Shigella Gastroenteritis in Children with A Cute Diarrhea in Children Welfare Teaching Hospital

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ABSTRACT:

BACKGROUND :

Shigellosis is the most common cause of epidemic dysentery and affecting all age groups especially in the first (2) years of life, It is a major cause of childhood mortality and morbidity in developing countries .

OBJECTIVE:

To study the extent of shigella gastroenteritis among children presented with acute diarrhea.

METHODS:

Three hundred sixteen patient were included in the study (186 males and 130 females),admitted to the children welfare teaching hospital, medical city complex, Baghdad, suffering from diarrhea and their ages ranged from 2 months-10 years, over a 4 months period (from the first of December 2007 till the end of March 2008), History and physical examination were carried out, general stool examination and stool culture were done by taking fresh stool samples collected from these children and submitted to serial investigations.

RESULTS :

The study showed that out of 316patients suffering from diarrhea, 22(6.9%) patients with shigella positive, 16(6.2%)had watery diarrhea, 6(10.7%) had bloody diarrhea, 262(82.9%) were less than 2 years. Out of 22patients with shigella positive 12(54.5%) of them were less than 2 years. Most of the patients presented with diarrhea consume unboiled tap water 192 (60.8%), with 8 (36.4%) of them are Shigella species positive. The use of filtration and chlorination of water at home shows no shigella species diarrhea and only 2 (0.7%) Shigella species negative diarrhea. Diarrhea is the presenting symptom followed by fever 20(90.9%), vomiting 14(63.64%), Then abdominal pain 4(18.18%).

CONCLUSION:

Shigellosis was found to be the third most common cause of infectious bacterial diarrhea following Escherichia coli and campylobacter jejuni and also the third most common cause of bloody diarrhea following entamoeba histolytica and Campylobacter jejuni, and the relationship between water supply and its sterilization with shigella infection is significantly different between people who consume purified and sterilized water than those who did not.

KEYWORDS: gastroenteritis in children, shigella species infection, dysentery.

INTRODUCTION:

Shigella species are exquisitely , fastidious Gram-negative organisms which annually cause an estimated 164.7 million cases of Shigellosis world wide[1].

Shigellosis is the most common cause of epidemic dysentery and found all over the world , especially in children aged under 5 years and mostly in the developing countries[2]. Four species of Shigella are responsible for illness: S. dysenteriae (serogroup A; There are 13 serotypes), it produce the most severe illness.S. Flexneri(serogroup B; 6 serotypes and 13 sub serotypes), S. boydi (serogroup C; 18 serotypes), It is the least virulent bacterium, S. sonnei (serogroup D; 1 serotype). In industrialized countries, S. sonnei is currently most common, and S. flexneri account for essentially all other cases [2,3].

Morbidity and mortality result from inadequate hand washing after defecation or nappy changing or from person – to – person directly via the feco-oral route[4].

It is highly infectious microorganism in comparison with other causes of gastroenteritis regarding that only (10-bacilli of microorganisms) needed to induce infection[5]. Mortality from Shigellosis is highest in severely malnourished children[6]. The inflammatory reaction that causes tissue destruction consequences of enterocyte destruction by intracellular bacteria as well as by the inflammatory responses[7,8,9]. More than 95% of

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shigella infections may be asymptomatic. Hence, the actual incidence may be 20 times higher than reported[10].The incubation period varies from 12 hours to 7 days, But typically is 2-4 days, and is inversely proportional to the load of ingested bacteria[11].The clinical features includes severe abdominal pain, emesis, high fever, anorexia, Generalized toxicity, urgency and painful defecation , severe headache, lethargy, confusion, hallucinations, meningisums, delirium and seizures lasting less than 15 minutes, especially with S. dysenteriae. Hemolytic uremic syndrome, Hypoglycemia and protein losing enteropathy are common [2,12,13].

Rectal prolapse, Toxic megacolon or pseudomembranous colitis (usually associated with S. dysenteriae) , cholestatic hepatitis (usually mild), conjunctivitis, iritis, corneal ulcers, pneumonia, arthritis (usually 2-5 weeks after enteritis) are uncommon [2,13,14].

The WBC count is often 5-15 X 10^9 / L (5000-15000/ ml) ,with high percentage of bands, leucopenia or leukemoid reactions are occasionally detected [2,13].

Culture of both stool and rectal swab specimens optimizes the chance of diagnosing Shigella infection. The specimens should be processed immediately after collection, but despite meticulous care in obtaining and processing specimens from patients infected with shigella species, approximately 20% may fail to yield Shigella organisms. With rapid techniques, gene probes or polymerase chain reaction (PCR) primers are directed toward virulence genes [2,11].

Treatment usually depend on rapid assessment of patients hydration status should be investigated and institution of parenteral or ORS according to hydration status, antipyretic may be given if needed, prompt recognition and treatment of seizures and raised intracranial pressure are essential, suitable antibiotics should be used accordingly, and to achieve prevention we should encourage prolonged breast feeding, education of families and child care centre personnel in hand-washing techniques, water and sewage treatment when it is possible, proper handling and refrigeration of food, Even after cooking, exclusion of children with documented Shigella gastroenteritis from child care centers until 2 stool cultures are negative[2,3,10,11].

METHODS:

This prospective study was conducted at the children welfare teaching hospital, medical city complex, Baghdad, Iraq, over a 4 months period (from the first of December 2007 till the end of March 2008). Three hundred sixteen patient suffering from acute diarrhea were included in the study and their ages ranged from 2 months-10 years. History and physical examination were carried out, and the following information's were recorded : name, age, sex, residence, clinical features, water supply and feeding pattern.

General stool examination and stool culture was done by fresh stool samples were collected from these patient who presented with diarrhea.

Two direct smears were prepared by mixing a small amount of fresh stool (approximately 2 gm), one with physiological saline used primarily to detect motile trophozoite stage of protozoa, and another one with weak lugal iodine for protozoal cysts .

Regarding the stool culture, the stool sample was divided into 4 portions:-

The first portion was directly incubated on Macconkey's agar to detect Shigella (non-lactose fermenters), it was incubated for 24 hrs then subcultured on to (SS agar) followed by agglutination test with specified antisera against shigellae.

The second portion of stool sample was directly inoculated in buffered saline then was put in refrigerator for 3-4 weeks, then subcultured on Macconkey's agar to detect yersinia (non-lactose fermenters).

The third portion of the stool was directly inoculated on blood agar supplemented with antibiotics to detect Campylobacter. This was incubated for 72 hours. with gas generation kit in an anaerobic jar.

The fourth portion was directly inoculated in tetrathionate media and incubated for 24 hours and then subcultured into Macconkey's agar to detect the non-lactose fermenters (salmonella, proteus and pseudomonas) and the lactose-fermenters (coliforms). In addition to that agglutination test with specific antisera for Escherichia coli and klebsiella were done.

A stool sample for caryblair was obtained from every patient included in the study and then sent for advanced center for detection of Vibrio cholera in Egypt[15].

Investigation for identification of rotavirus diarrheal cases were not carried because we did not have such facilities in the hospital at the time of the study.

The result were analyzed using Chi square, with P-value of less than 0.05 was considered significant.

RESULTS:

Shigella species was detected in (6.96%) of children with diarrhea, it was the third most common isolate in patients with watery diarrhea (6.2%) following Escherichia coli (33.1%) and

campylobacter jejuni (10%). Shigella species was the third most common cause of bloody diarrhea (10.7%) following entamoeba histolytica (64.3%) and campylobacter jejuni(17.9%) as in table -1.

Most of the patients included in the study 262(82.91%) were less than 2 years of age, the age distribution of shigella species cases in relation to the total number of cases of diarrhea as shown in table -2,which shows that statistically significant difference in the age distribution of shigella species in relation to the total cases of diarrhea.

Most of the patients consume unboiled tap water 192(60.8%) with 8(36.4%) of them are with shigella infection, while those who consume tap water after filtration and chlorination at home shows (zero %) shigella infection and only 2(0.7%) shigella species negative diarrhea as shown in table -3.

More than one quarter of shigella species positive cases presented with bloody diarrhea.

Apart from diarrhea, fever was found as the second most common presentation followed by vomiting then abdominal pain as in table -4.

Table 1: Isolation rate of enteropathogens in children in relation to the type of diarrhea.

Enteropathogens isolated (Excluding rota virus)		Diarrhea		Total	Comparison of Significant	
		Watery	Bloody		P-value	Sig.
E. coli	N	86	0	86	0.00	Highly Sig. (P<0.01)
	%	33.1	0	27.2		
Campylobacter jejuni	N	26	10	36		
	%	10	17.9	11.39		
Shigella spp.	N	16	6	22		
	%	6.2	10.7	6.96		
Yersinia enterocolitica	N	14	4	18		
	%	5.4	7.1	5.69		
Salmonella (non - Typhoidal)	N	6	0	6		
	%	2.3	0	1.89		
Vibrio cholera	N	0	0	0		
	%	0	0	0		
Entamoeba histolytica	N	28	36	64		
	%	10.8	64.3	20.25		
Giardia lamblia	N	20	0	20		
	%	7.7	0	6.32		
No detectable pathogen or unavailable investigation	N	64	0	64		
	%	24.6	0	20.25		
Total	N	260	56	316		
	%	100	100	100		

Table 2: Patients age distribution of children with shigella species isolation.

Age groups Years)		Shigella isolation		Total	Comparison of Significant	
		Positive	Negative		P-value	Sig.
2mo.-2yr	N	12	250	262	0.047	Sig.(P<0.05)
	%	4.6	95.4	100		
>2yr-4yr	N	6	32	38		
	%	15.8	84.2	100		
>4yr-6yr	N	2	4	6		
	%	33.3	66.7	100		
>6yr	N	2	8	10		
	%	20	80	100		
Total	N	22	294	316		
	%	7	93	100		

Table 3: The relationship between patient's water supply and Shigella species isolation.

Water supply			Shigella isolation		Total	Comparison of Significant	
			Positive	Negative		P-value	Sig.
Tap water	Boiled	N	4	60	64	0.015	Sig.P<0.05)
		%	18.2	20.4	20.3		
	Unboiled	N	8	184	192		
		%	36.4	62.6	60.8		
	Filtered	N	2	14	16		
		%	9.1	4.8	5.1		
	Chlorinated by tab.	N	2	26	28		
		%	9.1	8.8	8.9		
	Filtered & Chlorinated	N	0	2	2		
		%	0	0.7	0.6		
River water	Boiled	N	2	2	4		
		%	9.1	0.7	1.3		
	unboiled	N	4	6	10		
		%	18.2	2	3.2		
Total		N	22	294	316		
		%	100	100	100		

Table 4: Clinical features of Shigella positive cases Isolation.

Clinical features			Shigella positive cases		Comparison of Significant	
			No.	%	P-value	Sig.
Diarrhea	Type	Watery	16	72.72	0.00	Highly Sig. (P<0.01)
		Bloody	6	27.28		
	Duration	<1week	18	81.82	0.00	Highly Sig. (P<0.01)
		1-2week	4	18.18		
Fever > 38C°		Yes	20	90.9	0.00	Highly Sig. (P<0.01)
		NO	2	9.1		
Vomiting		Yes	14	63.64	0.049	Sig. (P<0.05)
		NO	8	36.36		
Abdominal pain		Yes	4	18.18	0.00	Highly Sig. (P<0.01)
		NO	18	81.82		

DISCUSSION:

Diarrheal disorders in childhood account for a large proportion (18%) of childhood deaths, with an estimated 1.8 million deaths per years globally, it was estimated in 1999 that shigella infection may lead to 600,000 deaths per year of children < 5 years of age, or quarter to a third of all diarrhea related mortality in this age group [16] .

In this study shigella species was identified in (6.96%) of patients with diarrhea who were admitted to children welfare teaching hospital in baghdad for management of diarrhea.

Shigella species was identified as the third most common bacterial cause of diarrheal cases after escherichia coli (27.2%) and campylobacter jejuni (11.4%) and the fourth most common causative agent of diarrheal cases after escherichia coli (27.2%), entamoeba histolytica (20.3%) and campylobacter jejuni (11.4%).

A previous study done in basrah had shown that the percentage of shigella species among children with diarrhea was (1.4%) [17] .

The detection of higher percentage of shigella species in relation to the study done in basrah may be related to the availability of better equipments for investigations and detection of microorganisms especially after removal of international economic sanction.

The survey previously done in bangladesh reveals that shigella species were isolated from (4%) of infant and young children [18].

In other study done in six asian countries were included in the surveillance , shigella was isolated from (5%) of patients with diarrheal episodes [19].

most of the cases (54.5%) of shigella species infection were younger than 2 years, this result is in agreement with the results of other studies done in india [20].

As the transmission of shigella species is most likely via the feco-oral route and water are important vector although most of our cases consume tap water and small percentage use river water.

The study show's that significant difference between person consume purified and sterilized water by different method than persons who consume raw river water.

this result is in agree with other study done in thailand [21], but the study done in egypt disagree with this result [22].

Despite that this study did not shows a great protective effect of breast feeding against shigella species gastroenteritis, but the study done in egypt reveals significant decrease in the incidence of shigella associated diarrhea in the 1st year of life[22].

In addition to diarrhea, the study had revealed that (90.9%) of the patients with shigella species had fever exceeding 38centigrade, followed by vomiting which was present in (63.64%)and abdominal pain (in children > 2 years)in(18.18%), but no cases of joint pain, convulsion nor hemolytic uremic syndrome. the result of this study regarding the clinical features are supported by the result of other studies that the predominant symptoms of shigella species infection in addition to diarrhea are fever, abdominal pain and vomiting [2,20,21].

CONCLUSION:

- Shigella species was found to be the third most common cause of infectious bacterial diarrhea (6.96%) following e.coli and campylobacter jejuni.
- Among cases of bloody diarrhea, it was found that shigella species is the third most common cause of bloody diarrhea (10.71%) after e. histolytica and campylobacter jejuni.
- The most common presenting symptoms was diarrhea, followed by fever exceeding 38c (90.90%) , vomiting (63.63%), and abdominal pain (18.18%).
- Water supply and its sterilization is important factor in prevention of diarrhea.

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