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Socio-demographic Characteristics of *Campylobacter jejuni* infected Diarrhoeal Patients under 5 Years

Nasreen Huda[1], Sofia Andalib[2], Md. Abdullah Yusuf[3]

[1]Assistant Professor, Department of Microbiology, Shahabuddin Medical College, Dhaka, Bangladesh; [2]Professor & Head, Department of Microbiology, Medical College for Women and Hospital, Dhaka, Bangladesh; [3]Assistant Professor & Head, Department of Microbiology, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh

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Abstract

Background: *Campylobacter jejuni* infected diarrhoea can occur in different socioeconomic condition among the children under 5 years. **Objective:** The purpose of the present study was to see the socioeconomic condition among the *Campylobacter jejuni* infected diarrhoea children under 5 years of age. **Methodology:** This was a cross sectional study conducted in the Department of Microbiology at Banghabanhdhu Sheikh Mujib Medical University (BSMMU), Dhaka from July 2007 to June 2008 for a period of 1(one) year. All the diarrhoeal samples were collected from outdoor unit of ICDDR,B. Children up-to 5 years of age with acute diarrhoea with or without blood and mucous associated with either fever or abdominal pain or both were included as study population. Stool samples were collected from all diarrhoeal children in a sterile collection pot. Detection of *Campylobacter* antigen was performed from stool samples. The inoculated selective media in the candle jar were incubated at 42^0 C (microaerophilic condition) for 48 hours which is favorable for the growth of the organism. With the above criteria it is confirmed as *Campylobacter*, further identification of suspected *Campylobacter jejuni* and *Campylobacter coli* was confirmed by standard test. **Result:** Two hundred and seventeen children up-to 5 years of age who were suffering from acute diarrhoea were studied to assess the rate of infection by *Campylobacter jejuni* and *Campylobacter coli* as an enteric pathogen. Among 217 diarrhoeal children, *Campylobacter* were isolated from 28(12.9%) cases. Isolation rate of *Campylobacter* was 19.3% in below 1 year of age group and 5.8% was above 1 year of age group ($p<0.003$). Out of 217 study patients 141 were male and 76 were female and the isolation rate of *Campylobacter* were 20(14.2%) from male and 8(10.5%) from female respectively ($p>0.05$). About 50.0% *Campylobacter* positive patients were belong to lower class and 35.7% were in middle class. **Conclusion:** In conclusion *Campylobacter jejuni* infected diarrhoea children under 5 years of age are mostly below 1 year of age with a predominance of male. [Bangladesh Journal of Infectious Disease 2015;2(2):33-36]

Keywords: Socioeconomic condition; *Campylobacter jejuni;* children under 5 years; diarrhoea

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Corresponding Author: Dr. Nasreen Huda, Assistant Professor, Department of Microbiology, Shahabuddin Medical College and Hospital, Gulshan-2, Dhaka, Bangladesh; Email: nasreen.eva@gmail.com; Cell no.: +8801711000007
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Introduction

Acute diarrhoea is one of the leading causes of morbidity and mortality in children in most developing areas of the world[1]. In the last ten years, the number of viral, bacterial, and parasitic agents identified in person with diarrhoeal disease in developing countries has doubled[2]. Despite the use of oral rehydration therapy, deaths due to diarrhoea in children aged less than five years are still estimated to be about two million per year[3]. ICDDR,B in Bangladesh treats more than 100000 patients in a year, and this number is increasing year after year[4]. The purpose of the present study was to see the socioeconomic condition among the *Campylobacter jejuni* infected diarrhoea children under 5 years of age.

Methodology

This was a cross-sectional study conducted in the Department of Microbiology at Banghabanhdhu Sheikh Mujib Medical University (BSMMU), Dhaka from July 2007 to June 2008 for a period of 1(one) year. All the diarrhoeal samples were collected from outdoor unit of ICDDR,B, Dhaka. In this research institute patient came from various places. The laboratory work was done both in Laboratory science division (LSD) of ICCDDR,B and the laboratory of Microbiology & Immunology Department at BSMMU, Dhaka. Children up-to 5 years of age with acute diarrhoea with or with out blood and mucous associated with either fever or abdominal pain or both were included as study population. Diarrhoeal children having antibiotic for last two weeks due to other reason were excluded from this study. Socioeconomic conditions were ascertained by the income of the head of the family. Stool samples were collected from all diarrhoeal children in a sterile collection pot. Immediately after collection, specimens were directly inoculated into primary selective medium for *Campylobacter species* in the laboratory of ICDDR,B. Then the inoculated media were kept in a candle jar and transported to laboratory of BSMMU within 2 to 4 hours. The rest of the stool samples were transported from collection site to laboratory of BSMMU for inoculation on MacConkey's and *Salmonella-Shigella* agar media for isolation of *Salmonella* and *Shigella*. This inoculation was completed as soon as possible not later than 4 to 6 hrs of collection. After finishing the inoculation, rest of the stool samples were then preserved in refrigerator at -20^0 C in Microbiology and immunology department of BSMMU until tested for antigen detection. Biochemical tests were also done to identify the species. Detection of *Campylobacter* antigen was performed from stool samples. Routine stool examination was also done from all stool samples. The primary culturing medium for *Campylobacter* used was Brucella agar base with defibrinated 5% sheep blood containing Polymixin B 2.5 IU/ml, Trimethoprim 5 mg/liter, Cephalothin 15 mg /liter, Vancomycin 10 mg/liter, and Amphoterecin B 2mg/liter. The inoculated selective media in the candle jar were incubated at 42^0 C (microaerophilic condition) for 48 hours which is favorable for the growth of the organism. The suspected colony was identified as *Campylobacter jejuni* and *Campylobacter coli* according to established criteria[5]. Statistical analysis was performed by using SPSS version 11.5.

Results

Two hundred and seventeen children up-to 5 years of age who were suffering from acute diarrhoea were studied to assess the rate of infection by *Campylobacter jejuni* and *Campylobacter coli* as an enteric pathogen. Among 217 diarrhoeal children, *Campylobacter* were isolated from 28(12.9%) cases. Highest number of *Campylobacter* positive cases were from 0 to 1 year of age group which was 22(19.3%) cases followed by in 1-2 years of age (7.1%) and in 2-3 years of age group (6.9%). *Campylobacter* isolation rate among the 3 to 4 and 4 to 5 years age group children were 1(4.3%) cases and 1(4.3%) cases respectively (Table 1).

Table 1: Isolation rate of *Campylobacter* from stool sample among different age group of diarrhoeal children (n=217)

Age group	*Campylobacter* Isolates		Total
	Positive	Negative	
0 to 1 Yrs	22(19.3%)	92(80.7%)	114(100.0%)
1 to 2 Yrs	2(7.1%)	26(92.9%)	28(100.0%)
2 to 3 Yrs	2(6.9%)	27(93.1%)	29(100.0%)
3 to 4 Yrs	1(4.3%)	22(95.7%)	23(100.0%)
4 to 5 Yrs	1(4.3%)	22(95.7%)	23(100.0%)
Total	**28(12.9%)**	**189(87.1%)**	**217(100.0%)**

Isolation rate of *Campylobacter* was 19.3% in below 1 year of age group and 5.8% was above 1 year of age group. The difference was highly significant ($p<0.003$) (Table 2).

Table 2: Socioeconomic Status of *Campylobacter* Positive Cases (n=28)

SE Condition	Frequency	Percentage
Upper Class	4	14.3
Middle Class	10	35.7

Lower Class	14	50.0
Total	**28**	**100.0**

Out of 217 study patients 141 were male and 76 were female and the isolation rate of *Campylobacter* were 20(14.2%) from male and 8(10.5%) from female respectively. The difference was not significant (p>0.05) in Z test where Z=0.807 (Table 3).

Table 3: Isolation rate of *Campylobacter* in age group upto 1 year and above in diarrhoeal children

Age group	Culture Growth		Total
	Positive	Negative	
<1 year	22(19.3%)	92(80.7%)	114(100.0%)
>1 year	6(5.8%)	97(94.2%)	103(100.0%)
Total	**28(12.9%)**	**189(87.1%)**	**217(100.0%)**

*p value=0.0003

About 50.0% *Campylobacter* positive patients were belong to lower class and 35.7% were in middle class. Only 14.3% *Campylobacter* positive children were belong to upper class (Table 4).

Table 4: Results of *Campylobacter* positive Cases among Diarrhoeal Children in Respect of Sex

Gender	Culture Growth		Total
	Positive	Negative	
Male	20(14.2%)	121(85.8%)	141(100.0%)
Female	8(10.5%)	68(89.5%)	76(100.0%)
Total	**28(12.9%)**	**189(87.1%)**	**217(100.0%)**

*p value=0.05

Discussion

Acute diarrhoea is still the important health problem of children in developing countries[6]. One of the major pathogen of diarrhoea is *Campylobacter* and is the most frequent cause of bacterial diarrhoea in developed as well as in developing countries. *Campylobacter* is an invasive microorganism that has been associated with both diarrhoeal and systemic disease[7]. During the last 2 decades, major advances methods have been made to isolate *Campylobacter* species.

In this study, the diarrhoeal children upto 5 years of age were included for this study because it is seen that *Campylobacter* affects all age group but has fimodal age distribution with peak in children younger than 4 years[8]. Jain et al[9] reported that, *Campylobacter* infection significantly higher among children aged less than 5 years of age which was 10.96% up to 5 years of age and 5.97% above 5 years of age. It has been postulated that the higher incidence rates seen in this group of children may be due to over sampling of this age group, because parents may be more likely to seek medical care for their children[10]. Among bacterial causes of diarrhoea, the five most common bacterial pathogens in children up to five years of age is *Campylobacter jejuni* (17.4%) followed by *Escherichia coli* (ETEC) (16.8%), Aeromonas *spp*. (12.2%), *Shigella* (9.2%) and *Vibrio cholerae* (9%)[4]. In Thailand, children up to five years of age, the five most common bacterial causes of diarrhoea are *Campylobacter* (13.3%) followed by *Shigella* species (12.6%), *Salmonella* species (12.3%) and *Escherichia coli* (ETEC) (9.1%), *Plesiomonas* (2.5%)[5]. On the other hand, in developed country like United States, *Salmonella* is found the most common bacterial agent (7.5%) followed by *Shigella* (3.9%), *Campylobacter jejuni* (3.8%), and *Escherichia coli* 0157 (0.8%)[6].

It was found in the present study, that the isolation rate of *Campylobacter* in diarrhoeal children was significantly higher up to 1 year age which was 19.3% and 5.8% was above 1 year of age group children. The difference was significant (p<0.003). Similar observation was seen by Haq and Rahman[11] that isolation rate of *Campylobacter* was 32.8% upto 1 year age group children and 15.9% above 1 year age group children. Here the difference was also significant (p<0.001). In Thailand *Campylobacter* were associated with 18.8% of cases among diarrhoeal children younger than 12 months, 12.3% were in aged 12 to 23 months, and 10.3% of cases among those aged 24 to 59 months[12]. The high incidence below 1 year age group can be due to, infants start walking and seating in this age and they try to put many thing in their mouth and thus can get infected. Weaning period also start within this age so there is always a high chance of this child to have diarrhoea and also infants are less immune. It is also clearly seen that isolation rate was gradually decreasing with increasing of age. The cause of decrease rate of infection by *Campylobacter* with increasing age may be due to acquisition of immunity because it is claimed that in developing countries repeated infection in young children induces immunity[13]. Patients infected with *Campylobacter* developed specific immunoglobin IgG, IgM and IgA antibody in their serum and IgA antibody is intestinal secretions[13]. In developing country, specific serum IgA levels rise progressively with age, reflecting recurring exposer to *Campylobacter*.

It is noticed in the present study that, among 217 diarrhoeal children 20(14.2%) were male and 8(10.5%) were female. No significant difference

($p>0.05$) in *Campylobacter* isolation rate between male and female population was observed. Previous study in Bangladesh, also demonstrated that among the isolation rate of *Campylobacter*, 27.9% were male and 21.9% were female and the difference was not significant ($p>0.05$)[11]. Moore et al[14] also reported similar finding where male female ratio was 1:0.7. It is observed that more male children are attending in the hospital for treatment. It reflects that, male children may get more attention and care in the society than the female children.

Conclusion

In conclusion *Campylobacter jejuni* infected diarrhoea children under 5 years of age are mostly below 1 year of age. Furthermore majority of the patients were male. However, most of the patients are from low socio-economic condition. There is a significant relationship with the culture positivity and the age of the patients. Again the isolation rate of *Campylobacter jejuni* is significantly associated with difference of the gender of the patients. Large scale multicentre study should be carried out to see the scenario of Bangladesh.

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