**Study on drug utilization pattern of acute gastroenteritis in children aged 1 to 12 years in tertiary care teaching hospital**

**ABSTRACT**

**Background:** One of the main causes of pediatric morbidity in developing nations is acute gastroenteritis (AGE). To lessen the severity and complications of the disease, appropriate medication therapy and supportive care are crucial. **Objective:** To assess the drug utilization patterns in children aged 1 to 12 years diagnosed with acute gastroenteritis at a tertiary care teaching hospital. **Methods:** This was a prospective observational study conducted from November 2023 to April 2024 in the Pediatric Department of Government Cuddalore Medical College and Hospital. A total of 100 pediatric inpatients aged 1–12 years without comorbid conditions were enrolled after obtaining ethical approval and informed consent. Data on demographics, clinical presentations, prescribed medications, and treatment outcomes were collected and analyzed. **Results:** Out of 100 children, 59% were male, and 45% belonged to the 1–3 years age group. ORS therapy was prescribed in 84% of cases, and zinc supplementation in 74%. Commonly used drugs included IV fluids (13.54%), antiemetics (12.15%), and anti-ulcerants (12.15%). Among IV fluids, dextrose normal saline (DNS) was most frequently used (63.39%). Cephalosporins (56.31%) and nitroimidazoles (28.15%) were the most prescribed antibiotics. Of the patients, 34% were treated with antibiotics alone, and 25% were treated with a combination of antibiotics. Clinical improvement was noted in 62% of patients, and 30% showed complete recovery. **Conclusion:** The study emphasizes the importance of ORS, zinc supplementation, and probiotics as first-line treatments in managing pediatric AGE. IV fluids and antibiotics serve as supportive therapies based on symptom severity. Adhering to standard treatment protocols can enhance outcomes and promote rational drug use in pediatric care.

**Keywords:** Acute gastroenteritis, Drug utilization, Pediatric, Antibiotics, Dehydration, Zinc supplementation.

**INTRODUCTION**

One of the leading causes of morbidity and mortality among children under five in low- and middle-income countries is acute gastroenteritis (AGE). Every year, it causes millions of fatalities, mostly in developing nations [1]. AGE is a diarrheal illness that develops quickly and is unrelated to chronic illnesses. Its defining traits include altered consistency or increased frequency of bowel movements. It is essential to develop and market affordable, user-friendly oral rehydration treatments [2].

Symptoms includeVomiting, Abdominal pain or cramps, Diarrhea, [Nausea](https://www.verywellhealth.com/nausea-after-eating-8362669), Fever and Chills, Weakness, Muscle pain, Weight loss, Decreased appetite [3]. Acute gastroenteritis in children is covered in this article, with an emphasis on common infections such as foodborne, antibiotic-associated, and traveler's gastroenteritis [4]. It recommends replacing fluids at home, and for mild to moderate dehydration, commercial ORS solutions are advised. Steer clear of popular home beverages because they have low Na+ and K content and high osmolality.

Acute gastroenteritis in children can be managed outpatiently, but admission must consider risk factors like prematurity, young maternal age, lack of healthcare access, and socio-economic stressors [5]. Clinical indications for hospital management include intractable emesis, poor ORS tolerance, severe dehydration, young age, irritability, uncertain diagnosis, underlying illness, ORS treatment failure, and concerns about adequate care at home by caretakers. Breastfeeding should be continued during both rehydration and maintenance phases [6].

Pharmacological therapy includes antimicrobial agents, probiotics, supplemental zinc therapy, and dietary modifications. The systematic process of drug utilization evaluation involves reviewing and improving medication use patterns, giving clinicians feedback, creating optimal use criteria, encouraging appropriate use through interventions and education, and determining appropriateness based on drug interactions, concomitant diseases, and treatment indications.

**MATERIALS AND METHODS**

This prospective observational study was conducted from November 2023 to April 2024 in the Paediatric department of the Government Cuddalore Medical College and Hospital in Chidambaram, India. Around 100 patients of aged 1 to 12 years without any co-morbidities from the inpatient department of pediatrics were included after receiving approval from the institutional ethical committee. The patient’s representative received appropriate counselling before the procedure, and their written parental informed permission was obtained. The socio-demographic information, clinical history, and other required tests were gathered together with their review reports. All of the patients had the necessary laboratory tests performed after being admitted. A vital factor to examine before giving treatment was the electrolytes level. If the patient had severe dehydration, the main treatment will be given following the IV fluids as supportive therapy. Patients received intravenous antibiotics for the respective symptoms like cold, cough, fever. The dose was administered based on the result of anthropometry. Subjects with any other co-morbidities were not allowed to participate in the study. It examines the real- world application of AGE therapy in healthcare settings, identifying areas for optimization and ensuring safe use of ORS therapy, Zinc supplementation and probiotics.

**RESULTS**

This prospective observational study was carried out in the Pediatric department. The study included 100 patients who met the inclusion and exclusion criteria. Out of the total 100 patients, male children (59%) were more prone to AGE than female children (41%). The majority of the patients belonged to the age group of 1-3 years (45%). From the above study, 43% of patients had a history of previous hospitalization. Among 100 patients, 91 patients were immunized up to their age. The commonly prescribed class of drugs were IV fluids (13.54%), Antiemetics (12.15%), anti-ulcerants (12.15%) followed by ORS therapy, antipyretics, probiotics, zinc and antibiotics.

**FIGURE 1: PRESCRIBED DRUG CLASS**

**PRESCRIPTION OF ORS THERAPY:**

Among 100 patients, 84% of patients received ORS therapy and the rest of the patients have not received ORS therapy.

**FIGURE 2: DISTRIBUTION OF ORS THERAPY PRESCRIBED**

**PRESCRIPTION OF ZINC THERAPY:**

Among 100 patients involved in the study, 74% of patients were encountered with zinc therapy and rest 26% were not prescribed with zinc therapy.

**TABLE 1: DISTRIBUTION OF ZINC THERAPY PRESCRIBED**

|  |  |  |
| --- | --- | --- |
| **ZINC THERAPY** | **NO. OF PATIENTS** | **PERCENTAGE** |
| PRESCRIBED | 74 | 74% |
| NOT PRESCRIBED | 26 | 26% |

**PRESCRIPTION OF ANTI-ULCERANTS:**

Among the anti-ulcerant drug, ranitidine (75.78%) followed by pantoprazole (16.84%), rarely lansoprazole (6.31%) and omeprazole (1.05%) were prescribed.

**TABLE 2: DISTRIBUTION OF ANTIULCERANTS PRESCRIBED**

|  |  |  |
| --- | --- | --- |
| **TYPES OF ANTIULCERANTS** | **NO. OF PATIENTS** | **PERCENTAGE** |
| PANTOPRAZOLE | 16 | 16.84% |
| RANITIDINE | 72 | 75.78% |
| LANSOPRAZOLE | 6 | 6.31% |
| OMEPRAZOLE | 1 | 1.05% |
| TOTAL | 95 | 100% |

**ANTIBIOTICS:**

Cephalosporins (56.31%) and nitroimidazoles (28.15%) were highly prescribed groups among the antibiotics followed by tetracyclines (4.85%), fluroquinolones (3.88%), macrolides (3.88%) whereas aminoglycosides (2.91%) were prescribed to lesser extent.

**TABLE 3: DISTRIBUTION OF ANTIBIOTICS**

|  |  |  |  |
| --- | --- | --- | --- |
| **CATEGORY** | **DRUG NAME** | **NO. OF PATIENTS** | **PERCENTAGE** |
| CEPHALOSPORINS | Ceftriaxone  | 58 | 56.31% |
| Cefotaxime  |
| Cefixime  |
| NITROIMIDAZOLES | Metronidazole  | 29 | 28.15% |
| FLUOROQUINOLONES | Ciprofloxacin  | 4 | 3.88% |
| Norfloxacin  |
| Olfloxacin  |
| MACROLIDES | Azithromycin  | 4 | 3.88% |
| AMINOGLYCOSIDES | Gentamicin  | 3 | 2.91% |
| Amikacin  |
| TETRACYCLINES | Doxycycline | 5 | 4.85% |
| TOTAL |  | 103 | 100% |

**NUMBER OF ANTIBIOTICS PRESCRIBED:**

This graph shows, 34% of patients received monotherapy of antibiotics and 25% of patients received combination therapy of antibiotics.

**TABLE 4: DISTRIBUTION OF THE NUMBER OF ANTIBIOTICS PRESCRIBED**

|  |  |  |
| --- | --- | --- |
| **NO. OF ANTIBIOTICS** | **NO. OF ENCOUNTERS** | **PERCENTAGE** |
| 0 | 36 | 36% |
| 1 | 34 | 34% |
| 2 | 25 | 25% |
| 3 | 2 | 2% |
| 4 | 2 | 2% |
| 5 | 1 | 1% |

**PRESCRIPTION OF IV FLUIDS:**

Among the IV fluids, commonly prescribed IV fluids were DNS (63.29%) followed by RL (25.89%) and NS (10.7%).

**TABLE 5: IV FLUIDS DISTRIBUTION**

|  |  |  |
| --- | --- | --- |
| **TYPE OF IV FLUIDS** | **NO. OF PATIENTS** | **PERCENTAGE** |
| NORMAL SALINE | 12 | 10.7% |
| DEXTROSE NORMAL SALINE | 71 | 63.39% |
| RINGER LACTATE | 29 | 25.89% |
| TOTAL | 112 | 100% |

**PATIENT OUTCOME:**

Based on the study, about 62% of patient’s conditions were relieved and 30% of patient’s conditions were cured.

**FIGURE 3: DISTRIBUTION BASED ON PATIENT OUTCOME**

**DISCUSSION**

Acute gastroenteritis, characterized by sudden onset of diarrhea with or without vomiting is one of the most common infectious diseases of childhood. In this study, male children (59%) were more prone to AGE than female children (41%). 45% of the patients were between the age group of 1-3. From the above study, 43% of patients had a history of previous hospitalization. Among 100 patients, 91 patients were immunized up to their age. Oral rehydration solution, zinc supplementation, and probiotics play a major role in the treatment of AGE. Among the patients, zinc therapy was administered to 74% of the patients. The commonly prescribed class of drugs were IV fluids, antiemetics, anti-ulcerants following ORS therapy, probiotics, zinc and antibiotics. Among the anti-ulcerant drug, ranitidine (75.78%) followed by pantoprazole (16.84%), rarely lansoprazole (6.31%) and omeprazole (1.05%).

 IV fluids and antibiotic therapy were predominantly given to patients as supportive treatment whereas commonly prescribed IV fluids were DNS (63.29%) followed by RL (25.89%) and NS (10.7%). Among the IV fluids prescribed, DNS was commonly prescribed compared to NS and RL. While 34% of patients received monotherapy of antibiotics and 25% of patients received combination therapy of antibiotics. The majority of patients received prescriptions for two or more antibiotics, with a maximum of five medicines being utilized. Cephalosporin (Cefotaxime) and Nitroimidazole (Metronidazole) were the most commonly prescribed drug class of antibiotics. In this study, 62% of the patient's conditions were improved and relieved and 30% of the patients were completely cured.

**CONCLUSION**

Guidelines stress bowel rest, dietary adjustments, and hydration or rehydration. To provide the electrolytes and glucose, the WHO recommends rehydrating using water that contains sodium bicarbonate, glucose, and salt. Treating acute gastroenteritis primarily involves oral rehydration. When there is clear evidence that probiotics are effective in lowering the severity and duration of symptoms, they may be used as an active treatment for diarrhea. Oral zinc supplementation is a simple and effective therapeutic strategy for treating acute diarrhea. Zinc supplementation for gastroenteritis in children is a safe and effective measure to shorten the illness and reduce complications. Zinc supplementation is therefore an effective treatment for acute gastroenteritis, according to this study. IV rehydration is done with a lactated Ringer's solution or normal saline is an effective treatment of acute gastroenteritis. Antibiotics are considered in certain situations which may also reduce the severity and duration, even the prevention of some complications like the spread of infection. In conclusion, oral rehydration solution, zinc supplementation, and probiotics play a major role in the treatment of children with acute gastroenteritis. Antibiotics and IV fluid play a supporting role in the management of acute gastroenteritis in children.

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