Hospital-Based Epidemiology of Childhood Cholera: A 6-Year Review in a University Hospital in Bangkok, Thailand

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Background : *Cholera is the cause of severe acute watery diarrhea. Without proper fluid therapy, severe cholera kills half of the affected patients. In terms of epidemiology and surveillance, up-to-date information of this disease in each country is essential.*
Objectives : *To evaluate 1) prevalence, serogroups, serotypes and antimicrobial susceptibility pattern of V. cholerae, and 2) demographic data and clinical manifestation of pediatric patients with cholera.*
Material and Method : *Microbiogical records of children aged 0-15 years with cholera, who were treated at King Chulalongkorn Memorial Hospital, Bangkok, Thailand, between January 1995 and December 2000 were retrospectively reviewed. Serogroups, serotypes, and antimicrobial susceptibility of V. cholerae were studied. Medical records of children with positive stool cultures for V. cholerae were reviewed in terms of demographic data, clinical manifestation of the patients.*
Results : *Of 11,709 stool culture specimens, pathogenic bacteria were found in 1,745 specimens and 95 specimens (5.4%) were positive for V. cholerae. V. cholerae O1 and non-O1/non-O139 were found in 52.6% and 47.4%, respectively. Common serotypes of V. cholorae O1 were Ogawa. Antimicrobial susceptibility of the pathogens to co-trimoxazole, ampicillin, ceftriaxone, ciprofloxacin and gentamicin were 55.0%, 56.4%, 91.4%, 92.5% and 94.9%, respectively.*

Age distribution of the patients ranged from 2 months to 15 years with an average age of 2.92 years. Clinical manifestations included acute watery diarrhea (92.8%), vomiting (56.4%), fever (37.5%), hypotension (19.6%) and abdominal pain (3.8%). Stool leukocytes were microscopically detected in 20% of the patients. No patients died in the present study.
Conclusion : *Childhood cholera in Thailand still exists. Most patients presented with acute watery diarrhea. Regarding antimicrobial susceptibility pattern, ceftriaxone and quinolones are appropriate drugs of choice.*

Keywords : *Cholera, Vibrio cholerae, Children*

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Intestinal infection with *Vibrio cholerae* results in the loss of large volumes of watery stool, leading to severe and rapidly progressing dehydration and shock. Without adequate and appropriate rehydration therapy, severe cholera kills approximately half of the affected individuals [1].

Cholera has spread from the Indian subcontinent where it is endemic to involve nearly the whole world. *V. cholerae* serogroup O1, biotype El Tor has moved from Asia to cause pandemic disease in Africa and South America [1]. In October 1992, an outbreak of epidemic cholera caused by a new serogroup, O139 (Bengal), began in Madras, India [2], and subsequently spread to Bangladesh and Thailand [3].

Information concerning cholera in each country is essential in terms of epidemiology and surveillance, and management of the patients. The authors conducted this study to evaluate children aged 0-15 years with cholera in King Chulalongkorn Memorial Hospital, Bangkok, Thailand, in terms of prevalence, serogroups, serotypes and antimicrobial susceptibility pattern of *V. cholerae*, and demographic data and clinical manifestation of the patients.

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Method and Material

Stool culture records of specimens obtained from pediatric patients aged 0-15 years, who were treated at King Chulalongkorn Memorial Hospital, a tertiary university hospital in Bangkok, Thailand, during 1995-2000, were retrospectively reviewed. Medical records of children whose stool cultures were positive for *V. cholerae* were reviewed. Data recorded included: 1) organism: serogroups, serotypes and antimicrobial susceptibility pattern, and 2) patients: age, gender, clinical presentation, and laboratory investigations. Data was presented in mean, range and percentage.

Results

Of 11,709 stool culture specimens obtained from pediatric patients and sent to the Department of Microbiology, King Chulalongkorn Memorial Hospital, Bangkok, Thailand, 1,745 specimens were positive for pathogenic bacteria (14.9%), and 95 of 1,745 (5.4%) specimens were positive for *V. cholerae.* Of 95 positive stool culture specimens for *V. cholerae*, 50 (52.6%) were serogroup O1 and 45 (47.4%) were serogroup non O1/non O139. There were no cases of *V. cholerae* sero-group O139 in the present study. Of 16 isolates of *V. cholerae* O1 which serotypes were identified, Ogawa was predominant (15/16, 93.8%). Biotyping of the organism were not performed. Susceptibilities to co-trimoxazole, ampicillin, ceftriaxone, ciprofloxacin and gentamicin were 55.0%, 56.4%, 91.4%, 92.5% and 94.9%, respectively. (Table 1).

The average age of the 95 children was 2.9 years, with a range of 2 months to 15 years. Approximately three-quarters of the patients were 4 years of age or younger. The male and female ratio was 10:7.

After reviewing 56 available medical records, it was found that 20 children (35.7%) had underlying diseases, i.e. HIV/AIDS (5 cases), hematologic malignancy (4), chronic liver disease (3), thalassemia (2), valvular heart disease (2), febrile convulsion (2), aplastic anemia (1), and neurological anomalies (1). Common clinical presentations included diarhea (94.6%), vomiting (55.4%) and fever (37.5%). Forty-nine children had watery stool, whereas 3 children had mucous stool and one had mucous bloody diarrhea. Forty-nine children had some degree of dehydration; 31 children had moderate, moderate to severe, or severe dehydration. Eleven children (19.6%) developed hypovolemic shock (Table 2). No patients died in the present study.

The mean value of white blood cell (wbc) count was 15,914.9 cells/mm^3, with a mean percentage of neutrophils of 57.7%. The average serum sodium, potassium and bicarbonate levels were 134.5, 4.0 and 14.7 mEq/L, respectively. The lowest serum sodium, potassium and bicarbonate levels were 123.0, 2.0 and 5.0 mEq/L. (Table 3). Stool examination was performed in 45 children. Stool leukocytes more than 5 cells/high power field (HPF) were found in 16 children (35.5%), i.e. 7 children (15.5%) had 5-10 stool wbc/HPF and 9 children (20.0%) had more than 10 stool wbc/HPF.

Discussion

Even though the present study did not detect an outbreak of cholera, it demonstrated that cholera was not uncommon in Thai children (5.4% of all positive stool culture). *V. cholerae* O139 was not found in the present study. This was different from a previous study conducted in Samutsakorn, Thailand, which showed that 45% of patients with cholera was caused by this new serogroup [1].

Most children were younger than 4 years of age. Even though acute watery diarrhea with severe degree of dehydration and hypovolemic shock is a characteristic feature of patients with cholera, the majority of the presented patients did not develop shock and had mild or moderate degree of dehydration. In terms of cholera surveillance, the authors recommend routine stool cultures in all pediatric patients with acute diarrhea.

The general concept is that as *V. cholerae* is not invasive, it mediates a non-inflammatory type of infection. However, stool exam from a number of the presented patients showed inflammatory cells, which is similar to a previous study from India[4].

Concerning antimicrobial susceptibility pattern, co-trimoxazole, the most widely used antibiotics for childhood diarrhea in Thailand[5], may not be effective in patients with cholera. Similar to previous studies from other countries[6-8], the resistance to co-trimoxazole was as high as 97%. Ceftriaxone and fluo-

Table 1. Antimicrobial susceptibility pattern of *V. cholerae*

Antibiotics	Number of Isolates tested	Percentage of susceptibility
Co-trimoxazole	40	55.0
Ampicillin	39	56.4
Ceftriaxone	36	91.4
Ciprofloxacin	40	92.5
Gentamicin	39	94.9

Table 2. Clinical presentations of children with cholera (n=56)

Clinical presentations		Number (%)
Diarrhea		53 (94.6)
Vomiting		31 (55.4)
Fever		21 (37.5)
Hypotension		11 (19.6)
Abdominal pain		2 (3.6)
Degree of dehydration	- no	7 (12.5)
	- mild	16 (28.6)
	- mild to moderate	2 (3.6)
	- moderate	19 (33.9)
	- moderate to severe	5 (8.9)
	- severe	7 (12.5)

Table 3. Complete blood count and serum electrolyte of children with cholera (n=56)

Investigations		Mean ± SD	Range
CBC - WBC count (cells/mm^3)		15,914.9 ± 7,448.2	660 - 36,000
- % neutrophil		57.7 ± 21.3	4 - 93
Electrolyte (mEq/L) - Na		134.5 ± 5.7	123.0 - 148.7
	- K	4.0 ± 0.9	2.0 - 6.2
	- CO_2	14.7 ± 5.3	5.0 - 29.0

roquinolones should be used as the antibiotics of choice, with a susceptibility rate of more than 90%. However, the latter drug should be used with caution due to the possibility of chondrotoxicity.

The limitations of the present study include the number of available medical records and the number of isolates tested for antimicrobial susceptibility.

In conclusion, cholera still exists in Thailand. Half of *V. cholerae* is the serogroup O1. Clinical presentations may not be as severe as expected. The majority of patients present with acute watery diarrhea but stool leukocytes may occasionally be found. Almost all isolates are susceptible to ceftriaxone and ciprofloxacin.

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ระบาดวิทยาของอหิวาตกโรคในผู้ป่วยเด็ก: การศึกษาย้อนหลัง 6 ปีของโรงพยาบาลมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร

ชิษณุ พันธุ์เจริญ, นรุตม์ นิวัฒนกาญจนา, จุฑารัตน์ เมฆมัลลิกา, วรนุช จงศรีสวัสดิ์

***บทนำ** : อหิวาตกโรคเป็นสาเหตุของโรคท้องร่วงเฉียบพลันชนิดรุนแรง หากไม่ได้รับการรักษาด้วยสารน้ำอย่างเหมาะสม ผู้ป่วยที่มาอาการรุนแรงอาจเสียชีวิตได้ถึงครึ่งหนึ่ง ข้อมูลที่ทันสมัยเกี่ยวกับอหิวาตกโรคในแต่ละประเทศนับว่ามีความสำคัญอย่างยิ่งในแง่ระบาดวิทยาและการเฝ้าระวังโรค*

***วัตถุประสงค์** : เพื่อศึกษา 1) ความชุก ซีโรกรุ๊พ ซีโรทัยพ์ และความไวต่อยาต้านจุลชีพของเชื้ออหิวาต์ และ 2) ข้อมูลทั่วไปและอาการสำคัญของผู้ป่วยเด็กที่เป็นอหิวาตกโรค*

***วัสดุและวิธีการ** : ทำการศึกษาย้อนหลังจากบันทึกทางจุลชีววิทยาของผู้ป่วยเด็กอายุ 0-15 ปีที่เป็นอหิวาตกโรค และรับการรักษาในโรงพยาบาลจุฬาลงกรณ์ระหว่างเดือนมกราคม พ.ศ. 2538-เดือนธันวาคม พ.ศ. 2543 ในเรื่องซีโรกรุ๊พ ซีโรทัยพ์ และความไวต่อยาต้านจุลชีพของเชื้ออหิวาต์ จากนั้นทำการศึกษาเวชระเบียนของผู้ป่วยในเรื่องข้อมูลทั่วไปและอาการของผู้ป่วย*

***ผลการศึกษา** : จากอุจจาระจำนวน 11,709 ตัวอย่าง ตรวจพบเชื้อก่อโรคจำนวน 1,745 ตัวอย่าง และ 95 ตัวอย่าง ตรวจพบเชื้ออหิวาต์ (5.4%) เป็นเชื้อชนิด O1 และ non-O1/non-O139 คิดเป็นร้อยละ 52.6 และ 47.4 ตามลำดับ ซีโรทัยพ์ของเชื้อชนิด O1 ที่พบบ่อยคือ ซีโรทัยพ์โอกาวา การศึกษาความไวของเชื้อต่อยาต้านจุลชีพพบว่า เชื้อไวต่อยา co-trimoxazole, ampicillin, ceftriaxone, ciprofloxacin และ gentamicin คิดเป็นร้อยละ 55.0, 56.4, 91.4, 92.5 และ 94.9 ตามลำดับ*

การศึกษาผู้ป่วยจำนวน 56 คนพบว่า อายุอยู่ระหว่าง 2 เดือนถึง 15 ปี อายุเฉลี่ย 2.92 ปี อาการประกอบด้วย ท้องร่วงเฉียบพลัน (92.8%), อาเจียน (56.4%), ไข้ (37.5%), ความดันโลหิตต่ำ (19.6%) และปวดท้อง (3.8%) ตรวจพบเม็ดเลือดขาวในอุจจาระได้ถึงร้อยละ 20 ไม่มีผู้ป่วยเสียชีวิตในการศึกษานี้

***สรุป** : อหิวาตกโรคในเด็กยังคงพบได้ในประเทศไทย ผู้ป่วยส่วนใหญ่มาด้วยอาการท้องร่วงเฉียบพลัน ในแง่ความไวของเชื้อต่อยาต้านจุลชีพ ยา ceftriaxone และยากลุ่มควิโนโลนส์เป็นยาที่เหมาะสมในการรักษาอหิวาตกโรค*