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Acute Bacterial Diarrhea in Egyptian Adults

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Abstract

The present study is one of the few studies on diarrhea in adult patients and to our knowledge it may be the first in Egypt. This study was done on 83 patients with acute diarrhea and 20 controls all were above 13 years old. In this study, 70% of diarrheic patients were below 30 years old and most cases occurred during summer months (June-August), this seasonality is best evident in Shigellosis. The frequency of positive bacterial cultures was 17 cases (20%) in diarrheal patients compared to only 1 case (5%) in controls. However, there was a high rate of isolated parasitic pathogens in both groups. Shigella was the most frequent isolate (9 cases), five of them were Shigella dysenterae, 2 Shigella flexeneri, one case Shigella boydii and another one shigella sonnei. Diarrheogenic E.coli was detected in six patients (3 heat toxin (LT) and 3 heat stable toxin (ST) and in 2 controls (2LT). Campylobacter jeujeni, Salmonella species and aeromonas hydrophilia were less frequently detected. The complaints of patients and the sensitivity to various antibiotics were also studied.

Introduction

ACUTE diarrheal disease secondary to infectious agents is a common problem in all age groups [1]. It constitutes a major cause of morbidity and mortality to infants and children in developing countries [2,3]. In Egypt diarrhea in children was studied by many authors [4,5,6]. However, little information is available concerning the cause of acute diarrhea in Egyptian adults.

This study described the etiological and clinical features of diarrheal disease in Egyptian adults and tries to throw light on Escherichia coli (E.coli) as an important cause of diarrhea.

Patients and Methods

This study was conducted on 83 patients over 13 years old, presenting to the outpatient clinic at Kasr El-Aini hospital and meeting the criteria of acute diarrhea (duration of illness five days or less, with a frequency of four or more unformed stools/day), detailed description has been published elsewhere [7]. Twenty matched controls were selected from another group of patients attending the same clinic for minor

illness but not diarrhea. All cases were examined by a physician and interviewed according to detailed and uniform questionnaire.

Laboratory and biological methods:

Fresh stools were inoculated on routine media including tryptic soya blood agar (5% sheep blood), MacConkey, Hektoen enteric agar, TCBS sucrose agar, selenite broth enrichment media and alkaline peptone water. All the above media were incubated at 37°C for 48 hours and inspected for suspected colonies every 24 hours. Selenite enrichment medium was subcultured on MacConkey agar and Hekton entric agar 24 hours from incubation, also alkaline peptone water was subcultured after 24 hours of incubation at 37°C on TCBS sucrose agar media. Campy blood plates were incubated at 42°C for 48 hours into a microaerophilic atmosphere using Campy gas packs. For recovery of Yersenia enterocolitica the plates were left at room temperature for 24 hours. Plates were inspected for Gram negative non lactose fermenter colonies including Salmonella, Shigella, Yersenia enterocolitica, Aeromonas hydrophilia and Plesimonas shigelloids, Campy blood agar plates were inspected for Campylobacter jejeuni and TCBS sucrose agar for vibrios.

The suspected Gram negative colonies were further identified by a standard screening set including Kligler iron agar (KIA), Motility indole ornithine (MIO) media, Simmon citrate agar and Christensen's Urea media. Subsequently the organisms were confirmed using API 20 E identification panel for routine enteric pathogens.

The lactose fermenting organism (Escherechia coli) was tested by standard techniques [8] for enterotoxin production by measuring the increase in volume of the intestinal contents of a suckling mouse after placing the culture filtrate into its stomach (ST-toxin producers) [9] and by Y-1 adrenal cells for LT-toxin, the cells are exposed to test fluids then examined for cell damage [10].

Entero invasive Escherechia coli (EIEC) were selected by first screening for non motile, lysine decarboxylase negative organism. Then confirmed by injecting the colonies into a guinae pig conjunctiva (Sereny test). Enteroadherence was tested using Hep-2 cells in presence of D-mannose.

Drug sensitivity for different isolates were determined by standard test [11], stool examination for parasites was performed on fresh specimens and by Merthiolate Iodine Formaldehyde concentration (MIFC) [12].

Results

In this study, 70% of diarrhaeic patients were below 30 years old and most cases occurred during summer months (June-August) this seasonality is best evident in Shigellosis.

In this study frequency of positive bacterial cultures were 17 cases (20%) in diarrheal patients compared to only 1 case (5%) in controls. However, there was a high rate of isolated parasitic pathogens in both groups (Table 1).

Shigella was the most frequent isolate (9 cases), five of them were Shigella dysentriae, 2 Shigella flexeneri, one case Shigella boydii and another one Shigella sonnei. Diarrhaeogenic E.coli was detected in 6 patients {(3 heat labile, toxin (LT) and 3 heat

stable toxin (ST)} and in 2 controls (2LT). Campylobacter jeujeni, Salmomella species and aeromonas hydrophilia were less frequently detected (Table 2).

The complaints of patients with different bacterial pathogens are shown in Table (3). The sensitivity of different isolates to antibiotics in vitro is given in Table (4).

Table (1): Frequency of Positive Bacterial and/or Parasitic Pathogens in Diarrheal Patients, Versus Controls.

	Diarrheal patients		Control	
	No.	%	No.	%
Positive bacterial pathogens only	26	28.5	1	5.0
Positive parasitic pathogens only	50	37.9	14	70.0
Positive bacterial and parasitic pathogens	12	4.8	none	0.0
Negative both bacterial and parasitic pathogens (Free)	55	37.3	5	25.0

No. = Number % = Percent.

Table (2): Frequency of Different Bacterial Pathogens Detected in Acute diarrheal Specimens.

Type of bacterial pathogens	No.	%
Shigella species	9	11
Diarrheogenic E.coli (84 samples)	6	7
Campylobacter jeujeni	3	4
Salmonella species	2	2
Aeromonas hydrophilia	1	1
Indefinite bacteria	23	27

No. = Number % = Percent.

Table (3): Clinical Presentation of Positive Specimens in Shigellosis, Escherichia Coli and Others.

Clinical presentations	Shigellosis (9)	Escherechia coli (9)	Others (8)
Duration of illness	2.6	3.2	3
Frequency per day	9.3	6.9	6.8
Form of stool:			
(liquid %)	(88.9)	(71.4)	(66.7)
(mush)	(11.1)	(28.6)	(33.3)
Presence of blood (%)	(66.7)	(71.4)	(16.7)
Presence of mucus (%)	(44.4)	(100)	(83.3)
Tenesmus	(77.8)	(85.7)	(50.0)
Fever (%)	(33.3)	(0.0)	(50.0)
Vomiting (%)	(11.1)	(0.0)	

% = Percent.

Table (4): Sensitivity of Antibiotics of Positive Bacterial Cultures from Diarrheal Specimens (%).

	Shigella spp. %	Campylobacer jeujeni %	Salmonella %	Aeromonas hydrophilia %	Total %
Sulfisoxazole	66.7	100	50.0	0.0	57.1
Gentamycin	100	100	100	100	100
Cotrimoxazole	100	0.0	50.0	100	78.6
Tetracycline	66.7	100	50.0	100	73.3
Amplicillin	66.7	66.7	50.0	0.0	64.3
Chloramphenicol	66.7	66.7	50.0	0.0	64.3
Erythromycin	20.0	100	50.0	100	54.5
Amikacin	100	100	100	100	100
Cephalothin	100	33.3	50.0	0.0	73.3

% = Percent.

Discussion

In this study frequency of bacterial cultures was much higher (20%) in diarrhaeic patients versus controls (5%), this reflects the importance of bacterial pathogen as a cause of acute diarrhea in adults. The high rates of isolated parasitic pathogens in both diarrhaeic patients (37.9%) and in controls (70%), reflects the endemicity of parasitic infestation in Egypt as described by El-Sahley et al. [13].

Failure to detect bacterial cultures and/or parasitic pathogens in 37.3% of diarrheal specimens may be due to the presence of bacterial pathogens which can not be isolated by culture e.g. E.coli or Rota virus and Norwalk-like agents which cause a high proportion of acute diarrheal illness in children [14].

In this study Shigella was the most common cause of bacterial diarrhea (11%). As expected the peak incidence of shigellosis was during the summer [15]. Shigella dysentraie acounted for 57% and Shigella flexenri for 22% of all Shigella isolates, a pattern evident in developing countries and in contrast to high rates of Shigella sonnei in industerialised countries [16,17].

Since Skirrow published the results of a new selective culture method for Campylobacter subspecies jeujeni in 1977 [18], this bacterium has been recognized as a major cause of diarrheal disease [19,20]. Campylobacter jeujeni enteritis is a zoonosis with a worldwide distribution and poultry probably constitutes the largest potential reservoir of infection [21]. In the present study Campylobacter jeujeni was detected in 4% of bacterial diarrheas compared to only 1% detected by Zaki et al. [6] in rural Egypt probably because they were mostly children.

There are 5 major categories of diarrhaeogenic E. coli: entero toxigenic, entero haemorrhagic and entero adherent [22]. We tested for enterotoxigenic, enteroinvasive and entero adherent E.coli. Enterotoxigenic E.coli was detected in 6 diarrheal patients and 2 controls, the entero toxigenic E.coli is asociated with persistent diarrhea in children [23,24].

The high asymptomatic carriage of en-

terotoxigenic E.coli detected in this study and in others [23,24], suggests that all the population are frequently exposed to these pathogens.

In this study Shigella diarrhea was characterized by frequent high fever, tenesmus, blood and mucus in stool and less frequent vomiting. E.coli diarrhea has a similar characteristics but fever and vomiting were not encountered. Approximately complaints and findings on clinical examination concurred with published findings [6,17,24].

In conclusion, the high frequency of infectious agents causing diarrhea is rather an omninous sign, that warns against the insanitation of the environment, rapid spread of infections and moreover the increasing resistance to traditional antibiotics.

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