supplies and sanitary disposal of feces, with improved nutrition and attention to food preparation^[4,8].

Materials & Methods: -

Four hundred and sixty children included in this study were admitted to Central Teaching Hospital for Children in June 2001 due to sudden onset of watery diarrhea with various degrees of dehydration. These patients aged from few days and up to 12 years of age.

The information taken about each patient are, name, age, sex, residence, history of previous attacks, family history of same presentation, main complaints and duration of diarrhea. Full clinical examination of each child was done; to state the degree of dehydration and presence of

complication. Stool examinations were done macroscopically for color, consistency, presence or absence of blood and mucus followed by culture of stool on Thiosulfate-Citrate-Bile-Sucrose (TCBS). Then the bacteria isolated were further identified as *Vibrio cholerae* by biochemical tests as Indol, Citrate, and Oxidase. Lastly, slide agglutination tests were done using Anti-O group antiserum in order to confirm the diagnosis.

After identification as *Vibrio cholerae*, antibiotic susceptibility test was performed to these antibiotics, Ampicillin, Tetracycline, Gentamycin, Trimethoprim, Erythromycin and Nalidixic acid.

Another stool samples were taken 7 days after starting treatment and cultured as well.

Results: -

Children included in the study were 460, all had severe diarrhea. The cases were divided into 4 groups according to the degree of dehydration during admission. As shown in table -1 that (47.8%) were severely dehydrated and only (3%) were not dehydrated.

Macroscopical examination of the stool revealed that (90%) were watery in consistency and (2.6%) with blood and mucus.

Out of these 460 cases with diarrhea, 160 (34.8%) were diagnosed as cholera cases, of which 87(54.4%) were male and 73 (45.6%) were female, as shown in table-2.

Table –1 Degree of dehydration in children with diarrhea (total =460).

Degree of dehydration	No	%
Sever dehydration	220	47.8
Moderate dehydration	184	40
Mild dehydration	42	9.2
Not dehydrated	14	3
Total	460	100

Table-2 Distribution of Cholera and non Cholera cases in relation to sex.

Sex	Cholera cases		Non - cholera cases	
	No	%	No	%
Male	87	54.4	177	59
Female	73	45.6	123	41
Total	160	34.8	300	65.2

These 160 child were divided according to child's age, as shown in figure-1, which shows that the infection were predominate in children of 1-5 years of age (62.5%). Regarding residency of the

patients, as shown in table-3, the highest percent were in patients from AL-Mahmoodyah district (37.5%), to be followed by Abu-Graib district (20%).

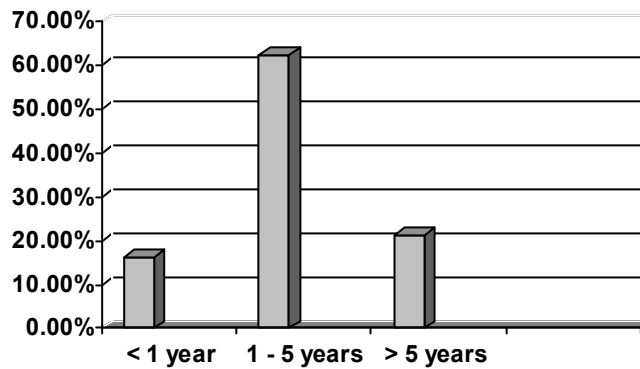


Figure-1: The incidence of *Vibrio cholerae* in relation to age.

Table-3: Incidence of *Vibrio cholerae* in relation to residency.

Residency	No	%
Al-Karkh	27	16.9
Al-Rusafa	19	11.9
Al-Mahmoodia	60	37.5
Abu-Graib	32	20
Out side Baghdad	22	13.8
Total	160	100

For sign and symptom other than diarrhea and dehydration,

Table-4 demonstrates that, vomiting occur in (50.6%) and fever in (31.3%), most of them were infants with a lowest proportion in children above 5 years of age. Few patients developed convulsion (3.1%) and stupor in (4.4%).

Regarding the antibiotic sensitivity pattern of the isolated *Vibrio cholerae*, as we noted in table-5 that (95%) were resistant to commonly used antibiotic that is Tetracycline, while (79.4%) were resistant to Amoxicillin and (68.8%) were resistant to Gentamycin. But the microorganism was sensitive to Trimetheprim (68.8%), and to Nalidixic acid (69.4%).

Table-4: Incidence of sign and symptom other than diarrhea in children with *Vibrio* infection.

Sign and symptom	No	%
Vomiting	81	50.6
Fever	50	31.3
Convulsion	5	3.1
Stupor	7	4.4

Table -5: Antibiotic susceptibility pattern of the isolated *Vibrio cholerae*.

Antibiotics	Sensitive		Resistant	
	No	%	No	%
Ampicillin	79	49.4	81	50.6
Amoxicillin	33	20.6	127	79.4
Tetracycline	8	5	152	95
Gentamycin	50	31.2	110	68.8
Trimethoprim	110	68.8	50	31.2
Erythromycin	62	38.7	98	61.3
Nalidixic acid	111	69.4	49	30.6

Lastly 2nd culture and sensitivity test were done 7 days after the 1st one and noted that *Vibrio cholerae* were isolated from 20 patients (12.5%).

Discussion:

In this study, the highest percent of the patients have severe dehydration, which is due to severe watery diarrhea (90%) of the patients, while the lowest percent (3%) are not dehydrated, which may be due to early admission to the hospital. Patients may be presented in asymptomatic state, mild diarrhea, or as a typical cholera gravis which result in profound, rapidly progressive dehydration and even death [4, 8, 10].

On macroscopical examination of the stool, we have only (2.6%) of the samples that contain blood and mucous, which is usually not related to *Vibrio* infection, while (90%) was watery in consistency, which is one character of *Vibrio* diarrhea [5, 8].

The distribution of *Vibrio* by sex was 54.4% in male and 45.6% in female, on which *vibrio* infection in children is very close in

male and female, while in adult men are affected more frequently than women [11].

The incidence of *vibrio* according to age of the patients, as noted in figure-1, the lowest percent were in children below 1 year of age, which may be due to the immunity conferred by breast feeding, breast feeding is associated with a substantial decrease of the risk of severe cholera [12], or might be due to the boiled drinking water given usually to infant [13]. The highest percent were at 1-5 years of age, because of low health consciousness and poor personal hygiene at this age. This result was noted also in India, which is an endemic area [14, 15, 16]. The lower percent in elder patient is due to the acquired immunity gained from repeated exposure to the disease, whether clinical or asymptomatic infection, which is noted also in other study [11].

Regarding residency, as noted in table-3, the highest percent were in AL-Mohmoodyiah district, followed by Abu-Graib which is due to poor sanitation and poor water supply.

For sign and symptom other than diarrhea, as noted in table-4, that 50.6% develop vomiting, which is one of the main symptom of vibrio infection, as it occur early and abruptly, and occasionally begins before diarrhea, but usually before dehydration or acidosis^[9]. 31.3% of the patients develop fever during the illness, most of them are infants, and few are above 5 years of age. This is agreeing with others, who noted that temperature is often raised in infants, while adult are usually a febrile^[9, 7].

Few patients develop convulsion and stupor, which is due to sever dehydration and hypokalaemia resulting from sever diarrhea. These complications are more common and serious in children than in adults^[7].

In this study as we noted in table- 5, that there is a high resistance rate to Tetracycline, which is a commonly used antibiotic in adult patient, but sensitive to Trimetheprim and Nalidixic acid. This result were reported as well in Asia and Africa, on which *Vibrio cholerae* were resistant to a commonly used antibiotic as Tetracycline, Erythromycin and Ampicillin, but still sensitive to Ceftriaxone, Cefixim and Nalidixic acid^[17, 18, 19].

Such a resistant organism poses an additional threat through a higher secondary infection rate and by causing illness of longer duration^[18, 19].

Lastly vibrio were isolated from 12.5% of the patients 7 days after first sample inspite of using antibiotic, and this will indicate the development of carrier state in these patients, which are asymptomatic carrier that they secrete microorganisms from 5 days –2 weeks^[4, 15, 20].

Conclusion: -

- 1-Vibrio cholerae is one of the important causes of watery diarrhea that lead to severe dehydration and various complications if untreated.
- 2-In children, the highest percent of the disease is in-patients of 1 –5 years of age, with a highest percent are in people living in the periphery of Baghdad.
- 3-The isolated microorganisms were highly resistant to Tetracycline but sensitive to Trimetheprim and Nalidixic acid.

4-Culture and sensitivity test that have been done 7 days after 1st sample reveal that 12.5% of the cases have positive culture in spite of antibiotic treatment.

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