## Comparison of Drug Therapy in the Management of Acute Gastroenteritis

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## Introduction

**Background:** American Academy of Paediatrics defines acute gastroenteritis as "diarrheal disease of rapid onset, with or without accompanying symptoms or signs such as nausea, vomiting, fever or abdominal pain caused mainly due to viruses, bacteria, parasite, toxins, food-borne and certain drugs.

**Methods:** This is an observation study conducted in private hospital, primary-health care centres, nursing home located in Telangana state, India. The data has been collected after the issue of prescription by the registered physician.

**Results:** The information has been collected from small group of population, out of which females were 64.7%. In the present study, majority of the cases were reported in the age group between 18-59 years. Treatment regimen prescribed includes IV re and oral hydration, $5-HT_3$ antagonist, Probiotics, PPIs, Fluoroquinolones, Antiamoebics, NSAIDS, Cephalosporins, Aminoglycosides, Anti-diarrhoeals, Gastric Mucosal Protectants, Prokinetics, Anti-cholinergics.

**Conclusion:** Generally, antimicrobial therapy is not recommended in mild-moderate condition as it is basically self-limiting disease. Oral or intravenous rehydration is primarily recommended. Sticking to the medication adherence play the important role in the management of the AGE otherwise leads to relapse of the disease.

**Abbreviations:** AGE: Acute Gastroenteritis, IV: Intravenous, NSAIDS: Non-steroidal anti-inflammatory drugs, PPIs: Proton pump inhibitors, ORS: Oral rehydration solution.

**Keywords:** Acute gastroenteritis, pharmacotherapy, antimicrobials.

## Introduction

The American Academy of Paediatrics (AAP) defines acute gastroenteritis as "diarrheal disease of rapid onset, with or without accompanying symptoms or signs such as nausea, vomiting, fever or abdominal pain[1]. In contrast to

chronic condition, there is increased stool frequency or altered stool consistency [2]. Gastroenteritis can also be defined as the inflammation of the mucus membranes of the gastrointestinal tract and is characterized by diarrhea or vomiting [3].

According to the centres for disease control, gastroenteritis is hallmark which account for about nearly 2 lakh deaths per year worldwide [4].

Etiologies include bacteria, viruses, parasites, toxins, and drugs. In majority of cases, viruses accounts for the major cause affecting patients of all ages [5]. High rate of hospitalisation and increased financial burden have been associated with acute gastroenteritis. The major risk for the transmission of Acute Gastroenteritis is contaminated and unprocessed water intake in majority of the cities [6].

In particular, vomiting is the most common clinical manifestation in norovirus AGE than compare to non-viral gastroenteritis infections. Similar studies on norovirus or rotavirus AGE suggests a similar frequency of vomiting which led to propose a score that vomiting is not the common clinical feature in case of bacterial AGE [7]. The assessment of dehydration can be carried out by careful observation of skin turgor and sunken eyes, general appearance and mucous membranes appearance[8].

Oral rehydration solution is universally recognized as firstline treatment. Zinc was recommended as an adjunct to oral rehydration therapy by 10 of 15 Clinical Practice Guidelines [8].

In 2014, the European Society for Paediatric Gastroenterology, Hepatology and Nutrition published its guidelines for the management of acute gastroenteritis in children and concluded that 'the use of the probiotics may be considered in the management of children with acute gastroenteritis in addition to rehydration therapy [9]. In another study, $5HT_3$ receptor antagonist had shown the effectiveness to reduce the episodes of vomiting[10]. In

another randomised controlled trial, fluoroquinolones had shown the reduction in the duration of diarrhoea and other symptoms of acute gastroenteritis[11]. Studies have been carried out and they concluded that empiric therapy may be started with oral co-trimoxazole or metronidazole, but in severe cases parenteral treatment with ceftriaxone or ciprofloxacin might be considered[12].

## Materials and Methods

This study was conducted at an in-patient department of gastroenterology of a tertiary care teaching hospital, located in Telangana, India.

## Aim and Objective

This study was conducted to evaluate the comparative effectiveness of pharmacotherapy of acute gastroenteritis in various age groups.

## Inclusion Criteria

Patients whose chief complaints were vomiting, diarrhoea and among them who were diagnosed with AGE. There is no limit regarding the age of the patient. Patients with co-morbidities like hypertension, Diabetes Mellitus, hypothyroidism were also included.

## Exclusion Criteria

Patients with other gastro-intestinal disorders like peptic ulcer disease, gastro oesophageal reflux disorder, haemorrhoids, irritable bowel syndrome and colitis were excluded from the study.

## Results

The data has been collected from a small number of patients, out of which 64.7% were female and 35.29% were male (fig.01). Among the patients, 5.8% have co-morbidity of hypertension and Diabetes mellitus and 11.7% have hypothyroidism.

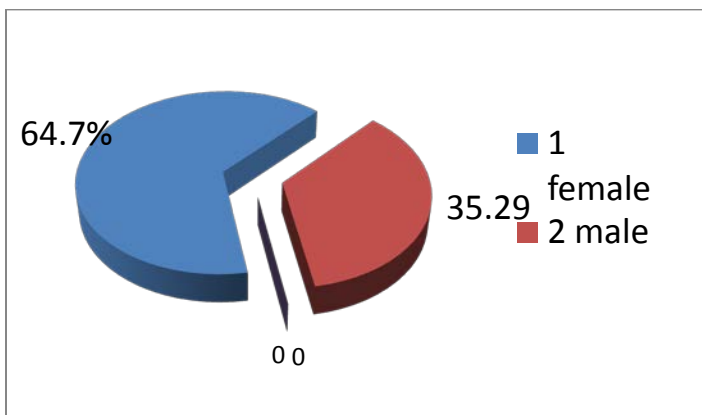Figure 1: Gender wise distribution

Table 1: Age group wise distribution

| Age group (years) | Percentage (%) |
|---|---|
| Paediatrics (< 18 years) | 17.6 % |
| Adults (18-59 years) | 64.70% |
| Geriatrics (>60 years) | 17.6% |

Table 1 show that majority of the patients with acute gastroenteritis were reported in adults (64.70%) and almost similar numbers of patients with acute GE were observed in paediatrics and geriatrics (17.6%).

Table 2: Drugs class based distribution

| Class of drug | Percentage |
|---|---|
| IV rehydration therapy | 88.23% |
| 5-HT$_3$ antagonist | 82.35% |
| Probiotics | 76.47% |
| Proton pump inhibitors | 76.47% |
| Antiamoebics | 64.70% |
| Fluoroquinilones | 58.82% |
| NSAIDS | 58.82% |
| Cephalosporins | 35.29% |
| Anti-diarrheals | 23.52% |
| Gastric Mucosal Protectants | 23.52% |
| Anti-cholinergics | 23.52% |
| Oral rehydration | 11.76% |
| Aminoglycosides | 5.88% |
| Prokinetics | 5.88% |

Table 2 denotes drugs class based distribution; it was observed that IV rehydration therapy was prescribed to majority of the patients (88.23%) followed by 5-HT$_3$ antagonist (82.35%), Probiotics, PPIs (76.47%), Antiamoebic (64.7%), Fluoroquinilones, NSAIDS (58.82%), cephalosporins ( 35.29%), anti-diarrhoeals, Gastric Mucosal Protectants (23.52%). Aminoglycosides and prokinetics (5.88) were least prescribed.

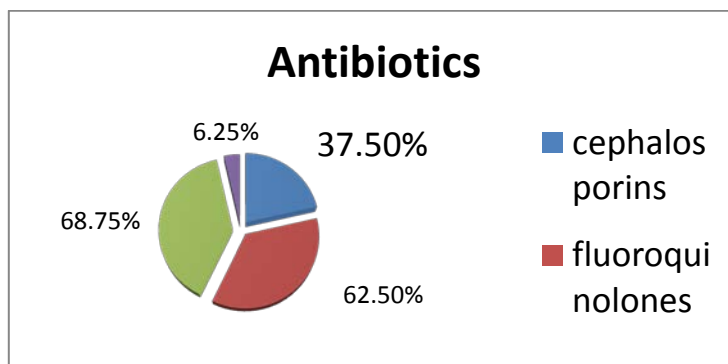Figure 2: Distribution based on Antibiotic classification



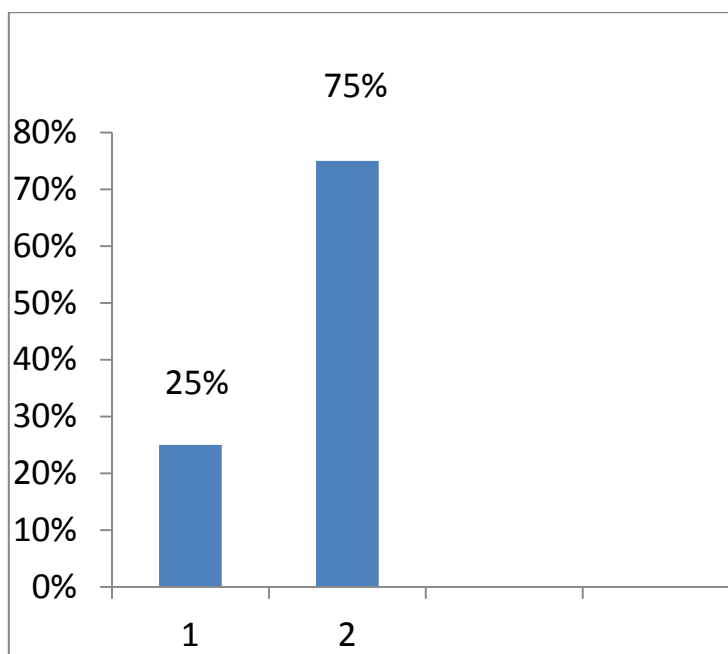Figure 3: Number of antibiotics prescribed per patient



Figure 3 denotes the number of antibiotics used per patient, Single antibiotic was prescribed to 25% patients which includes cephalosporins (18.75%) or fluoroquinolones (6.25%) and the combination of two antibiotics were prescribed to 75% of patients, out of

which a combination of fluoroquinolones + antiamoebic (56.25%) were majorly prescribed followed by cephalosporins + antiamoebic (12.5%) and cephalosporins +aminoglycosides (6.25%).

## Discussion

In the present study, the prevalence of acute gastroenteritis is higher in female (64.7%) compared to male (35.29%). Similarly a retrospective survey was conducted by S.E. Majowicz et al, during the year 2001-2002 in Canadian-based population and concluded the higher prevalence in female population[13]. In another study conducted by N. Bhaveshaikh analysed the in-patient data records of 208 patients of which 53.84% were female[14].

 In this study, it was observed that majority of cases were reported in adults i.e between age group 18-59 years while the incidence rate was found to be similar in paediatrics and geriatrics. In contrast a randomised controlled trial was conducted by M.Siurala et al, in rural community suggests that there may be some inherent age factors which predispose to the high prevalence rate of gastritis in elder people[15]. A nationwide representative cross-sectional telephone survey of 21,262 adults over a 12-month period during 2008–2009 in Germany was conducted and estimated that 95% episodes of acute Gastrointestinal illness occur per person per year in adults[16].

The study which was discussed by Z.schwetz et al, in two epidemiological setting which states that the initial treatment for acute gastroenteritis must include rehydration, which can be achieved with oral electrolyte solutions or intravenous fluids. Antibiotic therapy is not required in most patients, because the illness is usually self-limiting. Nevertheless, empirical and specific antimicrobial therapy can be considered in certain situations[17].

Another study conducted by E.Bruzzese et al, suggest that Empiric therapy may be started with oral co-trimoxazole or metronidazole, but in severe cases parenteral treatment with ceftriaxone or ciprofloxacin might be considered[12].As per the study conducted by A.Guarino suggested the effective interventions like use of probiotics such as Lactobacillus or Saccharomyces boulardii and anti-diarrheals such as diosmectite or racecadotril[18]. Another article reviewed by M.Piescik reconfirmed that either smectite or racecadotril is an effective adjunct therapy to oral rehydration[10]. Another clinical trial conducted by B.Carter concluded that use of anti-emetics like ondansetron reduces the incidence of vomiting[19].

The treatment regimen in this present study shows that intravenous rehydration (NS, RL) therapy is majorly prescribed to 88.23% of patients followed by anti-emetics like ondansetron (82.35%) and they stated a clear evidence that ondansetron compared with placebo increased the proportion of 95% of patients with cessation of vomiting and reduced the risk of hospitalization[19]. This is quite similar to our study as in our study 76.47% patients were treated with probiotics. In contrast to the randomized controlled trial conducted by S.J. Allen et al, concluded that 59% patients received probiotic results in reduction in duration of diarrhoea within 25 hours[20].

In our study, fluoroquinolones predominantly ciprofloxacin was prescribed to 58.82% patients. In contrast to the clinical trial conducted by M.S. Dryden concluded that 85.5% patients had cleared the pathogen at the end of treatment with ciproftoxacin[11].

In the present study, among the antibiotics, antiamoebic drug like metronidazole (64.7%) was majorly prescribed followed by fluoroquinolones (58.83%), cephalosporins (35.29%) whereas aminoglycosides (5.88%) were least prescribed. In contrast to the study conducted by N.bhaveshaikh et al, concluded that cephalosporins (62.5%) were most commonly used antibiotics followed

by fluoroquinolones (49%), antiamoebic (35.58%) whereas aminoglycosides (5.29%) were least prescribed[14]. In our study, sucralfate (23.52%) was also prescribed. A study conducted by E.S.Kristensen et al, concluded that there is no significant difference between sucralfate and placebo[21].

**Conclusion**

Our study reports a higher prevalence of acute gastroenteritis in female population; predominantly in adults i.e age group 18-59 years. Most of the patients diagnosed as acute gastroenteritis complained about the common symptoms like diarrhoea, vomiting for more than 2 days. Patients' hydration status appears to be very important in the assessment of acute gastroenteritis.

Generally, antimicrobial therapy is not recommended in mild-moderate condition as it is basically self-limiting disease. Oral or intravenous rehydration is primarily recommended. ORS sachets can be recommended to paediatrics whose hydration status appears to be normal. Ondansetron has been recommended to reduce the episodes of vomiting. Beside this, other antimicrobials, prokinetics, anti-diarrhoeals, gastric mucosal protectants, probiotics, NSAIDS were also prescribed based on the severity of the disease.

Practice of proper hygiene, lifestyle modifications, healthy diet etc. can reduce the incidence of acute gastroenteritis. Moreover, unnecessary antimicrobial therapy should be avoided in order to prevent antibiotic resistance. Proper counselling should be given to the patient or patient's representative about the disease, medications, complications etc. Sticking to the medication adherence plays an important role in the management of the disease which could otherwise lead to a relapse of the said disease.

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