

**Serogroup distribution of enteropathogenic *Escherichia coli* isolated from infants with acute diarrhoea admitted to Yangon Children's Hospital (2004)**

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Bacteriological characteristics of enteropathogenic *Escherichia coli* in 200 infants (<12 months) with diarrhoea diseases admitted to Yangon Children's Hospital from July to December, 2004 were studied. Isolation of bacterial pathogens was done from rectal swabs in Cary-Blair transport media which were plated onto selective media for specific bacterial pathogens. The most frequently isolated bacterial pathogen was Enteropathogenic *Escherichia coli* (EPEC) accounting for 21% (42 cases) of the tested cases. The EPEC was isolated from 17.39%, 23.21% and 20.66% from <2, 2-6 and 6-12 months of age groups respectively. Isolated *E. coli* serogroups were O26K60, O25K+, O55K59, O119K69 (4 cases each), O6K51 (3 cases each), O1K51, O27K+, O78K80 O114K90, O125K70, O127K63 and O148K+ (2 cases each), and one case each of O8K40, O44K74, O28K73, O86K62, O112K66, O136K78 and O144Kx2. Antibiotic susceptibility revealed that EPEC was sensitive to amikacin (79.5%), cefotaxime (69.2%), netilmicin (66.6%), gentamicin (51.3%), norfloxacin (33.3%), chloramphenicol (20.5%) and to co-trimoxazole (5%). All EPEC tested were resistant to ampicillin.

## INTRODUCTION

In Myanmar, diarrhoea has been recognized as a major public health problem and according to the results from the survey conducted in 1995, diarrhoea accounts for 16% of total mortality in children under five years of age [1]. According to Health Management Information System (HMIS) report for diseases under National surveillance (1996-2003), diarrhoea and dysentery diseases ranked third and fourth positions in 17 diseases and total number of deaths in the total population was 4th highest number in 2003 [2]. The morbidity and mortality of diarrhoea diseases in children admitted to YCH from 1999-2003 showed that the number of admitted cases was increasing yearly but the case fatality rate had reduced [3]. Most diarrhoea episodes occur during the first two years of life. Incidence is highest in the age group

6-11 months, when weaning often occurs [4]. Since the mid 1940s, *Escherichia coli* had been recognized as a cause of diarrhoea [5]. The role of enteropathogenic *E. coli* in Myanmar was recorded [6]. Admission of children with acute diarrhea during 1999-2003 was highest in December and January and lowest in August and September, ranging from 230759 to 306895 cases (YCH record). Thus, changing pattern of aetiological agents responsible for acute diarrhoea need to be investigated in relation with drug susceptibility.

## MATERIALS AND METHODS

### *Place of study*

Medical Units 1, 2, 3 and neonatal unit of YCH

*Case selection:* 200 cases of children (<1 yr) with acute diarrhoea disease

### Study period

July to December, 2004

### Study design

Cross - sectional, hospital-based study was carried out. Physical examination and thorough history were taken to provide clinical, social and environmental status.

### Collection of specimen

Rectal swab specimens were taken after receiving informed consent from the mothers. The swabs were dipped in Cary Blair transport media and transported to Bacteriology Research Division, DMR (LM).

### Isolation, identification and characterization of bacteria

All samples were inoculated onto MacConkey agar, Salmonella - Shigella agar, Thiosulphate Citrate Bile salt Sucrose agar for primary isolation. In addition, incubation at 42°C for 48 hours in selenite F enrichment broth and at 37°C for 6 hours in alkaline peptone water was done for isolation of *Salmonella*, *Shigella* species and *Vibrio cholerae* respectively [7].

### Antibiotic susceptibility testing

It was done by the method of Kirby-Bauer [8] utilizing ampicillin, amikacin, chloramphenicol, cefotaxime, cephalothin, gentamicin, netilmicin, norfloxacin and trimethoprim/ sulphamethoxazole.

## RESULTS

### Isolation of enteropathogenic *Escherichia coli* (EPEC)

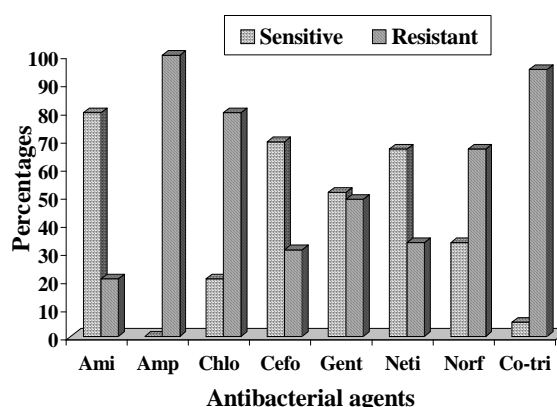
As shown in Table 1, among 200 cases with acute diarrhoea, 23 (11.5%), 56 (28%) and 121 (60.5%) were from the age groups of <2, 2-6 and 6-12 months respectively. EPEC was isolated from 4 cases (17.39%) of <2 months age group; 13 cases (23.21%) of 2-6 months and 25 cases (20.66%) of 6-12 months age groups. Overall, EPEC was detected in 42 cases (21%).

Table 1. Age distribution of enteropathogenic *E. coli* culture - positive cases

Age groups (months)	Cases with acute diarrhoea		EPEC culture positive	
	No. cases	percentages	No. cases	percentages
<2	23	11.5	4	17.39
2-6	56	28	13	23.21
6-12	121	60.5	25	20.66
Total	200	100	42	21

### Distribution of enteropathogenic *Escherichia coli* in different areas of Yangon

It was demonstrated that EPEC was isolated from 6 cases from Mingaladon, 5 cases from Hlaingthaya, 4 cases from Tonte, 3 cases each from Insein, and Shwepyitha; 2 cases each from Thaketa, Kamayut, South Okkalapa, Dala and Dagon Myothit. Moreover, one case each of EPEC was isolated from Pabedan, Thingangyun, Botah-taung, Sanchaung, Dawpon, Hlegu, Ahlone, Tamway of Yangon area. Apart from it one case each from Beik, Nyaungtone and Kha-naungto was infested with EPEC (Table 2). As shown in Table3, serogroup distribution was scattered. It revealed that 18 different serogroups of *E. coli* were isolated. Among them, 5 cases of O26K60; 4 cases each of O25K+, O55K59 and O119K69; 3 cases each of O6K51 and O78K80; 2 cases each of O1K51, O27K+, O114K90, O125K70, O127K63 and O148K+ were included.



Ami=Amikacin  
Chlo=Chloramphenicol  
Norf=Norfloxacin  
Co-tri=Co-trimoxazole  
Amp=Ampicillin  
Cefo=Cefotaxime  
Neti=Netilmicin  
Gent=Gentamicin

Fig. 1. Antibiotic susceptibility pattern on enteropathogenic *E. coli* (EPEC), n = 42 cases

Table 2. Distribution of enteropathogenic *Escherichia coli* in different areas of Yangon

Place	Serogroup	Age(mo)	sex	Lab. No.
Mingaladon	O1K51	10	F	531
	O8K40	8	M	582
Retro	O25K+	5	M	465
	O55K59	0.75	M	466
	O78K80	7	F	405
Exp; Retro	O127K63	7	M	418
Tonte	O27K+	9	M	435
	O144Kx2	5	M	430
	O78K80	2	M	451
Hlaingthaya	O112K66	4	M	499
	O6K51	8	M	412
	O25K+	8	M	424
	O114K90	6	M	494
Insein	O26K60	7	M	588
	O78K80	3	F	593
	O28K73	9	M	520
Shwepyitha	O119K69	9	M	504
	O148K+	9	M	507
	O26K60	10	F	505
Thaketa	O27K+	10	F	492
	O119K69	9	M	532
	O1K51	2	F	401
Kamayut	O26K60	9	F	536
	O25K+	5	M	483
South Okkalapa	O114K90	0.4	F	441
	O6K15	3	M	416
Dala	O25K+	5	M	515
	O119K69	19	M	480
Dagonmyothit	O125K70	7	M	471
	O86K62	8	F	408
	O148K+	11	F	578
Pabedan	O26K60	8	F	553
Thingangyun	O55K59	9	M	404
Botahtaung	O55K55	10	M	522
Sanchaung	O136K78	5	M	557
Dawpon; Retro	O55K59	8	M	469
Hlegu	O26K60	8	F	431
Ah-lone	O125K70	5	M	571
Tamway	O6K51	7.5	M	443
Beik	O127K63	5	M	554
Nyaungtone	O44K74	11	M	556
Khanaungto	O119K69	6	F	552

*Antibiotic susceptibility pattern of enteropathogenic Escherichia coli*

As shown in Fig. 1, 79.5% of EPEC isolates were sensitive to amikacin, 69.2% to

cefotaxime; 20.5% to chloramphenicol, and 5% to cotrimoxazole. All isolates were resistant to ampicillin.

Table 3. Serogroups of *Escherichia coli* isolated from infants

Sr. No.	Sero-groups	No. of cases	Male	Female	Locality
1	O1K51	2	0	2	Thaketa, Mingaladon
2	O6K51	3	3	0	Hlaingthaya, S. Okkalapa, Tamway
3	O8K40	1	1	0	Mingaladon
4	O25K+	4	4	0	Hlaingthaya, Mingaladon, Kamayut, S. Okkalapa
5	O26K60	5	1	4	Hlegu, Shwepyitha, Thaketa, Pabedan, Hlaingthaya
6	O27K+	2	1	1	Shwepyitha, Tonte
7	O28K73	1	1	0	Insein
8	O44K74	1	1	0	Nyaungdon
9	O55K59	4	4	0	Thingangyun, Yuzana, Dawpon, Botahtaung
10	O78K80	3	1	2	Mingaladon, Tonte, Hlaingthaya
11	O86K62	1	0	1	Dagon Myothit
12	O112K66	1	1	0	Tonte
13	O114K90	2	1	1	Kamayut, Hlaingthaya
14	O119K69	4	3	1	Insein, Ahlone, Dala, Seikgyi
15	O125K70	2	2	0	Dala
16	O127K63	2	2	0	Mingaladon, Beik
16	O136K78	1	1	0	Sanchaung
17	O144Kx2	1	1	0	Nyaungdone
18	O148K+	2	1	1	Insein, S. Dagon
Total		42	29	13	
			(69.04%)	(30.95%)	

**DISCUSSION**

In this study, EPEC isolation rate was highest in the age group of 2-6 months (23.21%). Regarding to the isolation rate in gender, 29 cases (69.04%) of males and 13 cases (30.95%) of females were infected with EPEC and it reflects that males are more prone to get EPEC infection in this study. As in previous studies, conventional

EPEC serogroups such as O26K60, O55K59, O25K+, O119K69, O78K80 were the most frequent serogroups isolated. It was also reported by a paediatrician that a child infected with *E.coli* serogroup O127K63 which showed resistant to all tested antibiotics passed away. In this study all EPEC were resistant to ampicillin, 97% to cotrimoxazole and 71% to chloramphenicol. It was also noted that antibiotic resistance pattern was changing and majority of the isolated EPEC were multidrug resistant. The sensitivity rates had decreased more significantly for cotrimoxazole. The susceptibility rates of EPEC serogroups were significantly reduced to even third generation cephalosporin and newer aminoglycosides. Thus safe and active antibiotics need to be searched for the treatment of EPEC infection. In addition to not only relying on the antibiotics but also keeping clean and healthy environment for infants and mothers, more research and education should be emphasized on environmental research.

#### ACKNOWLEDGEMENTS

We would like to thank our Director General Dr Paing Soe, Deputy Director General Dr Soe Thein and Director Dr Kyaw Moe for their keen interest and support. Our sincere gratitude to Professor

Dr Thein Aung, Professor and Head of the Department of Child Health, Chairman, Board of Postgraduate studies and to infants and mothers who participated in this study.

#### REFERENCES

1. Ye Myint. Epidemiology of diarrhoea. In: *Impact of diarrhea on health of children and current management*; 42nd Myanmar Medical Association Symposium. Myanmar Medical Association. 1996; p. 2-8.
2. NHP 1996-2003. National Health Plan. Ministry of Health.
3. Yaminn. Enteropathogenic *Escherichia coli* in infants with acute diarrhoeal disease admitted to Yangon Children Hospital. M. Med.Sc (Paediatrics). IM (1), 2006.
4. World Health Organization. Reading on diarrhoea, student manual. Geneva. WHO 1994; 3-24.
5. Gordon JE. Neonatal enteric infections caused by *Escherichia coli*. by Tennant, B (ed.). *Annals of the New York Academy of Sciences* 1971, 176: 104-105.
6. Mar Mar Nyein. *Escherichia coli* diarrhea in Myanmar. *DMR Bulletin* 2000, 14(1):1-19.
7. WHO. Manuals of diagnostic laboratory procedure for acute enteric infection. Simplified methods. *World Health Organization*, Geneva, 1990.
8. Bauer AWW, Kirby WMM, Sherris JC & Turck M. Antibiotic susceptibility testing by standardized disc method. *American Journal of Clinical Pathology* 1966; 45: 493-496.