

## Diarrheal diseases among internally home displaced (idps) in khartoum state, Sudan

Mogahid, M. El-Hassan<sup>1</sup>; Naglaa, M. Eid<sup>2</sup>; Miselyeen, A. Elmekki<sup>1</sup> and Ahmed, A. Al-Jarie<sup>3</sup>

1- College of Medical Laboratory Science, Sudan University of Science and Technology, Khartoum, Sudan

2- Ga'afar Ibn Ouf Teaching Hospital for Children, Khartoum, Sudan.

3- Al-Ghad International Medical Science Colleges, Abha, KSA

### ABSTRACT

One hundred diarrheal specimens were collected from Dar-salam and Jabel awlia camps for IDPs during the period from November 2008 to April 2009. The specimens were transported in transport media and inoculated into a variety of selective media, the bacteria were identified later using API 20E, biochemical tests and slide agglutination test as a serotyping method. The results showed that *Escherichia coli* represent 72%, *Shigella* species represented 8%, *Shigella sonnei* alone represented 5% of them and was sensitive to Tetracycline, Gentamicin and Ciprofloxacin while the rest was *Shigella dysenteriae* which was sensitive to Ciprofloxacin, Tetracycline, Gentamicin and Cotrimoxazol. *Salmonella paratyphi C* represent only 1% and was sensitive to Chloramphenicol, Gentamicin and Ciprofloxacin, *Yersinia enterocolitica* also have 1% infection rate and was sensitive to Ciprofloxacin, Tetracycline, Gentamicin and Chloramphenicol, while *Campylobacter* species composed 4% and was sensitive to Erythromycin, Ciprofloxacin and tetracycline.

**Keywords:** Diarrheal diseases among, Sudan

### INTRODUCTION

Diarrheal diseases are major causes of morbidity and mortality in developing countries especially in displace person, where large concentrations of people and poor hygienic conditions combine to generate major health risks that need special attention. The number of refugees and internally displaced persons in need of protection and assistance has increased from 30 million in 1990 to more than 43 million in 2005. Diarrhea can cause severe dehydration and poor absorption of nutrients, which in turn make affected individuals more susceptible to infectious diseases. Diarrhea in early childhood is associated with impaired growth, physical fitness, and cognitive development, which can lead to diminished future school performance and lower economic power (WHO, 2005). From a strictly medical

perspective, diarrhea is defined as stool weight of more than 250 grams in 24 hours (Bass, 2000).

Water and sanitation play a crucial role in the transmission of diarrheal disease with 2.4 billion people lack access to basic sanitation, the majority of these unserved people (93%) live in Asia and Africa. These environmental factors contribute to approximately 94 percent of the 4 billion cases of diarrhea that the World Health Organization estimates to occur globally each year; 2 million of them die every year from diarrheal diseases (including cholera). Children under the age of 5 in developing countries bear the greatest burden and account for the majority of million deaths attributed to diarrhea annually (WHO, 2005).

It remains a problem in developed countries as well in the United States in

which each child will have had 7-15 episodes of diarrhea by the age of 5 years, 9% of all hospitalizations of children less than 5 years old are associated with diarrhea and 300-500 children die each year from this potentially preventable condition (Gangarosa *et al.*, 1992).

There are three broad classes that encompass most cases of diarrhea: Non-inflammatory diarrhea which is described as a watery, non-bloody the most common cause of non-inflammatory diarrhea is a bacterium that produces a toxin as *Escherichia coli*, *Staphylococcus aureus*, *Bacillus cereus*, *Clostridium perfringens*, and *V. cholerae*. There is usually no blood loss. The second one is inflammatory diarrhea which is usually characterized by the presence of fever and blood in the stool, its common causes include infection with *Campylobacter*, *Shigella*, *Salmonella*, *Yersinia* species or infection with some species of *Escherichia coli*. Diarrhea due to these pathogens tends to be less voluminous. The last type is Enteric fever which is characterized by abdominal tenderness, confusion, prolonged high fever, prostration and occasionally a rash. Common causes of enteric fever-related diarrhea include *Salmonella typhi* or *Salmonella paratyphi* (Bass, 2000).

## METHODS

A descriptive cross sectional study was conducted in both Jabel Awlia and Dar-alslam camps. Inclusion criteria is being home displaced, under 5 years of age and suffering from diarrheal disease.

A questionnaire, prepared in accordance with the objective of the study including personal information, socioeconomic status, source of drinking water, type of diet, main clinical signs and symptoms and history of taking antibiotics, was filled.

Diarrheal specimens were collected in clean, wide neck, leak proof and free of preservative containers. The

processing of the samples was started by describing the macroscopic appearance of samples and if it contains mucus or blood, then wet preparations were applied to microscopically detect fecal leucocytes and presence of bacterial cells.

The specimens were transported in Carry Blair transport media (HiMedia). Smears from all the specimens were stained with basic fuchsin preliminary indicator to examine the presence of campylobacter's, and then were inoculated into plates of MacConkey agar, Deoxy Chocolate Agar (DCA), Xylose Lysine Deoxycholate (XLD), Thiosulphate Citrate Bile Salt agar (TCBS) and Campylobacter selective agar (HiMedia). The plates were incubated aerobically at 37°C for 24hrs except Compylobacter selective media which was incubated in microaerophilic atmosphere with 5% CO<sub>2</sub> for up to 48hrs.

Colonial morphology from each growing bacteria was established and smears from each one were stained by Grams' stain and then were identified using API20 E (bioMerieux SA, France). Serotyping identification (Mast, UK) was used only to determine the species of the genera *Salmonella* and *Shigella* which can not be obtain using API20E while *Campylobacter* was identified on the bases of characteristic appearance on culture medium, Grams' stain, oxidase, and catalase reactions.

The sensitivity spectrum of each of the isolates to different antibiotics was determined by standardized single disc diffusion method (Bauer *et al.*, 1966). Results were analyzed using Microsoft Excel and Descriptive Statistics (Frequencies) of SPSS.

## RESULTS

Out of the 100 stool samples bacteriologically screened for enteric bacteria *Escherichia coli* represented 72% of the total number, the higher prevalence of *Escherichia coli* was

distributed among children age group (37%) followed by 25% in infant while adult and elderly have only 8 % and 2 % respectively. *Shigella* species accounted 8% of the total samples, distributing evenly among infants (under 2 years) and children between 2 and 5 years, *Shigella sonnei* represented (5%) of them which showed sensitivity to Ciprofloxacin and tetracycline and resistance to Ampicillin and Cotrimoxazol followed by *Shigella dysenteriae* (3%) which was sensitive to Ciprofloxacin, Tetracycline and Cotrimoxazol and resistant only to Ampicillin while four cases (4%) were confirmed as *Campylobacter* infection among infant age group (less than 2 years).

All cases of *Campylobacter* are concentrated in Jabel awlia camp and all showed sensitivity to Erythromycin, Ciprofloxacin and Tetracycline. *Yersinia enterocolitica* was isolated from one case in Dar-alsalam camp among age group 2-5years, this isolate was sensitive to Ciprofloxacin, Gentamicin, Tetracycline and Chloramphenicol and was resistant only to Cotrimoxazol, *Salmonella paratyphi C* was also found in one case in children of age group 2-5 years and showed sensitivity to Ciprofloxacin and Chloramphenicol and was resistant to Ampicillin and Cotrimoxazol.

Table 1: Frequency of isolated pathogens among enrolled patients

Bacterial isolates	Frequencies	Percent
<i>Escherichia. coli</i>	72	72.0
<i>Shigella. sonnei</i>	5	5.0
<i>Shigella. dysenteriae</i>	3	3.0
<i>Salmonella. paratyphi C</i>	1	1.0
<i>Yersinia. enterocolitica</i>	1	1.0
<i>Campylobacter</i>	4	4.0
<i>Citrobacter. freundii</i>	6	6.0
<i>Escherichia. cloacae</i>	5	5.0
<i>Proteus</i>	1	1.0
<i>Pseudomonas</i>	1	1.0
No growth	1	1.0
Total	100	100.0

Table 2: Antimicrobial Sensitivity Test to each isolate

Species Agents(ug/ml)	<i>Shigella. sonnei</i>	<i>Shigella. dysenteriae</i>	<i>Yersinia. enterocolitica</i>	<i>Salmonella. Paratyphi C</i>	<i>Campylobacter</i>
Tetracycline (30)	Sensitive	Sensitive	Sensitive	–	Sensitive
Chloramphenicol (30)	–	–	Sensitive	Sensitive	–
Gentamicin (120)	Sensitive	Sensitive	Sensitive	Sensitive	–
Ciprofloxacin (10)	Sensitive	Sensitive	Sensitive	Sensitive	Sensitive
Cotrimoxazol (25)	Resistant	Sensitive	Resistant	Resistant	–
Ampicillin (10)	Resistant	Resistant	–	Resistant	–
Erythromycin (10)	–	–	–	–	Sensitive

### DISCUSSION

WHO estimated that 2.4 billions lack access to basic sanitation, and that water hygiene and sanitation interventions reduce diarrheal incidence

by 26% and mortality by 65%. Those factors, in addition to the crowdedness of people in home displaced camps combine to make the problem of diarrheal disease more serious in those camps.

Although the etiologies of diarrheal illness during refugee emergencies have not been well documented, the responsible pathogens are most likely to be the same agents that cause diarrhea in non-refugee populations in developing countries (Toole and Waldman, 1990).

The prevalence of *Shigella* (5%) and *Salmonella* (1%) recorded in our study is relatively similar to the findings of Desenclos *et al.*, (2000) who documented prevalence rates of 3.5% and 2% to both *Shigella* and *Salmonella* respectively. While in another non-refugee study, Beyene *et al.*, (2003) in Jimma University Specialized Hospital in Ethiopia, *Campylobacter* species were isolated from 11.6% of the total patients (430 children) while *Salmonella* and *Shigella* species were 5.8% and 4.9% respectively among children, which is slightly different from our study comparing to the larger sample size?. Their study agrees with ours in the target group through which *Campylobacter* is more frequent (less than 2 years) and in the pattern of antimicrobial agents, while *Salmonella* and *Shigella* in their study were sensitive to chloramphenicol, gentamicin and kanamycin and showed resistance to trimethoprim-sulfamethoxazole and ampicillin, while all *Campylobacter* isolates in their study were sensitive to tetracycline and erythromycin which is completely agrees with our results.

The prevalence of *Y. enterocolitica* (1%) recorded in our study was much lower compared with a study by Okwori, *et al.*, (2007) who in a similar study documented a prevalence rate of (15%) among patients suffering from diarrhea in Jos (Nigeria). Studies in Africa has revealed low prevalence of diarrhea due to *Y. enterocolitica* unlike other parts of the world especially northern European countries with a frequency of up to 13% (Ostroff *et al.*, 1994; WHO, 1983). Their isolates of *Y. enterocolitica* were

susceptible to ciprofloxacin, floxavid, streptomycin and tetracycline which partially agrees with our results.

The risk factor in these camps is mainly sanitation which is shared between the residents and its consequences are increasing specially with shortage of clean water, presences of unknown carriers and the flies especially mosquitoes and house flies which may act as a fomite or mechanical carrier to the infection.

#### REFERENCE

- Bass, Doesey M. (2000). "Rotavirus and other agents of vira gastroenteritis." In *Nelson Textbook of Pediatrics*, 16th ed. Edited by Richard E. Behrman *et al.*, Philadelphia: Saunders, 996-998.
- Bauer, A.W.; Kirby, W. M.; Sherris, J. C. and Turck, M, (1966). Antibiotics susceptibility testing by a single disc method. *Am. J. Clin. Pathol.* 45: 493-496.
- Desenclos, J. C.; Michel, D. and Tholly, F. (2000). Mortality trends among refugees in Honduras, *Int J Epidemio.*, 19:367-73.
- Gangarosa, R. E.; Glass, R. I.; Lew, J. F. and Boring, J. R. (1992). Hospitalizations involving gastroenteritis in the United States, the special burden of the disease among the elderly. *Am J Epidemiol* 1992; 135:281-90.
- Getn Beyene and Abrham Haile-Amlak. (2003). Antimicrobial sensitivity pattern of *Campylobacter* species among children in Jimma University Specialized Hospital, Southwest Ethiopia.
- Okwori. A. E. J.; Agada, G. O. A.; Olabod, A. O. E. S. Okpe and J. Okopi. (2007). The prevalence of pathogenic *Yersinia enterocolitica* among diarrhea patients in Jos, Nigeria, *African J. Biotechnology* 6(8): 1031-1034.

- Ostroff, S. M.; Kapperud, G.; Huteagner, L.C.; Nesbakken, T.; Bean, N. H.; Lassen, J. and Tauxe, R.V. (1994). Sources of sporadic Yersinia enterocolitica infections in Norway: a prospective case-control study. Epidemiol. Infect. 112: 133-141.
- Toole, M. J. and Waldman, R. J. (1990). Prevention of excess mortality in refugee and displaced populations in developing countries. JAMA; 263:3296-302.
- World health Organization. (2005). Diarrheal diseases control programme. Report of the tenth meeting of the technical advisory group (Geneva, March 1317, 1989). WHO/D/89 32:1.
- World health Organization (1983). Manual for laboratory investigation of acute enteric infections. pp.37-45. public CDD/83.3 WHO Geneva.

## ARABIC SUMMARY

### أمراض الإسهال بين النازحين تحت سن الخامسة في ولاية الخرطوم ، السودان

- مجاهد م الحسن<sup>١</sup>، نجلاء م عيد<sup>٢</sup>، مسك اليمين ع المكي<sup>١</sup>، أحمد أ الجاري<sup>٣</sup>  
 ١- كلية علوم المختبرات الطبية ، جامعة السودان للعلوم والتكنولوجيا ، الخرطوم ، السودان  
 ٢- مستشفى جعفر ابن عوف للأطفال ، الخرطوم ، السودان.  
 ٣- كليات الغد الدولية للعلوم الطبية، أبها ، السعودية

تم جمع مائة من عينات الإسهال من أطفال تحت سن الخامسة في مخيمات النازحين بدار السلام وجبل أولياء خلال الفترة من نوفمبر ٢٠٠٨ إلى أبريل ٢٠٠٩. وقد تم نقل العينات في أوساط النقل وتم بعد ذلك زراعتها في مجموعة متنوعة من الأوساط الزرع الانتقائية وقد تم تحديد أنواع البكتيريا في وقت لاحق باستخدام API 20E، الاختبارات الكيموحيوية و اختبار تراف الشريحة كأسلوب مصلي. أظهرت النتائج أن القولونية تمثل ٧٢٪ وتمثل الأنواع الشيعيلة ٨٪، حيث شكلت الشيعيلة السونية وحدها ٥٪ منهم، وكانت حساسة للنتراسيكلين، جنتاميسين وسبيروفلوكساسين بينما كان البقية الشيعيلة الدوسنتارية التي كانت حساسة للسبيروفلوكساسين، التتراسيكلين، جنتاميسين و كاتريموكسازول. السالمونيلا الباراتفية C لم تمثل سوى ١٪ وقد وجدت حساسة للكلورامفينيكول، جنتاميسين وسبيروفلوكساسين. بيرسينيا القولون أيضا كانت متسببة في ١٪ من معدل الإصابة وكانت حساسة للسبيروفلوكساسين، التتراسيكلين، جنتاميسين والكلورامفينيكول، في حين شكلت الأنواع العطيفة ٤٪ من مجمل مسببات الاصابة وكانت حساسة للإريثروميسين، سبيروفلوكساسين والتتراسيكلين.