



Prevalence of Bacterial Gastroenteritis among Hospitalized Infants and Children with Acute Diarrhea in Pediatric Hospital, Ain Shams University

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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INTRODUCTION

Acute gastroenteritis is one of the most common infectious diseases and a significant cause of morbidity after upper respiratory tract infections. It accounts for a large proportion (18%) of childhood deaths, with an estimated 1.5 million deaths per year, making it the second most common cause of child deaths worldwide. The World Health Organization (WHO) and The United Nations Children's Fund (UNICEF) estimate that almost 2.5 billion episodes of diarrhea occur annually in children younger than five years in developing countries, with more than 80% of these cases occurring in Africa and South Asia (46% and 38%, respectively) (*Bhutta, 2011*).

Acute gastroenteritis is generally defined as decrease in the consistency of stool or an increase in frequency of evacuation typically by 3 times in 24 hr with or without vomiting and fever, however change in stool consistency versus previous consistency of stool is more indicative of diarrhoea than number of motions. Acute diarrhoea typically last for 7 days and not more than 14 days, persistent diarrhoea last (2–4 weeks), and chronic last for (greater than 4 weeks) (*Guarino, 2014*).

The major pathogens causing acute infectious diarrhoea are viruses, bacteria, and parasites. Most cases are self-limited and resolve within 24–48h, and in developed nations, the aetiology is likely to be viral (*Jones et al., 2004*).

Pathogens affecting the small intestine are usually non-invasive organisms. These patients present with high-volume watery stools and in some cases mal absorption, frequently leading to dehydration. Patients often have peri umbilical pain and cramping. The most common pathogens in this category are viruses, such as noro virus and rota virus, but also include bacteria: enter toxigenic *E. coli*, *Vibrio cholera*, toxin-producing *Staphylococcus aureus*, and the parasites *Giardia lamblia*, *Isospora belli*, and *cryptosporidium*. These enteropathogens typically cause disease via enterotoxin production, ingestion of preformed toxin, and/or bacterial adherence to epithelial cells, Colonic and distal small intestinal pathogens are more likely to be invasive. They result in a syndrome of lower abdominal pain; small volume, frequent stools which can be bloody and tenesmus (when the rectum is involved) The most common pathogens causing this presentation are bacteria including *Campylobacter*, *Shigella*, *Salmonella* and Shigatoxin-producing *E. coli*, and *Clostridium difficile* (*Thielman et al., 2004*).

Since there are individual and public health risks associated with antimicrobial therapy, it is generally best to await results of diagnostic testing before treating. Some risks of antibiotics include inducing TTP/HUS (Thrombotic thrombocytopenic purpura /Hemolytic uremic syndrome) with STEC (shiga toxin producing *E. coli*) infection, increasing antimicrobial resistance, exposing patients to side effects of

antibiotic therapy and increasing the risk of prolonged carrier stage and relapses in non-typhoid *Salmonella* infections. However, in certain situations, the benefits of empiric therapy outweigh the risks. Empiric therapy is thus recommended for the following situations: severe illness requiring hospitalization (particularly admission to an intensive care unit), moderate-to-severe traveler's diarrhea, elderly or immunocompromised hosts, suspected *C. difficile* colitis with severe disease, suspected shigellosis, or persistent diarrhoea with suspected *Giardia*. If these conditions are not present, or there is suspicion for STEC (bloody diarrhoea and absence of fever) or non-typhoidal *Salmonella*, or clinical uncertainty is present, it is most appropriate to wait for culture results before treating (*Rahouma et al., 2011*).

As new antimicrobial resistance patterns are continually emerging, it is important to check frequently updated sources for antimicrobial recommendations, the American College of Gastroenterology recommends a routine stool culture for a patient who presents with any of the following symptoms: severe or persistent diarrhoea, temperature of 38.5°C, bloody diarrhoea, or the presence of stool leukocytes, lactoferrin, or occult blood (*DuPont, 1997*).

The Infection Disease Society of America similarly recommends that stool cultures be performed for a patient with diarrhoea for 1 day, fever, dehydration, systemic illness, bloody

stools, or a clinical history that would include bacterial pathogens in the differential diagnosis (*Guerrant et al., 2001*).

The choice of the antimicrobial agent depends on the local prevalence of the 3 pathogens (*Shigella* spp, *Campylobacter* spp, and *Salmonella enterica* and the resistance patterns. In children with watery diarrhoea, antibiotic therapy is not recommended unless the patient has recently traveled or may have been exposed to cholera.

Bloody diarrhoea with low or no fever is typical of STEC (enterohemorrhagic *E coli*), but can be mild shigellosis or salmonellosis. Antibiotics are not recommended unless epidemiology suggests shigellosis. Parenteral rather than oral antibiotic therapy is recommended for: Patients unable to take oral medications (vomiting, stupor, etc). Patients with underlying immune deficiency who have AGE with fever 3. Severe toxemia, suspected or confirmed bacteraemia 4. Neonates and young infants (<3 months) with fever. Sepsis workup and antibiotics should be considered according to local protocol (*Guarino, 2014*).

AIM OF THE WORK

The aim of this study is to identify frequency of the most common bacterial pathogen causing acute gastroenteritis in infant and children and determine their antimicrobial susceptibility patterns at Ain shams University

Chapter 1

GASTROENTERITIS

Acute gastroenteritis defined by the Infectious Diseases Society of America (IDSA) and the American College of Gastroenterology (ACG).as the passage of three or more loose or watery stools per day (or more frequent passage of stool than is normal for the individual) (*Guerrant and DuPont, 1997*).

Stool patterns may vary among children; thus, it is important to note that diarrhea should represent a change from the normal. Frequent passage of formed stools is not diarrhea, nor is the passing of pasty stools by breast fed young infants (*Guerrant et al., 2001; Elli et al., 2007*).

There are three clinical classifications of diarrheal conditions:

- Acute diarrhea, lasting several hours or days
- Acute bloody diarrhea or dysentery
- Persistent diarrhea, lasting 14 days or longer

Infectious diarrhoea is a significant cause of illness and death among children under 5 years of age in lower source countries. It accounts for 9% of all deaths globally in this age group, and ranks only second to pneumonia (*UNICEF, 2012*).

The majority of these cases are associated with the first two years of life, with peak ages being between 6 and 11 months (*Walker et al., 2013*).

Epidemiology and magnitude of the problem:

Acute gastroenteritis is an extremely common illness among infants and children worldwide. According to the *Centers for Disease Control and Prevention (CDC)*, worldwide as many as 4,000,000 children per year die because of gastroenteritis and resulting dehydration, malnutrition, electrolyte abnormalities, shock, and cardiac arrest; all are potentially preventable causes (*Gastanaduy & Begue, 1999*).

Over 1.7 billion global cases of diarrheal disease are reported annually and are associated with an estimated 2.2 million deaths. The burden of diarrheal disease is most critical in developing countries, facilitated by unsafe water supplies, poor sanitation, and nutritional deficiencies. Diarrheal disease in children aged 5 years in these countries is devastating, where repeated diarrheal episodes contribute to malnutrition, which in turn puts these children at heightened risk of acquiring infectious diarrhea and is associated with stunting and impaired cognitive development (*Walker et al., 2013*).

While less common in high-income countries, diarrheal diseases remain a significant health concern.