Plesiomonas shigelloides-associated Diarrhoea in Bangladeshi Children: A Hospital-based Surveillance Study

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Summary

Little is known about clinical and epidemiological features of Plesiomonas shigelloides-associated diarrhoea in children. We reviewed hospital-based surveillance records of 38 children with diarrhoea having P. shigelloides as the only pathogen isolated from their faecal specimen. Of those 38 children, 29 (76 per cent) were below 2 years of age and 28 (74 per cent) were male. Thirty-two (84 per cent) children presented with watery diarrhoea and six (16 per cent) had dysenteric stools. Vomiting was a feature in 27 (71 per cent) children and clinically significant dehydration was observed in nine (23 per cent) children. Fever was present in three (8 per cent) children and five (13 per cent) had diarrhoea ≥14 days. Thirty-three (87 per cent) children were successfully treated with ORS alone and only five (13 per cent) required intravenous fluid in addition to ORS. Plesiomonas shigelloides was isolated throughout the year. The findings may be of public health importance for creating awareness among physicians about the clinical profile and management strategy of P. shigelloides-associated diarrhoea in children.

Introduction

Plesiomonas shigelloides is a Gram-negative, facultatively anaerobic, rod-shaped bacterium of the family Vibrionaceae. Based on case reports, epidemiological studies of outbreaks and microbiological studies, it is now suggested to be a diarrhoeagenic pathogen. To our knowledge, little is known about the clinical and epidemiological characteristics of P. shigelloides-associated diarrhoea in children, so we conducted this preliminary study.

Materials and Methods

Patient population

The Clinical Research and Service Centre of the International Centre for Diarrhoeal Disease Research, Bangladesh operates a Diarrhoeal Disease Surveillance System, which prospectively collected sociodemographic, clinical, and microbiologic information from a systematic 4 per cent (every 25th patient) sample of patients attending this treatment facility. This hospital treats around 110,000 patients with diarrhoeal illnesses from urban and peri-urban Dhaka each year. Sociodemographic information and anthropometry are collected through interview of the patients or their attendants by trained paramedical staff, while clinical information, including a thorough physical examination, is done by the attending physician. All information is recorded and entered into computers. Records of this surveillance system for the period 1993–1995 were reviewed. Thirty-eight children aged 5 years or less were identified who had diarrhoea and only P. shigelloides isolated from their faecal specimen. Clinical and epidemiological features of those children were studied.

Laboratory studies

Rectal swabs or stool specimen were obtained from each patient and were plated directly onto taurocholate tellurite gelatin agar (TTGA), Salmonella-Shigella (SS) agar and MacConkey’s agar. The plates were aerobically incubated at 37°C and were examined after 24 h. From TTGA agar, vibrio-like colonies were identified by morphological characteristics. Non-lactose fermenting colonies from MacConkey’s and SS agar were screened by cytochrome oxidase. Oxidase positive colonies were further classified into Aeromonas spp. and P. shigelloides using biochemical tests including sugar and
amin acid tests. Colonies from various plates were thoroughly examined and tested for other known enteropathogens. Rotavirus was identified by an enzyme-linked immunosorbent assay (ELISA), and microscopic examinations were performed for presence of parasites including *E. histolytica*, *Giardia lamblia*, and *Cryptosporidium pervum*.

**Results**

*Plesiomonas shigelloides* was isolated from 65 (0.9 per cent) children out of 7398 children enrolled in the surveillance system during the study period. Of those 65 cases, 38 had *P. shigelloides* as the only pathogen, and at least one co-pathogen was isolated from the remaining 27 children. Among 38 children who had only *P. shigelloides* isolated, 17 (45 per cent) were <1 year and 12 (31 per cent) were between 1 and 2 years of age, i.e., 29 (76 per cent) of these isolates were from children below 2 years of age. Twenty-eight (74 per cent) children were male. Thirty-two (84 per cent) children had watery stools and six (16 per cent) children presented with dysenteric stools defined as the presence of visible blood. Vomiting was present in 27 (71 per cent) children.

Clinically significant dehydration was less common; 29 (77 per cent) children had no sign of dehydration, eight (21 per cent) had signs of some dehydration and only one (2 per cent) child had severe dehydration. Thirty-one children (82 per cent) had <1 stools/day. Thirty-three children (87 per cent) were successfully treated with ORS alone and only five (13 per cent) required intravenous fluid therapy. Fever was present in three (8 per cent) children and five (13 per cent) had persistent diarrhoea, defined as continuation of diarrhoea for 14 days or more. In those 38 children, 24 per cent, 32 per cent, 30 per cent, and 14 per cent had weight-for-age of <60 per cent, 60–75 per cent, 75–90 per cent, and >90 per cent of NCHS median, respectively. *P. shigelloides* infections was found to be higher in young children. Infections are likely to be more common in younger children lacking immunity. With increasing age, immunity is acquired probably due to clinical or sub-clinical infection. We do not have a ready explanation for the higher isolation of *P. shigelloides* from male children noted in our study, although the socio-cultural context of the country for preferential attention to male children and the higher likelihood of bringing them to hospitals and clinics is likely. Most of the children in our study were undernourished. The hypochlorhydria of malnutrition may be one of the reasons for survival of an infectious inoculum of *P. shigelloides* with greater susceptibility to diarrhoea.

Finally, we remark that the findings of this study may be of public health importance since they are likely to create awareness among physicians about the clinical characteristics as well as the management strategy of *P. shigelloides*-associated diarrhoea in children. Further studies are needed to compare the features of *Plesiomonas* infections with adequately matched controls and also to correlate features with serovars of *P. shigelloides* as well as establishing all possible mechanisms of enteric pathogenicity.

**Discussion**

To our knowledge, *P. shigelloides*-associated diarrhoea has been reported mostly in adult populations and very little is known about its clinical and epidemiological features in children. The findings of this preliminary study suggest that diarrhoea in children associated with *P. shigelloides* infection may present with mild, acute watery diarrhoea without clinically significant dehydration in most cases, as well as running a limited course which can be adequately managed using oral rehydration therapy alone. However, it may also cause dysenteric illness, and some children may develop persistent diarrhoea. The infection may be common throughout the year in a tropical country like Bangladesh.

The clinical features observed in our study are consistent with that of previous studies where *P. shigelloides* have been reported to cause secretory diarrhoea as well as dysenteric illness clinically resembling shigellosis. Some serovars of *P. shigelloides* share antigens similar to that of *Shigella*, which might explain dysenteric presentation. Other associated clinical features, e.g., vomiting, dehydration, fever, persistent diarrhoea, and bowel movements per day noted in our study have been described in the literature. Isolation of *P. shigelloides* from children in our study was 0.9 per cent. Reported isolation ranges from 0.5 per cent to 16.9 per cent of persons with diarrhoea. These variations might be related to differences in climate, geographic location, sanitary conditions, and host and socioeconomic factors among others.

In our earlier study, the prevalence of *P. shigelloides* infections was found to be higher in young children and decreased with increasing age. In our study, we also observed high isolation in younger children. Infections are likely to be more common in younger children lacking immunity. With increasing age, immunity is acquired probably due to clinical or sub-clinical infection. We do not have a ready explanation for the higher isolation of *P. shigelloides* from male children noted in our study, although the socio-cultural context of the country for preferential attention to male children and the higher likelihood of bringing them to hospitals and clinics is likely. Most of the children in our study were undernourished. The hypochlorhydria of malnutrition may be one of the reasons for survival of an infectious inoculum of *P. shigelloides* with greater susceptibility to diarrhoea.

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**References**