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AN OVERVIEW OF ACUTE GASTROENTERITIS IN CHILDREN UNDER FIVE YEARS IN SUB-SAHARAN AFRICA

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ABSTRACT

Acute gastroenteritis represents a major cause of morbidity and mortality worldwide. Young children are affected most frequently, with three to ten episodes of diarrhoea per subject per year, a rate that decreases to less than one episode annually for children over five years of age and adults. Diarrhoeal diseases are one of the leading worldwide preventable causes of death among children under 5 years of age. Almost half of children do not receive optimal acute gastroenteritis (AGE) treatment in Sub Sahara Africa. The presence of blood or mucus in the stool as well as signs of dehydration are important for the definition of diarrhoea regardless of the frequency, volume and consistency of the stool, and diarrhoea is also categorized according to its duration and cause. The factors that increase the transmission of gastroenteritis in developing countries include contaminated water and food, poor sanitation and personnel hygiene, lack of breastfeeding, malnutrition, deficiencies in micronutrients like zinc or vitamin A, crowded environment, and living close to domestic animals. Gastroenteritis mainly cause by three groups of organism, viruses, bacteria, and parasites. Accessible uncontaminated water and good sanitation practices are important for reducing rates of infection and clinically significant gastroenteritis Personal hygiene measures. Children need to be assessed carefully for signs of dehydration, Educating mothers on breast feeding for first six months.

Keywords: Acute, Children, Diseases Gastroenteritis, Mortality, Sub-Saharan,

INTRODUCTION

Acute gastroenteritis (AGE) refers to inflammation of the intestinal mucosa. It is characterized by the onset of diarrhoea with or without vomiting, fever or abdominal pain.



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

The aetiology of acute gastroenteritis is variable with two main entities: infectious and non-infectious, with the former being the most common. In children acute diarrhoea may have a non-enteric origin, including a range of other infections such as urinary tract infection, pneumonia, otitis media and bacterial sepsis. Non-infectious diarrhoea can result from the intake of toxic food, chemicals, lactose or gluten intolerance, or malignancy. Intense irresistible gastroenteritis influences mostly youngsters under five years old and particularly those under 2 years old due to the adolescence of gastrointestinal invulnerability. Worldwide 3-5 billion cases of diarrhoea occur per year. The annual mortality in children less than five years old in developing countries has decreased from 4.5 million deaths to 1.8 million deaths during the last 20 years, due mainly to the introduction of oral rehydration therapy (ORT), but the morbidity remains high (Liu *et al.*, 2013). Diarrhoeal diseases are one of the leading worldwide preventable causes of death among children under 5 years of age (Troeger, *et al.*, 2018). In 2017, diarrhoeal diseases in children 5 years and younger were responsible for 440,521 deaths globally (World Health Organization, 2021). *Rotavirus* was the most common cause of severe diarrhoea in children (Agócs, *et al.*, 2014) and is therefore an important contributor to morbidity, mortality, and hospitalisation among children under 5 years (Shaheen, 2019). In the Middle East, up to 78% of hospitalised acute gastroenteritis (AGE) cases were attributable to *Rotavirus* (Shaheen, 2019). *Rotavirus* vaccination was introduced in 2015 to the national immunisation program and seemingly proved effective in reducing *Rotavirus* related gastroenteritis (Alrwashdeh, *et al.*, 2020). In Nigeria, gastroenteritis represents elevated degrees of mortality in small kids under five years, notwithstanding overall endeavours to further develop generally kid wellbeing levels. Every year, in the agricultural nations of Asia, Africa and Latin America, around 5,000,000 youngsters under five years old kick the bucket from intense gastroenteritis. Around 80% of these passing's are in the initial two years of life (Lucas and Gilles, 2009). A few variables are probably going to add to the extremely high the runs dreariness and death rates, in kids



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

under-five years including neediness, female lack of education, unfortunate water supply and sterilization, unfortunate cleanliness rehearses and deficient wellbeing administrations (Park, 2009). The Federation of International Societies of Paediatric Gastroenterology, Herpetology and Nutrition (FISPGHAN) has prioritised universal *Rotavirus* immunisation, early use of oral rehydration solution (ORS), and the limitation of inappropriate medical interventions when addressing paediatric AGE (Guarino, *et al.*, 2020).

To date, there is no universal definition for AGE. However, the 2014 joint European guidelines for the management of AGE in children is widely accepted in clinical practice; also, studies and its definition of AGE were therefore adapted in sub-Sahara Africa. It was found appropriate to omit the number of typical evacuations per day as a criterion for AGE to avoid AGE over diagnosis since stool frequency varies by age and diet (Tunc, *et al.*, 2008 and Corazziari, *et al.*, 2005). High bowel frequency is not uncommon in the first month of life, in which period infants can evacuate more than 6 times per day (Tunc, *et al.*, 2008). This omission also serves to further emphasise the importance of considering stool consistency rather than stool frequency in the diagnosis of AGE. Persistent diarrhoea was beyond the scope of this consensus, which focuses on the management of acute diarrhoea in both infants and children. The concept of persistent diarrhoea is well addressed in international guidelines, such as the European Society for Paediatric Gastroenterology Herpetology and Nutrition/European Society for Paediatric Infectious Diseases (ESPGHAN/ESPID) 2014 guidelines (Guarino, *et al.*, 2014).

Clinical Features of Acute Gastroenteritis

The most common symptom of acute gastroenteritis is diarrhoea. The word diarrhoea is derived from Greek meaning flow through, and refers to increase in water, volume, frequency and decrease in consistency of the stool due to imbalance of secretion and absorption of water and salts in the intestine. The World Health Organization (WHO)



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

defines diarrhoea as the passage of three or more loose or watery stools per day, but in breastfeeding infants, diarrhoea is considered when they have more than 6 to 8 stools per day. Nevertheless, normal stool can be difficult to define, and one may consider diarrhoea as having more than normal stools for that person. The presence of blood or mucus in the stool as well as signs of dehydration are important for the definition of diarrhoea regardless of the frequency, volume and consistency of the stool, and diarrhoea is also categorized according to its duration and cause. Acute diarrhoea lasts for less than 2 weeks (14 days), persistent diarrhoea more than 2 weeks, and some refer to chronic diarrhoea when duration is more than 30 days. Both infectious and non-infectious diarrhoea may be further classified according to its pathophysiological mechanism (Field, 2003). The runs is the aggravation of the gastrointestinal plot containing changes in digestive motility and retention, prompting expansion in the volume of stools and in their consistency (Ballabriga, *et al.*, 2000). In the runs, stool contains more water than typical stool and is much of the time called free or watery stool. In specific cases, they might contain blood in which case the runs are called looseness of the bowels (Obionu, 2001). Any section of at least three watery stools in something like a day (24 hours) is alluded to as the runs (Tauxe, 1997). The signs and side effects of the runs are entry of incessant free watery stools, stomach spasms or agony, fever especially assuming that there is an irresistible reason and dying. Microscopic organisms and parasites frequently can deliver horrendous looseness of the bowels (dysentery). Moreover, fiery entrails sickness, polyps and colorectal malignant growth can cause blood and bodily fluid in the stools, queasiness and heaving may likewise be available on account of disease (Longmach, *et al.*, 2004).

Mode of Transmission

The mode of transmission of gastroenteritis is faecal-oral through the ingestion of contaminated food or fluids or by direct person-to-person contact. The factors that increase the transmission of gastroenteritis in developing countries include contaminated water and



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

food, poor sanitation and hygiene, lack of breastfeeding, malnutrition, deficiencies in micronutrients like zinc or vitamin A, crowded environment, and living close to domestic animals. The key reservoirs of human enteropathogens are food, water and humans, but some of these infections (e.g. *Salmonella*, *Campylobacter* and *Yersinia*) are zoonosis that is transmitted from live animals, or by unsafe preparation of food. Children less than 2 years of age are particularly exposed to enteric pathogens, because of poor hygiene of hands and feet, and their explorative behaviour. When exposed, they often develop gastroenteritis due the lack of immunity induced by previous infections. The transition from breastfeeding, which provides some protection against enteropathogens to formula or cow milk, also increases the risk of gastroenteritis (Golding, *et al.*, 1997).

There are other genuine techniques for transmission of the runs as perceived by the Bound together Nations Children's Resource - UNICEF (1998). These include: lamentable wellspring of water supply, especially in country areas; unfortunate regular sterilization provoking attitudinal issues of crapping in open spaces, pit latrine, fences and in the streams (used for drinking and washing). Dealing with container is in like manner a component of defilement (Federal Republic of Nigeria - FRN 2000). Transmission of the runs occurs by the waste oral course in light of sad standards of individual and biological neatness. These circumstances will pick the reality of pollutions (enteropatogens). The essential piece of dealing with a young person with gastroenteritis are obstructing or treating dissipating out and keeping with remarkable food (Lucas and Gilles, 2009).

Causative Agents

There are many microbes that can cause intense gastroenteritis, including infections (*Rotavirus*, *Norovirus*, *Astrovirus*, *Sapovirus*, *Adenovirus*), microscopic organisms (*Shigella*, *Escherichia coli*, *Campylobacter*, *Salmonella*, *Vibrio cholerae*, *Yersinia enterocolitica*, *Aeromonas*), and protozoa (*Cryptosporidium*, *Entamoeba histolytica*,



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

Giardia intestinalis). Furthermore, *Clostridium difficile* may incite the runs when the anti-microbial treatment changes the gastrointestinal microbial equilibrium, and bacterial poisons might cause gastroenteritis without intestinal disease (for example *Staphylococcus aureus*). In created nations, infections are the significant reason for intense irresistible illnesses, while microbes, specifically *E. coli* and *Shigella*, are normal in emerging nations.

Gastroenteritis as a rule is brought about by three significant gatherings of miniature life forms in particular; Infections, microorganisms and protozoa or parasites (Lucas and Gilles, 2009). The fundamental specialists of gastroenteritis as per them are enteroviruses (for example *Rotavirus*, *Escherichia coli*, *Campylobacter spp*, *Shigella*, *Vibrio cholera*, *Salmonella* (nontyphoid), *Entamoeba histolytica*, *Giardia lamblia*). These are additionally assembled in the accompanying ways: Infections (for example *Rotavirus*); Microorganisms (for example *Shigella*, *Escherichia coli*, *Vibrio cholerae*, *Salmonella* non typhoid, *Campylobacter spp*). Parasites (for example *Entamoeba histolytica*, *Cryptosporidium* and *Giardia lamblia*).

All over the world, viruses especially *Rotavirus* been identified as the major cause of acute gastroenteritis in children. Concentrates on in Nigeria additionally found infections as the significant reasons for gastroenteritis in 60% of cases with microscopic organisms liable for about just 3-20 per cent. The vast majority of these microbes are sent by faecal-oral course.

Viruses that cause gastroenteritis include *Rotavirus*, *Norovirus*, *Adenovirus* and *Astrovirus* (Eckardt and Baumgart, 2011, and Dennehy, 2011). *Rotavirus* is the most common cause of gastroenteritis in children, both in the developed and developing world (Szajewska and Dziechciarz, 2010). Viruses cause about 70% of infectious diarrhoea episodes in this age group (Webb and Starr 2005). *Rotavirus* is a less common cause in adults, due to acquired immunity (Desselberger, and Huppertz, 2011).



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

In the developed world, *Campylobacter jejuni* is the primary cause of bacterial gastroenteritis. Half of these cases are associated with poultry (Galanis, 2007). In children, bacteria are the cause of 15% of cases (Webb and Starr 2005). The most common types are *Salmonella*, *Shigella*, *Escherichia coli*, and *Campylobacter* (Webb and Starr 2005). If food becomes contaminated with bacteria and remains at room temperature for several hours, the bacteria can multiply and increase the risk of infection in those who eat the food (Mandell *et al* 2009).

Toxigenic *Clostridium difficile* is an important cause of diarrhoea and usually occurs in the elderly. Infants can carry these bacteria without developing symptoms (Mandell *et al* 2009). Generally, traveller's diarrhoea is a type of bacterial gastroenteritis.

A number of protozoa can cause gastroenteritis, most commonly *Giardia lamblia*, but also *Cryptosporidium* and *Entamoeba histolytica* (Webb and Starr 2005). As a group, these contribute to 10% of cases in children (Elliott, 2007).

Diagnostic Methods of Gastroenteritis

Several researches have shown that microscopy, culture and sensitivity (MCS) has been in use for a long time and is still the main diagnostic method for many diarrhoea genic agents. It has the advantage that it can be performed without advanced equipment and may provide information about antibiotic resistance. However, for some agents special conditions are required, the sensitivity may be limited, and the time to result is relatively long. Virus culture is also in general too slow or too insensitive for diagnostic use. For *Rotavirus* there are rapid antigen detection assays with acceptable sensitivity, but for *Adenovirus* and *caliciviruses* sensitivity of such assays is insufficient. Protozoa have been detected by direct microscopy, which can be performed locally without advanced equipment. The accuracy of this method is however uncertain and depend on the skill and experience of the technician molecular based diagnostic assays provide rapid and reliable identification of pathogens,



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

and have improved the diagnostics of all types of microbial agents. Polymerase chain reaction (PCR) is the main molecular method used in microbiology (Yang and Rothman, 2004).

PREVENTION OF GASTROENTERITIS

A supply of easily accessible uncontaminated water and good sanitation practices are important for reducing rates of infection and clinically significant gastroenteritis. Personal hygiene measures (such as hand washing with soap) have been found to decrease rates of gastroenteritis in both the developing and developed world by as much as 30%. Alcohol-based gels may also be effective (Aloun, *et al.*, 2009). Food or drink that is thought to be contaminated should be avoided. Breastfeeding is important, especially in places with poor hygiene, as is improvement of hygiene generally. Breast milk reduces both the frequency of infections and their duration (Armah, *et al.*, 2012).

The burden of *Rotavirus*-related gastroenteritis is evident on economic level (healthcare cost) and healthcare utilisation (primary care visits, emergency department visits, and hospitalization) in countries with no routine *Rotavirus* immunisation (Ardura, *et al.*, 2021, and Soltani, *et al.*, 2015), even in high-income settings (Quee, *et al.*, 2020). As such, the benefit of the introduction of *Rotavirus* vaccines into national immunisation programs has been clear-cut in regard to the prevention of *Rotavirus* diarrhoeal episodes, particularly in high-risk countries with high morbidity and mortality (Mphahlele, *et al.*, 2021, and Soares, *et al.*, 2019). The introduction of the *Rotavirus* vaccine in sub-Saharan Africa in 2015 led to a notable decrease in *Rotavirus* related gastroenteritis from approximately 50% (Kaplan, *et al.*, 2011), 6% (Alwashdeh, *et al.*, 2020), of paediatric AGE cases. The high *Rotavirus* vaccination rate (90 to 95%) reported in sub-Saharan Africa in line with the FISPGHAN priorities in AGE management (Guarino, *et al.*, 2020). However, *Rotavirus* vaccination alone is not sufficient to address the burden of AGE. Other common viral and bacterial



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

aetiologies that are expected to increase in prevalence after comprehensive *Rotavirus* vaccination should also be included in public health priorities. Additionally, transient humanitarian/global emergencies such as the COVID-19 pandemic and refugees should be accounted for considering their influence on the AGE landscape. Poor nutrition and unsafe water/sanitation are the leading risk factors of diarrhoea related mortality (Troeger, *et al.*, 2018) and were significant associated with diarrhoeal episodes among children in sub-Saharan Africa (Okour, *et al.*, 2012). Thus, it is essential to provide health education promoting the importance of good sanitation and nutrition (i.e., hand washing, access to clean water, and access to clean toilets), particularly among high-risk low-resource settings (e.g., refugee camps (Nimri, and Hijazi, 1996) and rural areas (Okour, *et al.*, 2012) within sub-Saharan Africa

Vaccination

Due to both its effectiveness and safety, in 2009 the World Health Organization recommended that the *Rotavirus* vaccine be offered to all children globally. Two commercial *Rotavirus* vaccines and several more are in development (Alvarez, *et al.*, 2004) In Africa and Asia these vaccines reduced severe disease among infants and countries that have put in place national immunization programs have seen a decline in the rates and severity of disease (Abugalia, *et al.*, 2011).

MANAGEMENT OF GASTROENTERITIS

Gastroenteritis is usually an acute and self-limiting disease that does not require medication. The favoured treatment in those with gentle to direct parchedness is oral rehydration treatment (ORT) (Abebe, *et al.*, 2014). For children at risk of dehydration from vomiting, taking a single dose of the anti vomiting medication metoclopramide or ondansetron may be helpful, and butylscopolamine is useful in treating abdominal pain (Agnew, *et al.*, 1998).



Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

Rehydration is the primary treatment of gastroenteritis in both children and adults. This is preferably achieved by drinking rehydration solution, although intravenous delivery may be required if there is a decreased level of consciousness or if dehydration is severe. Drinking replacement therapy products made with complex carbohydrates (i.e. those made from wheat or rice) may be superior to those based on simple sugars. Drinks especially high in simple sugars, such as soft drinks and fruit juices, are not recommended in children under 5 years of age as they may increase diarrhoea. Plain water might be utilized assuming that more unambiguous ORT arrangements are inaccessible or the individual isn't willing to drink them. A nasogastric cylinder can be utilized in small kids to control liquids on the off chance that justified in the people who require intravenous liquids; one to four hours' worth is frequently adequate. It is recommended that breast-fed infants continue to be nursed in the usual fashion, and that formula-fed infants continue their formula immediately after rehydration with ORT. Lactose-free or lactose-reduced formulas usually are not necessary. Children should continue their usual diet during episodes of diarrhoea with the exception that foods high in simple sugars should be avoided. The BRAT diet (bananas, rice, applesauce, toast and tea) is no longer recommended, as it contains insufficient nutrients and has no benefit over normal feeding (Amar, *et al.*, 2007).

CONCLUSION

Acute gastroenteritis is one of most common entities seen by the practising paediatrician. Treatment of diarrhoea has relied upon simple and effective oral rehydration therapy. Vomiting and diarrhoea can be nonspecific symptoms in children, and the diagnosis of viral GE needs to be made after excluding other causes. The prevention of diarrhoeal diseases should focus on the improvement of nutrition, hygiene, and sanitation, the introduction of routine vaccination against *Rotavirus*, and the adoption of a standardised approach for AGE management (ORS use adjunct therapies, continued feeding, and avoiding routine antibiotic use).



RECOMMENDATION

Government should provide adequate water supply to rural communities minimized cases.

1. Sanitation should be observed regularly
2. Personal hygiene must be maintained
3. Educating mothers on breast feeding for first six months

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Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

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Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

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Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

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Lapai Journal of Science and Technology, Vol. 8, No. 1 (2022)

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