

CAMPYLOBACTER JEJUNI GASTROENTERITIS IN CHILDREN IN BASRAH- IRAQ

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ABSTRACT

A prospective study was conducted on 202 patients (122 males and 80 females), who were admitted to Basrah Maternity and Child Hospital, for the management of diarrhoea during the period from the first of July 2000 till the end of March 2001, their ages ranged from 43 days- 11 years. *Campylobacter jejuni* was detected in (13.86 %) of all cases presented with diarrhoea, and in (31.03 %) of cases presented with bloody diarrhea. It was found that *Campylobacter jejuni* was the second most common bacterial isolate in children with diarrhoea, and the second most common cause of bloody diarrhoea. The frequency of *Campylobacter jejuni* infection was higher in children below 4 years of age and in males more than females. However, these differences were statistically not significant (P -value > 0.05). In addition to diarrhoea, the disease was most commonly associated with fever exceeding 38C in (82.14 %), followed by vomiting (46.42%) and abdominal pain (10.71%). All Patients infected with *Campylobacter jejuni* presented with no dehydration (46.44%), or some dehydration (53.57%), (None presented with severe dehydration). Residence, nutritional status, water supply and type of feeding do not have significant effects on the frequency of the disease (P value > 0.05). However, it was found that chickens ownership was significantly associated with *Campylobacter enteritis* (P -value < 0.01).

INTRODUCTION

Campylobacter species are recognized as a major cause of acute gastroenteritis in humans throughout the world and are increasingly associated with the development of Guillian-Barre Syndrome.^[1] *Campylobacter jejuni* accounts for 80-90% of all causes of recognized illnesses due to *Campylobacter*.^[2,3] Other species are *Campylobacter coli*, between 5-10% of infections reported to be caused by *Campylobacter Jejuni* are probably caused by *Campylobacter coli*.^[4] campylobacteriosis is a worldwide zoonosis.^[3,5] The vast reservoir in animals (sheep, cattles and chickens) is probably the ultimate source of most enteric campylobacter infection in humans.^[2,6,7] The prevalence of diseases caused by campylobacter is based on the rate of isolation of the organism from patients with diarrhoeal illness. In developing countries, campylobacter infection is especially common during the first 5 years of life, infections occurring early in life are symptomatic, where as later infections are mostly asymptomatic.^[3] In *Campylobacter* infections among children and young adults, males usually predominate, and among older persons the ratio is equal or in favor of females.^[2] *Campylobacter jejuni* infection in children may play a role in the dehydration and malnutrition that accompany diarrhea in developing countries although, the progress of *Campylobacter jejuni* enteritis is generally quite good and the disease is usually self-limited.^[6,7]

This study was carried out to estimate the frequency of *Campylobacter jejuni* infection among children presented with diarrhea, to study some epidemiological criteria of *Campylobacter jejuni* enteritis and to look for the clinical profile of the *Campylobacter jejuni* infection.

PATIENTS AND METHODS

This study was carried out over a 9 months period (from the first of July 2000 till the end of March 2001). The study included children who were admitted to Basrah Maternity and Child Hospital for the management of diarrhoea. Two hundreds and two patients were included in the study (122 males and 80 females), their ages ranged from 43 day- 11 years. History and physical examination were carried out, and the following information's were recorded: date of admission, age, sex, residence, clinical features, water supply, animals at home, feeding pattern, vital signs, nutritional status and hydration status. Measurements of body weight and length/height were taken and plotted on CDC/ WHO weight for height or length charts.^[8]

Methods

Fresh stool samples were collected from these patients and were sent for general stool examination and stool culture. Any stool sample that was considered not to be fresh

(period between sample collection and investigation > 2 hours) was ignored.

❖ Stool Culture

A stool sample was divided into 4 portions.

- The first portion was directly inoculated on MacConkey's agar to detect Shigellae (non-lactose fermenters), it was incubated for 24 hours, then subcultured on to (SSA) followed by agglutination test with specific antisera against Shigellae.
- A second portion of stool sample was directly inoculated in buffered saline then was put in refrigerator for 3-4 weeks, then subcultured on MacConkey's agar to detect Yersinia (non-lactose fermenters).
- The third portion of the stool sample was directly inoculated on blood agar supplemented with antibiotics (Vancomycine, polymixine and trimethoprim) to detect Campylobacter. This was incubated for 72 hours with gas generation kit in an anaerobic jar.
- The last portion of the stool sample was directly inoculated in tetrathionate media and incubated for 24 hours and then subcultured into MacConkey's agar to detect the non lactose-fermenters (Salmonella, Proteus and Pseudomonas) and the lactose-fermenters (Coliforms). In addition to that agglutination test with specific antisera for Enteropathogenic Escherichia coil and klebsiella were done.

❖ Statistical Analysis

- Chi-square (X^2) test was carried out to determine the relative importance of various variables.
- Z-test was carried out to compare between two samples proportions.
- P-value less than 0.05 were considered as statically significant, and value less than 0.01 was considered to be highly significant.

RESULTS

The study included 202 patients with diarrhoea; 173 patients presented with watery diarrhoea, and 29 patients with bloody diarrhoea, Table-1. *Campylobacter jejuni* was detected in (13.86%) of children with

diarrhoea. It is the second most common bacterial isolate in patients with watery diarrhoea (10.98%) following *E.coli* which was detected in (34.10%) of cases. This table also shows that *C.jejuni* was the second most common cause of bloody diarrhoea (31.03%) following *E.histoiytica* (58.62%).

Table 1. Isolation rate of enteropathogens in children in relation to the type of diarrhoea.

Entropathogens isolated (excluding rotavirus)	Watery diarrhea No. (%)	Bloody diarrhea No. (%)	Total No. (%)
Entropathogenic Escherichia Coli	59(34.10)	-	59 (29.20)
Campylobacter jejuni	19(10.98)	9 (31.03)	28 (13.86)
Yersinia enterocolitica	8 (4.62)	2 (6.89)	10 (4.95)
Shigella species	2(1.15)	1 (3.44)	3 (1.48)
Salmonella (non-typhoidal)	--	-	-
Vibrio cholera	-	-	-
Giardia lamblia	14(8.09)	-	14 (6.93)
Entamoeba histolytica	12(6.93)	17 (58.62)	29 (14.35)
No detectable pathogen	59(34.10)	-	59 (29.20)
Total	173	29	202

The majority of patients included in the study 190 (94.05%) were less than 4 years of age, (Table-2). The age distribution of *Campylobacter jejuni* cases in relation to total cases of diarrhoea is presented in this table, which shows that there is no statistically significant difference in the age distribution of *Campylobacter jejuni* cases in relation to the total cases of diarrhoea. One hundred twenty two (60.4%) of cases were males and the rest were females (39.6%), (Table-2). Although higher numbers of males were infected with *Campylobacter jejuni* than females, there was no statistically significant difference concerning sex distribution of *Campylobacter jejuni* cases when compared with the total cases presented with diarrhoea. The study has also revealed that there is no statistically significant relation between residence of patients and *Campylobacter jejuni* infection, whether from the center of Basrah or from peripheral areas.

Table 2. Age and sex distribution of *Campylobacter jejuni* positive cases.

	Total No. of cases	<i>C.jejuni</i> +ve cases (%)	
*Age (years)	-	-	-
<2	169	18	(10.65)
2-4	21	7	(33.33)
4-6	4	1	(25.00)
>6 years	8	2	(25.00)
Total	202	28	(13.86)
Sex			
Males	122	20	(16.39)
Females	80	8	(10.00)
Total	202	28	(13.86)

- $X^2=6.303$, df 1, P-value>0.05
- Z-test=1.2, P-value>0.05

The clinical features of *Campylobacter jejuni* cases are presented in (Table-3). About one third of *Campylobacter jejuni* positive cases presented with bloody diarrhoea. In addition to that all *Campylobacter jejuni* positive cases detected in the study, presented with a duration of diarrhoea less than 2 weeks. Apart from diarrhoea, fever was found to be the most common presentation followed by vomiting. Abdominal pain and joint pain (in children >2 years of age) were present in a small percentage of patients.

Table 3. Clinical features of *Campylobacter jejuni* positive cases.

Clinical feature	<i>C.jejuni</i> + ve cases	(%)	<i>C. jejuni</i> +ve cases	(%)
Diarrhoea	Type	Watery	19	67.85
		Bloody	9	32.14
	Duration	<1 week	24	85.71
		1-2 week	4	14.14
Fever > 38°C			23	82.14
Vomiting			13	46.42
Abdominal pain			3	10.71
Joint pain			1	3.57

The hydration status of patients with diarrhoea was assessed; the results of this assessment are presented in (Table-4). Among children with positive stool culture for *Campylobacter jejuni*,

most cases either presented with no dehydration (46.42%) or with some dehydration (53.57%). No case presented with severe dehydration. Weight-for-length/height index was used to assess the nutritional status of patients. The results of this assessment are also illustrated in (Table-4). The frequency of *Campylobacter jejuni* positive cases were higher among malnourished patients (75% of cases). However, this difference was statistically not significant when compared with other cases of diarrhoea, as most of patients included in the study were malnourished. The relation between *Campylobacter jejuni* infection and the presence of animals at home was investigated in this study and it has been shown that there is a highly statistically significant association between *Campylobacter jejuni* infection and chickens ownership. There are different sources for water supply; including tap water, tankers and rivers. More than half of patients with *Campylobacter jejuni* positive cases (53.57%) and *Campylobacter jejuni* negative cases (54.59%) depend on tankers as a source of water and a small percentage drink water from river. The feeding patterns of children with diarrhoea (*Campylobacter jejuni* positive and negative cases) were also investigated. The frequency of formula feeding was more among *Campylobacter jejuni* positive cases and total cases of gastroenteritis in general. However, there is no statistically significant difference in the frequency of *Campylobacter jejuni* infection among children on different feeding patterns.

Table 4. Hydration status and nutritional status of *Campylobacter jejuni* positive cases.

	<i>C.jejuni</i> -ve cases No. (%)	<i>C.jejuni</i> +ve cases No. (%)	Total No. (%)
Hydration status*	-	-	-
No dehydration	47 (27.01)	13 (46.42)	60 (29.70)
Some dehydration	121 (69.54)	15 (53.57)	136 (67.32)
Severe dehydration	6 (3.44)	-	6 (2.97)
Total	174	28	202
Nutritional status*	-	-	-
Well nourished	62 (35.63)	7 (25)	69 (34.15)
Malnourished	-1SD	71 (40.80)	8 (28.57)
	-2SD	26 (14.94)	5 (17.85)
	-3SD	10 (5.74)	6 (21.42)
	-4SD	5 (2.87)	2 (7.14)
Total	174	28	202

DISCUSSION

Diarrheal diseases are one of the leading causes of morbidity and mortality worldwide.^[7] The knowledge of the etiology and epidemiology of childhood diarrhea in a given area is needed to plan any measure designed to prevent or ameliorate diarrheal illness and to develop practice guidelines for the most appropriate stool examination procedures.^[9] *Campylobacter* species are recognized as a major cause of acute gastroenteritis in humans throughout the world.^[3,5,10] In this study *Campylobacter jejuni* was identified in (13.86%) of patients with diarrhea who were admitted to Basrah Maternity and Child Hospital for the management of diarrhea. *Campylobacter jejuni* was identified as the second most common bacterial cause of diarrheal cases after enteropathogenic *Escherichia coli* (29.2%), and the third most common causative agent of diarrheal cases after enteropathogenic *Escherichia coli* (29.2%) and *Entamoeba histolytica* (14.35%), followed by *Giardia lamblia* (6.93%), *Yersinia enterocolitica* (4.95%) and *Shigella* species (1.48%), excluding rotavirus and other viruses. In developing countries campylobacter isolation rates have ranged from (2-25%) in surveys carried out on children with diarrhea,^[2] as in Mexico 12%^[11] and Nigeria 13.9%.^[12] The lowest isolation rate was reported in central Taiwan while the highest rate was reported in Bangladesh 25.6%.^[13] In relation to the type of diarrhea whether watery or bloody, *Campylobacter jejuni* was the second most common cause of bloody diarrhea 31.03% and this is comparable to the result of a study done in central Taiwan (37.7%).^[10] Although most cases (94.05%) of *Campylobacter jejuni* infection were younger than 4 years of age, the study has not revealed a statistically significant difference in age-specific isolation rates. This result is in agreement with the results of other studies done in Turkey^[14] and Bangladesh^[13], but differs from the result of a study done in Australia in which *Campylobacter jejuni* infection was higher in children older than 5 years of age.^[15] The study has shown also that male infants and children have higher rate of *Campylobacter jejuni* gastroenteritis than females (although the difference was statistically not significant). The same result

was supported by different researchers.^[2,10,14] In addition to diarrhea, the study has revealed that (82.14%) of patients with campylobacteriosis have fever exceeding 38°C, followed by vomiting which was present in (46.42%), abdominal pain (in children older than 2 years) in (10.71%) and joint pain in one patient (3.57%). Various studies in different countries showed conflicting results concerning the frequency of these symptoms.^[10,14] Concerning the hydration status of children with *Campylobacter jejuni* infection, all children were having no dehydration (46.42%) or some dehydration (53.57%). In comparison with other studies, dehydration was detected in (7.4-10%) of *Campylobacter jejuni* positive cases.^[10,14] This can be attributed to early medical consultation by parents because of their concern regarding bloody diarrhea, high grade fever, abdominal pain and/or vomiting. There was no significant difference in isolation rates of *Campylobacter jejuni* among well nourished and malnourished children compared with those who are infected with other pathogens; this is because gastroenteritis in general is considered as a major cause of malnutrition in children especially in developing countries.^[7,16] The study has illustrated that chickens ownership was significantly associated with *Campylobacter jejuni* infection. This is supported by the fact that chickens are considered as a classic source of campylobacter infection and about (30-100%) of chickens may be infected asymptotically with campylobacters.^[1,7,13,17] Despite that the study did not show a great protective effect of breastfeeding against *Campylobacter jejuni* gastroenteritis, breast feeding still remains an important way in the prevention of gastroenteritis in general especially in the first 6 months of life.^[16] As *Campylobacter jejuni* has been identified as a significant cause of acute diarrhea and especially bloody diarrhea, we recommend that stool culture for the identification of *Campylobacter jejuni* should be done for children with diarrhea especially those presenting with bloody diarrhea and negative stool examination for *Entamoeba histolytica*, and for children presenting with high grade fever vomiting and/or abdominal pain in addition to diarrhea.

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