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ACUTE GASTROENTERITIS IN PAEDIATRICS: A REVIEW

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ABSTRACT

Acute gastroenteritis, characterized by the sudden onset of diarrhoea with or without vomiting, is one of the most common infectious diseases of childhood. Dehydration is the major complication associated with gastroenteritis, appropriate fluid management (oral or intravenous) is an effective and safe strategy for rehydration. A child with minimal or no dehydration should be encouraged to continue his or her usual diet plus drink adequate fluids. New treatments such as antiemetic's, antidiarrheal agents and chemotherapeutic agents are often proposed, but not yet universally recommended. Probiotics, also known as "food supplement," seem to improve intestinal microbial balance, reducing the duration and the severity of acute infectious diarrhoea. This review article explains the new treatment methods for acute gastroenteritis in children.

Key Words: Acute gastroenteritis, Oral rehydration solution, Probiotics.

INTRODUCTION

Acute gastroenteritis (AGE), a common childhood illness occurring worldwide. Among children in the United States, remains a major cause of morbidity and hospitalization, accounting for >1.5 million outpatient visits, 200,000 hospitalizations, and approximately 300 deaths/year. Worldwide diarrhoea remains one of the leading causes of mortality among children younger than 5 years. It results from an inflammation of the gastrointestinal tract commonly caused by viral pathogens and less frequently by bacterial or parasitic organisms. Viruses cause both seasonal acute gastroenteritis and occasional outbreaks associated with the consumption of contaminated food or water [1, 2].

AGE consists of mild to severe diarrhoea that may be accompanied by loss of appetite, nausea, vomiting, cramps, and discomfort in the abdomen. Although the burden of diarrhoeal diseases among children under the age of five is heavy, improved prevention is achievable. The most important complication of gastroenteritis and the leading cause of death is dehydration; the mainstay treatment for gastroenteritis is oral rehydration. Antiemetics are another treatment option; mechanism of

vomiting is serotonin stimulation of 5HT-3 receptors in the stomach and small intestine as well as the vagus nerve. These receptors send afferent nerve impulses to the chemoreceptor trigger zone (CTZ) and the vomiting center (VC) in the brain stem which cause the diaphragm, abdominal muscles, and visceral smooth muscle to produce vomiting [3, 4].

AGE is diagnosed by checking the symptoms, if they are severe or last for more than 48 hours, also stool samples may be examined in a laboratory for white blood cells and bacteria, viruses, or parasites. If the symptoms persist beyond a few days, a doctor may need to examine the large intestine with a sigmoidoscope to determine whether the person has a disease such as ulcerative colitis.

Personal and food hygiene, including the use of clean water sources, are key measures to prevent transmission of these diseases. Breastfeeding, especially under 6 months of age, also effectively protects infants. Rotavirus vaccination has been widely available for children since 2006 and is now recommended worldwide. Although gastroenteritis usually is not serious in a healthy adult, causing only discomfort and inconvenience, it can cause life-threatening dehydration and electrolyte imbalance in the very ill or weak, the very young, and the very old [5].

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PREVENTION

Two rotavirus vaccines given by mouth are available and are safe and effective against most strains of rotavirus. Rotavirus vaccination is part of the recommended infant vaccination schedule.

For infants, a simple and effective way to help prevent gastroenteritis is breastfeeding also hygiene maintained in day to day life. Children infected with *E. coli* that causes bloody diarrhoea or *Shigella* should also have two negative stool cultures before they are allowed to return to the center. Infants and other people with a

weakened immune system should not be exposed to reptiles, birds, or amphibians, because these animals typically carry *Salmonella* bacteria, and infection is more severe in these groups of people.

Because use of most antibiotics can increase the risk of diarrhoea caused by *Clostridium difficile* infection, antibiotics are used only when necessary and never in situations in which they will have no effect.

There are seven basic principles guide optimal treatment of acute gastroenteritis.

Principles of Treating Children with Gastroenteritis and Dehydration	
+	Rehydration should be administered orally with an over-the-counter oral rehydration solution.
+	Children should receive rapid oral rehydration (within three to four hours of symptom onset).
+	In infants who are breastfed, breastfeeding should continue.
+	In infants who are formula-fed, diluting the formula is not recommended, and special formulas usually are not needed.
+	As soon as the dehydration is corrected, a regular diet should resume.
+	On-going diarrhoea losses should be replaced with additional doses of an oral rehydration solution.
+	Medications and unnecessary laboratory tests should be avoided [6].

Treatment should include two phases: rehydration and maintenance. In the rehydration phase, the fluid deficit is replaced quickly (i.e., during 3–4 hours) and clinical hydration is attained. In the maintenance phase, maintenance calories and fluids are administered. Rapid realimentation should follow rapid rehydration, with a goal of quickly returning the patient to an age-appropriate unrestricted diet, including solids. Breastfeeding should be continued at all times, even during the initial rehydration phases. The diet should be increased as soon as tolerated to compensate for lost caloric intake during the acute illness. During both phases, fluid losses from vomiting and diarrhoea are replaced in an on-going manner. Antidiarrheal medications are not recommended for infants and children, and laboratory studies should be limited to those needed to guide clinical management [7].

ORAL REHYDRATION SOLUTION

Among patients with cholera, demonstrated that although the secretory nature of diarrhoea in cholera results in substantial stool losses of water and electrolytes, intact Na-coupled solute co-transport mechanism allows efficient reabsorption of salt and water. In addition to *V. cholerae* 01 and 139, certain strains of *Escherichia coli*, shigella, salmonella, and other pathogenic bacteria produce toxins that bind to enterocyte receptors, causing chloride-mediated secretion stimulated by second messengers (e.g., cAMP, cGMP, and calcium). Even those infectious agents typically classified as causing osmotic diarrhoea (i.e., fluid and electrolyte loss caused by malabsorbed intestinal contents) can increase enterocyte secretion. Rotavirus damages the villous brush border, causing osmotic diarrhoea, and also produces an enterotoxin that causes a Ca⁺⁺-mediated secretory diarrhoea [8].

NONPHARMACOLOGICAL THERAPY

It include the dietary management depend on age diet history of patient. Breastfed infants should continue on demand. Formula-fed infants should continue their usual formula immediately upon rehydration in amounts sufficient to satisfy energy and nutrient requirements. Lactose-free or lactose-reduced formulas usually are unnecessary. Foods high in simple sugars should be avoided because the osmotic load might worsen diarrhoea; therefore, substantial amount of carbonated soft drinks, juice, gelatin desserts, and other highly sugared liquids should be avoided. BRAT diet is unnecessarily restrictive and, similar to juice centered diets, can provide suboptimal nutrition for the patient's nourishment and recovering gut. Recommended foods include age-appropriate unrestricted diets, including complex carbohydrates, meats, yogurt, fruits, and vegetables [9].

PHARMACOLOGIC THERAPY

Antimicrobial Agents & Non antimicrobial Drug Therapies

Viruses (e.g., rotavirus, astrovirus, enteric adenovirus, norovirus, and sapovirus) are the predominant cause of acute diarrhoea. The routine use of antimicrobial agents such as cefixime, ofloxacin, for treating diarrhoea lead to increased antimicrobial resistance. Even when a bacterial cause is suspected in an outpatient setting, antimicrobial therapy is not usually indicated among children because the majority of cases of acute diarrhoea are self-limited and not shortened by antimicrobial agents. Nonspecific antidiarrheal agents (e.g., adsorbents such as kaolin-pectin), antimotility agents (e.g., loperamide), antisecretory drugs, and toxin binders (e.g., cholestyramine), are commonly used among older children

and adults, but data are limited regarding their efficacy. Side effects of these drugs are well-known, in particular among the antimotility agents, including opiate-induced ileus, drowsiness, and nausea caused by the atropine effects and binding of nutrients and other drugs. Antiemetics are usually unnecessary in acute diarrhoea management. Using phenothiazines might interfere with oral rehydration by causing sleepiness. Ondansetron, a serotonin antagonist, either by the oral or IV route, can be effective in decreasing vomiting and hospital admission [10].

Supplemental Zinc Therapy & Functional Foods

Diarrhoea may lead to abnormal zinc status. Although severe zinc deficiency (e.g., acrodermatitis enteropathica) is associated with diarrhoea, milder deficiencies of zinc might play a role in childhood diarrhoea, and zinc supplementation might be of benefit either for improved outcomes in acute or chronic diarrhoea or as prophylaxis against diarrheal disease. It can be defined as foods that have an effect on physiologic processes separate from their established nutritional function. Probiotics have been defined as live microorganisms in fermented foods that promote optimal health by establishing an improved balance in intestinal micro flora. These products have included various species of lactobacilli or bifidobacteria or the non-pathogenic yeast

Saccharomyces boulardii. The mechanism of action might include competition with pathogenic bacteria for receptor sites or intraluminal nutrients, production of antibiotic substances, and enhancement of host immune defenses. One meta analysis concludes that *Lactobacillus* species are both safe and effective as treatment for children with infectious diarrhoea [11].

CONCLUSION

Acute gastroenteritis is most commonly seen in paediatrics. Treatment of acute diarrhoea is simple and effective therapy of oral rehydration. The combination of oral rehydration and early nutritional support promises to safely and effectively assist a patient through an episode of diarrhoea. Pharmacological and non-pharmacological methods are available for treatment. Diarrhoea treatment includes recognition for the role of zinc supplementation in reducing disease severity and occurrence, and development of an oral rehydration solution of lower osmolarity for global use.

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Nil

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

REFERENCES

1. Caleb K, Roger G, Joseph S, Christopher D. Managing Acute Gastroenteritis Among Children Oral Rehydration, Maintenance, and Nutritional, centre for disease and prevention; morbidity and mortality weekly report, 52(16), 2013, 1-16.
2. Kassiani M, Theologia S, Maria P, Petros K, Panos Z, Theano G, Apostolos V. Epidemiological investigation of parallel gastroenteritis outbreaks in school settings. *Bio Med central public health*, 13(241), 2012, 1471-2431.
3. Mohammed H, Nawal A, Antoine C, Agnes B, Laszlo N, Etienne R, Wissam H, Mohamed SM. Burden of acute gastroenteritis among children younger than 5 years of age –a survey among parents in the Anited Arab Emirates. *Bio Med Central paediatrics*, 12(74), 2012, 1471-2458.
4. Szajewska H and Dziechciarz P. Gastrointestinal infections in the paediatric population. *Curr Opin gastroenterol*, 26(1), 2010, 36-44.
5. Jacob M. Use of anti-emetics in children with acute gastroenteritis; are they safe and effective. *Journal of emergencies, trauma and shock*, 2(1), 2009, 3-5.
6. Catherine A and Zahra A. Gastroenteritis in Children: Part II. Prevention and Management. *American Family Physician*, 85(11), 2012, 1066-1070.
7. Elliott EJ. Acute gastroenteritis in children. *British Medical Journal*, 334(7583), 2004, 35-40.
8. Deise G, Beatriz C, Andrea G. Acute Gastroenteritis. *Pediatrics in Review*, 33(11), 2012, 496-508.
9. Bahl R, Baqui A, Bhan MK, Bhatnagar S, Black RE, Brooks A, *et al.* Effect of zinc supplementation on clinical course of acute diarrhoea. Report of a meeting. *J Health Popul Nutr*, 19, 2001, 338-46.
10. Ruiz PGM, Perez SI, Velazquez FR, Abate H, Breuer T, Clemens SC, *et al.* Safety and efficacy of an attenuated vaccine against severe rotavirus gastroenteritis. *N Engl J Med*, 354, 2006, 11-22.
11. Elliott EJ and Peadon E. Expert commentary on Alhashimi D, Alhashimi H, Fedorowicz Z. Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents. *Cochrane Database Syst Rev Evidence-Based Child Health*, 1(3), 2006, CD005506.