

## Bacterial Gastroenteritis in Kirkuk Pediatric Hospital

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### Abstract:

**Background:** Diarrhea is considered as one of the most common illness and one of the major causes of infants & children mortality in developing countries. A reduction in diarrhea-related mortality may be possible by the early identification of high risk subjects and targeting them for intensive intervention.

**Aims:** This study was done to collect important information about the common microbial agents that cause bacterial gastroenteritis in Kirkuk pediatric hospital.

**Patients and methods:** This is a retrospective study reviewed all patients who were admitted to Kirkuk pediatric hospital from 1<sup>st</sup> of January 2008 to 31<sup>st</sup> of December 2010 whom were complain from frequent loose bowel motion. Data regarding gestational age, gender, causative microorganisms, date of admission, date of discharge and outcome were collected and analyzed.

**Results:** The results of this study showed that among 301 cases who were admitted to the hospital during this period, 184 cases (61.13%) were proved to have bacterial gastroenteritis by stool culture. *Escherichia coli* was the most common bacterial pathogen found in 171 cases (92.93%). Most patients who admitted were infants 141 case (76.63%) while older children were only 43 cases (23.67%). The study showed that higher cases were recorded in the urban area (58.69%) than rural areas (41.31%). Majority of cases (65.76%) included in the study were improved, while mortality rate recorded in the hospital was (0.82%).

**Conclusion:** Significant number of cases had bacterial gastroenteritis. ; *Escherichia coli* was the most common causative bacterial infection in children. Infancy was the most common pediatric age group which was affected.

**Key words:** gastroenteritis, diarrhea, children, E coli.

### Introduction:

Diarrhea is caused by many different infectious or inflammatory processes in the intestine. These processes directly affect enterocyte secretory and absorptive functions. Some of these processes act by increasing cyclic AMP levels (*Vibrio cholerae*, *Escherichia coli* heat-labile toxin, vasoactive intestinal peptide-producing tumors); other processes –*Shigella* toxin, congenital chloridorrhoea- cause secretory diarrhea by affecting ion channels or by unknown mechanism.<sup>(1)</sup>

Major symptoms of gastroenteritis include nausea and vomiting, diarrhea

and abdominal cramps. These symptoms are sometimes accompanied by fever and overall weakness. The disease typically lasts for about three days. Adults usually recover without problems, but children with an underlying disease are more vulnerable to develop complications such as dehydration.<sup>(2)</sup>

Bacteria constitute about 10-20% of the infectious agents that cause gastroenteritis. The most frequent causative bacteria are Enteropathogenic *Escherichia coli*, *Shigella* spp, Non-typhoid *Salmonella* spp, *Campylobacter jejuni*, *Yersinia enterocolitica*,

*Salmonella typhi*, *Salmonella paratyphi* and *Vibrio cholera*. The ability of an organism to infect relates to its mode of spread, its ability to colonize the gastrointestinal tract, and the number of organisms required to cause the disease. (1)

Gastroenteritis due to *Escherichia coli* is a common malady of traveling people and is caused by different types of *Escherichia coli*. (2)

Children with shigellosis may present with mental status change. *Shigella dysenteriae* and *Escherichia coli* O157:H7 have been associated with hemolytic uremic syndrome. (3)

*Campylobacter jejuni* accounts for 15% of bacterial diarrhea. The infection is spread by person-to-person contact and by contaminated water and food, especially poultry, raw milk and cheese. (1)

Infection with non-typhoidal salmonellosis (NTS) most often results in gastroenteritis indistinguishable from that caused by other enteric pathogens. Patients often experience abdominal cramping and fever (38-39°C). Diarrheal stool is usually loose, non-bloody and of moderate volume. (4)

Food poisoning is intoxication –and not an infection– associated with the ingestion of performed microbial toxins. Since no microbial growth within the body is required, the incubation times are very short (within 2-12 hours) and there is no fever. (3)

In general, bacteria colonize the colon because it contains elements that are critical for their growth: a warm, moist, stable environment with an abundant supply of nutrients both of exogenous (i.e. dietary) and endogenous (i.e. sloughed cells, mucus, secretions) origin. (5)

Diagnosis of bacterial strains responsible for gastroenteritis is made by biochemical tests (Kligler iron agar, indol production) and serological tests by slide agglutination tests. (6)

Enteroinvasive infections of the large bowel cause leukocytes, predominantly neutrophils, to be shed into stool. Absence of fecal leukocytes does not eliminate the possibility of enteroinvasive organisms; however, the presence of fecal leukocytes eliminates consideration of enterotoxigenic E coli, Vibrio species, and viruses. (7)

Antimicrobial therapy is indicated for some bacterial gastroenteritis infections. The goals of pharmacotherapy in cases of gastroenteritis are to reduce morbidity and to prevent complications. However, many conditions are self-limited and do not require therapy. Oral rehydration therapy is the cornerstone of diarrhea treatment, especially for small bowel infections that produce a large volume of watery stool output. (8)

### **Aim of the study:**

This study was done to identify the common microbial agents that cause bacterial gastroenteritis in Kirkuk city, searching for the age group that affected more, looking for any deference in the geographical distribution, and to assess the outcome of this disease.

### **Patients and methods:**

This retrospective study was done in Kirkuk Pediatric Hospital. All children admitted to the hospital whom proved to have bacterial gastroenteritis by positive stool culture from 1<sup>st</sup> of January 2008 to 31<sup>st</sup> of December 2010 were included in the study. Data on the age, sex, causative bacteria and outcome of the condition are obtained from case-sheets taken from the hospital. Statistical analysis was carried out to assess the

difference between the results. Chi square was applied, statistically significant value was defined as ( $p < 0.05$ ).

### **Results:**

Over the period from 1<sup>st</sup> of January 2008 to 31<sup>st</sup> of December 2010, data of 301 cases whom admitted to the hospital complaining from frequent loose bowel motion were collected and analyzed; bacterial gastroenteritis as proved by results of positive stool culture were found in 184 (61.13%) cases. The remaining 117 cases (38.87%) of diarrhea are caused by non-bacterial pathogens. This is shown in table No. (1).

Infants appear to account for the majority of gastroenteritis cases (76.63%). After infancy the frequency of bacterial gastroenteritis decrease till it reach its lowest level in school age children (3.8%). Statistically significant difference between the occurrence of the

disease in infants and that in older children as shown in table No.2.

*Escherichia coli* was the most common causative bacteria of gastroenteritis in the vast majority of children (92.93 %). *Salmonella typhi* and *Shigella flexneri* each was found in about (2.7 %) of cases. *Shigella soni*, *Proteus mirabilis* and *klepseilla pneumonia* each was found in one case (0.54%). Types of the causative microorganism is shown in table No. (3).

The study showed that most of cases recorded in the hospital were in the urban region (58.69%) and the remaining cases were from villages and towns at the periphery of Kirkuk city (41.31%). This is shown in table No.(4). From the total 184 cases of bacterial gastroenteritis that were collected and followed up, 121 cases(65.76%) were improved. 62 (33.69) case were discharged on the family responsibility; and one case (0.54%) was died as it shown in table No. (5).

**Table (1):** distribution of gastroenteritis according to bacterial and non-bacterial causes.

Gastroenteritis	Male		Female		Total	
	No.	%	No.	%	No.	%
Bacterial	94	31.22	90	29.91	184	61.13
Non-bacterial	66	21.92	51	16.94	117	38.87
Total	160	53.14	141	46.85	301	100.00

**Table (2):** distribution of bacterial gastroenteritis according to the age group.

Age group	No.	%
Infants	141	76.63
Pre-school age	36	19.56
School age	7	3.80
Total	184	100.00

**Table (3):** causative microorganism of bacterial gastroenteritis

Type of bacteria	No.	%
<i>Escherichia coli</i>	171	92.93
<i>Salmonella typhi</i>	5	2.71
<i>Shigella flexneri</i>	5	2.71
<i>Shigella soni</i>	1	0.54
<i>Proteus mirabilis</i>	1	0.54
<i>Klebseilla pneumonia</i>	1	0.54
Total	184	100.00

**Table (4):** Frequency distribution of sample study according to residence.

Area	No.	%
Urban area	108	58.69
Rural area	76	41.31
Total	184	100.00

**Table (5):** outcome of bacterial gastroenteritis.

Outcome	No.	%
Cure	121	65.76
Discharge on responsibility	62	33.69
Died	1	0.54
Total	184	100.00

## **Discussion:**

Diarrhea is considered as one of the most common illness and one of the major causes of infants & children mortality in developing countries. A reduction in diarrhea-related mortality may be possible by the early identification of high risk subjects and targeting them for intensive intervention. <sup>(5)</sup>

In this study, the total number of cases of bacterial gastroenteritis was found to be more than that of non-bacterial gastroenteritis. The reason behind that is probably the symptoms of acute bacterial gastroenteritis are more serious than those of viral or protozoal diarrhea. This usually makes the family seek for medical advice while majority of cases that complain of viral diarrhea may be treated as out-patients.

The study also showed that *Escherichia coli* was the most common bacteria responsible for bacterial gastroenteritis (92.93%). Infants are more affected by the disease than older children. These results are comparable to those of a study done in the department of pediatrics in Ibn Alatheer and Ibn Seena Teaching Hospitals, Mosul, Iraq from October 2003 to June 2004 on a number of infants and children suffering from diarrhea which had shown that *Escherichia coli* is the most common causative bacteria of diarrhea, followed by *Enterobacter spp* and *Shigella spp*. <sup>(9)</sup> Cases that admitted to the hospital from urban areas were more than those admitted from rural areas. These results were comparable to those results proved by an epidemiological study of bloody diarrhea on a sample of children less than 5 years of age in pediatric hospitals

in Baghdad city in 2001.<sup>(10)</sup> The reason behind that was probably people in the urban areas have better opportunity for admission to hospital in which the study was carried out on one hand. In addition to that, many people who live in villages and towns have poor knowledge about complications of diarrhea.

From 128 cases of bacterial gastroenteritis, 62 cases (33.69%) were discharged from hospital on the responsibility of the parents. The mortality rate in the remaining 122 cases (66.31%) in our study was only one case (0.82%). Mortality predominantly is due to dehydration and secondary malnutrition from a protracted course.<sup>(11)</sup> The global introduction of oral or parenteral rehydration therapy was possibly the cause behind this high rate of improvement among cases.<sup>(8)</sup>

### **Conclusion:**

Significant number of cases that were admitted to pediatric hospital complaining of frequent loose bowel motion was proved to have bacterial gastroenteritis.

*Escherichia coli* was the most common causative bacteria of gastroenteritis.

Infancy (<1 year of age) was the most common pediatric age group which was affected.

Overall mortality rate was very low.

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