

Frequency of *Campylobacter Jejuni* in Diarrhoea/Dysentery in Children in Rawalpindi and Islamabad

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Abstract

Objective: To determine the frequency of *Campylobacter jejuni* infection in children suffering from diarrhoea/dysentery in the Department of Microbiology, Army Medical College and Military Hospital, Rawalpindi, from 29 August 2002 to 29 November 2002.

Methods: The study was carried out on one hundred stool samples of children up to the age of twelve years admitted with diarrhoea/dysentery in Military hospital, Rawalpindi. The samples were collected in clean polypropylene containers containing Cary Blair medium. These were transported to the Microbiology Department, Army Medical College, Rawalpindi within 1-2 hours. The samples were inoculated on Modified Preston (Oxoid) and Karmali media (Oxoid) beside other routine stool culture media. The cultures were incubated at 42°C under microaerophilic conditions. The growth after 48 hours was provisionally identified by colonial morphology, oxidase test, Gram staining and motility. The organisms were identified to species level by hippurate hydrolysis, urease test, nitrate reduction, catalase test, H₂S production and resistance to cephalothin.

Results: Eighteen percent of samples yielded the growth of *Campylobacter jejuni*. Mean age of children with *Campylobacter jejuni* infection was 18 months with peak incidence from 12 to 21 months. Male female ratio was 1.7:1. All the children had loose motions. Seven out of 18 (39%) had a combination of symptoms of loose motions, vomiting and pain abdomen. Those having fever with or without other complaints constituted 11 out of 18 (61.11%) i.e. more than 50% of all the children yielding *C. jejuni* had fever. About 90 % of diarrhoeal stools had blood and fifty percent also had mucous. There was either history of chicken meat consumption or contact with cattle and pets in most of the cases and both in some of them.

Conclusion: *Campylobacter jejuni* is a frequent cause of diarrhoea/ dysentery in children in our set up. In children it is often related to pets keeping and chicken meat consumption. In the remaining, untreated drinking water may be the source. *Campylobacter jejuni* frequently presents with blood and mucous in stools with sporadic cases presenting with watery diarrhoea (JPMA 53:517;2003).

Introduction

Diarrhoea is a common cause of increased morbidity and mortality in children in developing countries and Pakistan is no exception. According to WHO fact sheet diarrhoea occurs worldwide and causes 4% of all deaths and 5% of health loss to disability. It is most commonly caused by gastrointestinal infections, which kill around 2.2 million people globally each year, mostly children in developing countries.¹ Bacteria are important agents in the long list of the causes of diarrhoea and among them *Campylobacter jejuni* (*C. jejuni*) is now being recognized around the world as one of the principal causes of gastroenteritis.² In many clinical settings, the rate of recovery of *Campylobacter* species from stool samples exceeded the combined recovery of the time honoured enteric pathogens salmonella and shigella species. In a collaborative eight-hospital study in the United States in 1980, the overall isolation of *C. jejuni* from fecal specimens was greater than salmonella and shigella species combined.³ Many clinical and epidemiological investigations have established *Campylobacter jejuni* as one of the most common cause of sporadic bacterial enteritis in the United States.⁴ Pakistan being a developing country has a high incidence of diarrhoeal diseases especially in

children and *Campylobacter jejuni* may be one of the principal causes of diarrhoea. Little information is available on the subject in our setup, as most of the laboratories are not carrying out cultures for *Campylobacter jejuni* routinely. This may be due to lack of awareness on the subject or due to financial constraints. A study was designed to assess the frequency of *Campylobacter jejuni* infection in children admitted with diarrhoea /dysentery in Military Hospital, Rawalpindi.

Patients and Methods

The study was performed on one hundred stool samples of children up to the age of twelve years admitted with diarrhoea/dysentery in Diarrhoea ward of Military Hospital, Rawalpindi. Diarrhoea was defined as the passage of three or more loose stools in 24 hours and diarrhoeal stool containing visible blood was defined as dysentery.⁵ The samples containing mucus, pus and or blood were preferred. Children on antibiotic therapy three days prior to sample collection were excluded. Detailed history of patient complaints including frequency of stool, its contents, source/ type of drinking water, contact with pets and dietary habits especially chicken and poultry products consumed/meat including mutton and beef taken was recorded. The samples were collected in clean

polypropylene containers with screw caps, containing Cary Blair medium for their transport to the Microbiology department, Army Medical College, Rawalpindi.⁶ The samples so collected were inoculated on Modified Preston (Oxoid) and Karmali media (Oxoid) in parallel with cultures on Deoxycholate Citrate Agar and Thiosulphate Citrate Bile Salt Agar⁷ for salmonella/shigella and vibrio species respectively. The cultures were incubated at 42°C in Anaerobic Jar (Oxoid USA, Columbia, MD) under microaerophilic conditions using gas-generating kit CN 035 (Oxoid). It produced an environment containing 5% oxygen and 10% CO₂. The growth was identified after 48 hours by colony morphology, oxidase test, Gram staining and motility.⁸ The organisms were identified to species level by a positive catalase test, a negative urease test, failure to produce H₂S, non-fermentation in TSI, resistance to cephalothin, nitrate reduction and hippurate hydrolysis.^{9,10}

Results

Out of 100 stool samples studied eighteen samples (18 %) yielded the growth of *C. jejuni*. Two isolates of *Vibrio cholerae* and one isolate of *Aeromonas hydrophila* and *Shigella flexneri* each were also isolated. No *Salmonella* was isolated. Mean age of children with *C. jejuni* infection was 18 months with peak incidence from 12 to 21 months (Figure 1). The minimum and the maximum ages found were 3 and 48 months respectively. Males were more frequently infected than females. The male female ratio was 1.7:1. All the children with *C. jejuni* infection (n =18) had loose motions. Thirteen out of 18 (72.22%) had pain in abdomen alone or in combination with other symptoms. Eleven out of 18 (61.11%) had fever with or without other symptoms. Seven out of 18 (39%) had a combination of symptoms of loose motions, vomiting and pain in the abdomen and those having fever with or without other complaints constituted 11 out of 18 (61.11%) i.e.,

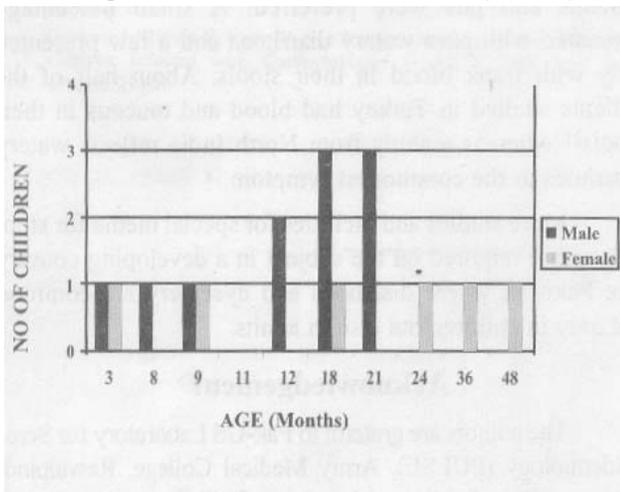


Figure 1. Age-sex distribution of children with positive culture for campylobacter jejuni (n=18).

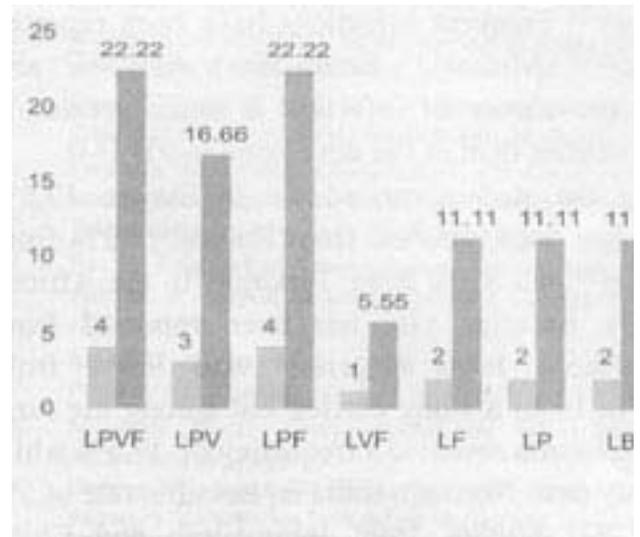


Figure 2. Frequency of complaints of children with campylobacter jejuni infection (n=18).

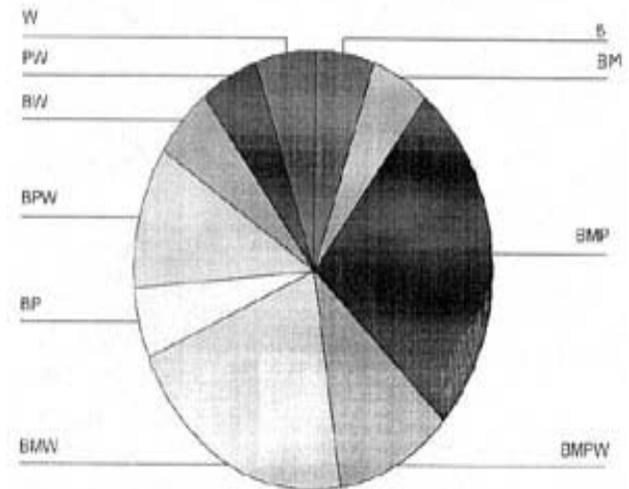


Figure 3. Distribution in terms of stool contents (n=18) where P = pus, B = blood, M = mucous and W = water).

more than 50% of all the children yielding *C. jejuni* had fever (Figure 2). Most of the children (8/18) were passing 6-10 stools /day followed by (5/18) children passing >15 stools/d. Three children were passing 3 stools/d and two passed 2 stools /d. About 90% of diarrhoeal stools that yielded *C. jejuni* had blood and fifty percent also had mucous (Figure 3). There was a relationship of *C. jejuni* infection with keeping of pets/cattle and chicken meat consumption. There was either history of intake of chicken meat (7/18) or contact with cattle and pets (8/18) in most of the cases and both in some of them (3/18). All were taking untreated water most often from wells.

Discussion

Campylobacter jejuni has been recognized as an important cause of diarrhoeal illness over the globe.

According to CDC Atlanta *C. jejuni* is number one food borne pathogen.¹¹ Frequent infections have been reported from Europe^{12,13} Africa^{14,15} South East Asia^{16,17} and China.¹⁸ The prevalence of infection is much greater in developing countries than in the developed world.^{12,13}

Among the studies carried out in Europe 17.5% isolation rate has been reported from France¹⁹, 12% from Czechoslovakia²⁰ and 8.3% from Turkey.²¹ In the African countries 18% isolation rate has been reported from Tanzania²², 16.5% from Nigeria¹⁴ and 9.3% from Zimbabwe.¹⁵ In India a study carried out among the rural population in Calcutta revealed a frequency of 11.5% while in another study from Northern India an isolation rate of 5% was reported.^{16,17} Studies from Bangladesh and China revealed an isolation rate of 25.5 % and 11.8%.^{18,23} A study carried out in Lahore, Pakistan during 1983-1989 has reflected an isolation rate of 12%.²⁴ The frequency of *C. jejuni* 18% observed in our study is similar to the frequency reported from Tanzania and France and is little higher than what was reported from Lahore, Pakistan. The difference in frequency of *C. jejuni* in different parts of the world is probably due to varying standards of living conditions, water supply and feeding habits as the infection occurs through water and food especially the consumption of poultry and even association with animals is a significant factor in the acquisition of disease.

Poultry is the primary food vehicle for transmission of *C. jejuni*. Some case control studies indicate that up to 70% of sporadic cases of campylobacteriosis are associated with eating chicken.²⁵ Domestic and wild animals have been considered to be the most common reservoir of *Campylobacter* for human infection.²⁴ *C. jejuni* is commonly present in the GIT of healthy chicken, cattle, pigs, turkeys, ducks and geese and direct animal exposure can lead to infection. Pets that may carry *Campylobacter* include birds, cats, dogs, hamsters and turtles.¹¹ The organism is occasionally isolated from streams, lakes and ponds. In United States, poultry is the most common source of sporadic infection.^{26,27} Epidemiological investigation have implicated raw milk²⁸, eggs, beef²⁹ contaminated water³⁰ and contact with infected animals including cats and puppies.^{26,31} In our study there was either history of chicken meat consumption or contact with cattle and pets in most of the cases and both in some of them. All were taking untreated water most often from wells.

Mean age of the children suffering from *C. jejuni* infection in our study was 18 months with peak incidence from 12 to 21 months (Figure 1). The maximum age at which the organism was isolated was 48 months and the minimum 3 months. Peak incidence in a study carried out in Tanzania was less than 18 months.¹⁸ In China it was

between 12-24 months.^{23,32} In Bangladesh, the highest infection rate was reported from children up to one year of age.^{22,33} In Riyadh, Saudi Arabia the maximum incidence of *C. jejuni* was seen in children 2 years and younger.³⁴ The preponderance of infection in younger children is probably due to lack of immunity. Our results are comparable with Tanzania and China whereas early acquisition in Bangladesh and rural population of China could be due to different eating habits and living environments as early exposure to domestic animals may be a contributory factor in rural population in these countries. Male female ratio in our study was found to be 1.7:1 (Figure 1). In a study carried out in Kaulampur slight male to female preponderance was noted.³⁵ In another study from India Calcutta no sex difference was observed.³⁶ A study carried out in Nigeria reported a male to female ratio 2:1.¹⁴ These findings reflect that males are more likely to get infected, reasons for which are not established.

All the children with *C. jejuni* infection (n=18) had loose motions. Thirteen out of 18 (72.22%) had pain in abdomen alone or in combination with other symptoms. Eleven out of 18 (61.11%) had fever with or without other symptoms. Seven out of 18 (39%) had a combination of symptoms of loose motions, vomiting and pain abdomen and those having fever with or without other complaints constituted 11 out of 18 (61.11%) i.e., more than 50% of all the children yielding *C. jejuni* (Figure 2). Similar findings have been reported from Kaulampur³⁴, Riyadh, Saudi Arabia.³⁴ In another study from Chicago, USA diarrhoea, fever and chills were the most frequent symptoms.³⁷ Most of children were passing 6-10 stools/day.

About 90 % of stools in our study had blood and fifty percent also had mucous. Majority (27%) of our children with *C. jejuni* had blood, mucous and pus in their stools (Figure 3). This was expected since stools containing blood, mucous and pus were preferred. A small percentage presented with pure watery diarrhoea and a few presented only with frank blood in their stools. About half of the patients studied in Turkey had blood and mucous in their stools²¹ whereas a study from North India reflects watery diarrhoea as the commonest symptom.³⁸

More studies and facilities for special media for stool culture are required on the subject in a developing country like Pakistan where diarrhoea and dysentery are common not only in children but also in adults.

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