

Acute Bacterial Diarrhoea in Elderly : A Clinico-Etiological Study

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Abstract

Diarrhoea is an important cause of morbidity and mortality in elderly. The magnitude and etiological profile of acute diarrhoea in Indian elderly is unknown. This hospital based study was done in elderly patients, age 60 years or above, who presented with acute diarrhoea at University Hospital, Banaras Hindu University, Varanasi. The aim of the study was to observe etiological pattern of acute bacterial diarrhoea in elderly.

In elderly patients, parasitic infection was the commonest cause (18%) followed by bacterial (15%) and fungal infections (12%). E. coli was the commonest bacterial enteropathogen isolated followed by Klebsiella and Aeromonas. As most of diarrhoea in elderly were secretory in nature, management of water and electrolyte balance is the most important part of the treatment.

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Introduction

Diarrhoea is an important cause of morbidity and mortality in elderly. According to Centre for Disease Control (CDC) report, gastroenteritis was one of the top three discharge diagnoses in elderly¹ and majority of diarrhoeal deaths occurred in elderly, with a case fatality ratio of 3% for elderly above 80 years.²

A W.H.O. report also observed a 400 fold increased mortality due to gastroenteritis in Japanese adults over 75 years.³ In a study⁴, only 14% of acute diarrhoea in elderly were due to infections, other common causes being fecal impaction, drugs, laxative abuse.

The magnitude and etiological profile of acute diarrhoea in Indian elderly is largely unknown. This hospital based study was done to observe etiological pattern of acute bacterial diarrhoea in elderly.

Material and Methods

Elderly patients with age 60 years or above

presenting with acute diarrhoea at University Hospital, Banaras Hindu University, Varanasi were studied. Acute diarrhoea was defined as more than 3 liquefied stools of less than 1 week duration. Patients with causes other than infection like drugs, laxative abuse, food allergy, fecal impaction were excluded. One hundred and twenty elderly patients with acute infectious diarrhoea were included in the study.

Twenty five children (age 1-14 years) and 25 adults (age 15-59 years) suffering from acute infectious diarrhoea and 57 apparently healthy elderly without history of diarrhoea or any systemic disease were included as controls. Detailed clinical examination was carried out on a pretested proforma in all patients and controls regarding clinical aspects of diarrhoea.

Stool samples were collected in sterile vials. These were properly labelled and sent to the laboratory within 2 hours of collection and processed immediately or kept in refrigerator at 4°C and processed on the same day. They were looked for consistency, presence of mucus, blood and parasites.

Stool samples were examined microscopically after adding methylene blue for presence of pus cells, erythrocytes and epithelial cells. They were examined for bacterial enteropathogens, parasites and fungus, according to methodologies recommended by W.H.O.⁵ Bacterial enteropathogens tested were Shigella, Salmonella, E. coli, Y. enterocolitica, Klebsiella and Aeromonas.

Differences in the prevalence rate were tested using Z test for significance.

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Observations

Stool samples were positive in 58 elderly patients (48%), 11 adult patients (44%), 10 children (40%) and 7 elderly healthy controls (12.3%) for the enteropathogens tested.

In elderly patients, parasitic infections were the commonest cause (18%) followed by bacterial (15%) and fungal infections (12%); in healthy elderly controls, parasitic enteropathogens were most common (7%) followed by fungal (3.5%) and bacterial (1.7%).

In adults with diarrhoea, bacterial infections were commoner (20%) than parasitic (16%) and fungal infections (4%). In children with diarrhoea also, bacterial infections were commoner (16%) than parasitic (12%) or fungal infections (4%).

The microscopic stool characteristics in different age groups with different bacterial enteropathogen isolated showed that in 14 elderly patients with *E. coli* isolation, 5 had leucocytes <1 per high power field (hpf) and 9 had 1-5 leucocytes/hpf. In 4 elderly patients, 2 each with *Klebsiella* and *Aeromonas* isolation, leucocytes in feces were < 1/hpf. RBCs in stool were not seen in any of the elderly patients positive for enteropathogens, whereas, it was observed in one adult with *S. typhi* isolation and in one child with *S. paratyphi* isolation.

All 4 adult patients with *E. coli* isolation had 1-5 leucocytes/hpf. In 2 children with *E. coli* isolation, 1 had 1-5 leucocytes/hpf, whereas 1 had <1 leucocytes/hpf.

Haemoglobin was less than normal (<13 gms in

Table 1. Isolation of bacterial enteropathogens from different groups

	Elderly patients (120)		Elderly healthy controls (57)		Adults (25)		Children (25)	
	No.	%	No.	%	No.	%	No.	%
1. <i>E. coli</i>	14	11.6	1	1.7	4	16.0	2	8.0
EPEC	5	(35.7)	1	(100.0)	3	(75.0)	1	(50.0)
ETEC	9	(64.3)			1	(25.0)	1	(50.0)
2. <i>S. typhi</i>	–	–	–	–	1	4.0	–	–
3. <i>S. paratyphi</i>	–	–	–	–	–	–	1	4.0
4. <i>Klebsiella</i>	2	1.6	–	–	–	–	1	4.0
5. <i>Aeromonas</i>	2	1.6	–	–	–	–	–	–

Figure in parenthesis shows percentage for different subgroups of *E. coli*.

Table 1 depicts the various bacterial enteropathogens isolated in different groups. In 2 patients with *E. coli* isolation (ETEC), there was mixed infection, with isolation of *Candida* in one case and *E. histolytica* in another. The *E. coli* isolation from stool samples of elderly patients as compared to elderly healthy controls was highly significant ($P < 0.01$). However, isolation of *Klebsiella* (2 cases) and *Aeromonas* (2 cases) in elderly patients did not reach the level of significance ($P > 0.05$) when compared to elderly control. Similarly bacterial enteropathogen isolation pattern in elderly patients as compared to adults and children also did not differ significantly ($P > 0.05$).

males and <12 gms in females) in 50% elderly with *E. coli* isolation (7/14), in 50% elderly with *Aeromonas* (1/2) and in 100% elderly with *Klebsiella* (2/2).

Serum albumin was <3.96 g/dl in 4 elderly with *E. coli* isolation (28.5%) and was <2.7 g/dl in 2 elderly patients (14.3%) with *E. coli*. Serum albumin was <2.7 g/dl in 2 elderly patients with *Aeromonas* (100%) and 2 with *Klebsiella* isolation (100%).

Thyrotoxicosis was present in 3 elderly patients with *E. coli* isolation (21.4%) and pulmonary tuberculosis was detected in 1 elderly patient with *E. coli* (7.1%). In 2 elderly patients with *Klebsiella* isolation, pulmonary

Table 2. Macroscopic stool characteristics in different age groups.

	Yellow semiformed	Yellow watery	White watery / colourless	Green semiformed	Green watery	Blood mixed mucoid
1. <i>E. coli</i>						
Elderly (14)	9 (64.2)	3 (21.4)	2 (14.2)	–	–	–
Adult (4)	–	3 (75.0)	1 (25.0)	–	–	–
Child (2)	1 (50)	1 (50.0)	–	–	–	–
2. <i>S. typhi</i>						
Adult (1)	–	–	–	–	–	1 (100.0)
3. <i>S. Paratyphi</i>						
Child (1)	1 (100.0)	–	–	–	–	–
4. <i>Klebsiella</i>						
Elderly (2)	–	–	–	2 (100.0)	–	–
5. <i>Aeromonas</i>						
Elderly (2)	–	–	–	1 (50.0)	1 (50.0)	–

Figure in parenthesis indicate percentage of patients with enteropathogen isolated.

tuberculosis was present in 1 case (50%) and malignancy in 1 case (50%). No co-morbidity was detected in elderly with *Aeromonas* isolation or in adults or paediatric patients.

All patients with diarrhoea were treated with oral or intravenous rehydration therapy and given I.V. quinolones, except in 2 elderly patients with confusion, where aminoglycoside therapy was given. All patients responded to therapy with no mortality upto hospital discharge.

Discussion

Forty eight percent positivity detected in elderly with acute diarrhoea is comparable to detection by other workers in India in adults⁶ and is more dependent upon resources to widen the search. Parasitic infections were commoner than bacterial infections in elderly in India as compared to adults or children and elderly in western world. This may be due to poor hygiene, ignorance, poor medical services and tropical climate.

E. coli was the commonest bacterial enteropathogen isolated in the elderly followed by *Klebsiella* and *Aeromonas*. *E. coli* isolation in elderly (11.67%) with diarrhoea was significantly higher as compared to healthy elderly controls ($P < 0.01$) but there was no significant difference when compared to adults and children with diarrhoea. *E. coli* was detected as single enteropathogen in majority of elderly patients with diarrhoea (85%).

E. coli detection rate in India varied from 5-36% in adults^{6,7,8} and 5.8% to 25.7% in children.^{9,10,11}

Enteropathogenic *E. coli* (EPEC) was detected in 4.1% (5 patients) and Enterotoxigenic *E. coli* (ETEC)

was seen in 7.5% (9 patients) of elderly with diarrhoea in our study. Western workers have isolated EPEC in 8-53% of their diarrhoea cases. However, Indian figures varied from 5-76% in various studies.^{12,13,14} None of these studies have been in elderly. In some urban areas upto 30% of acute diarrhoeal cases in young infants have been attributed due to EPEC.¹⁵ Incidence of ETEC has varied from 5-58% in various Indian studies in diarrhoea,^{10,11,17} while western workers have observed lower figures in recent years.^{12,13}

None of bacterial enteropathogens isolated in elderly had blood mixed stools, in all of them including Enteropathogenic *E. coli* (EPEC) leucocyte counts in stools were below 6/hpf and RBCs were not detected. The blood mixed stools in elderly (1 patient) was not positive for pathogens tested; whereas in 1 adult and in 1 child with bloody diarrhoea *S. typhi* and *S. paratyphi* were isolated respectively.

Isolation of *Klebsiella* and *Aeromonas* was not statistically significant due to small numbers. *Aeromonas hydrophila* has been reported in 3-5% of stools and *Klebsiella pneumoniae* in 0-6% of stools in patients with acute diarrhoea by Indian workers, mostly in children. Nath et al.¹⁷ detected *Aeromonas* in 10% cases of various age groups. *Aeromonas* has been reported in an otherwise healthy elderly with diarrhoea.

Bacterial enteropathogens were associated with severe symptoms of diarrhoea including severe dehydration as compared to parasitic and fungal infections.

Thus, *E. coli* was the commonest bacterial diarrhoeagen in elderly but unlike children there were no

Table 3. Clinical correlates with bacterial enteropathogens

Clinical correlates	E. coli			Aeromonas		Klebsiella	
	Elderly (14)	Adult (4)	Children (2)	Elderly (2)	Elderly (2)	Children (1)	
Loose stools (per day)	4-15 [9.5]	4-10 [6.8]	6-8 [7.0]	7-9 [8.0]	11-12 [11.5]	10 [10]	
Duration (in days)	3-8 [5.5]	2-6 [4.2]	4-6 [5.0]	4-7 [5.5]	4-6 [5.0]	5 [5]	
Abdominal pain	13 (92.0)	3 (75.0)	2 (100.0)	1 (50.0)	2 (100.0)	1 (100.0)	
Vomiting	13 (92.0)	2 (50.0)	2 (100.0)	2 (100.0)	2 (100.0)	1 (100.0)	
Fever	11 (78.0)	–	2 (100.0)	1 (50.0)	2 (100.0)	1 (100.0)	
Altered sensorium	2 (14.0)	–	–	–	1 (50.0)	1 (50.0)	
Abdominal distension	5 (35.0)	1 (25.0)	2 (100.0)	1 (50.0)	1 (50.0)	–	
Dehydration							
Mild	6 (43.0)	3 (75)	–	1	–	1 (50.0)	
Moderate	7 (50.0)	1 (25)	1 (50.0)	1 (50.0)	1 (50.0)	–	
Severe	1 (11.0)	–	1 (50.0)	– (50.0)	1 (50.0)	–	

Figures in [] indicate average, figures in () indicates %

dysenteric features suggesting that there may be some residual amount of immunity against enteropathogen due to previous exposures, however larger studies are needed to confirm this contention. As diarrhoea in majority of elderly was secretory in nature, management of water and electrolyte balance was most important.

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