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Original Research Article

Clinical and Bacteriological Study of Acute Gastroenteritis in Children

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Abstract

Background: Acute gastroenteritis is one of the most common causes of morbidity and hospitalization among children, particularly in developing countries. It is frequently associated with poor sanitation, unsafe drinking water, malnutrition, and inadequate feeding practices. Both bacterial and viral pathogens contribute to the burden of diarrhoeal diseases in early childhood, leading to dehydration, nutritional deficiencies, and increased healthcare utilization.

Objectives: To study the clinical profile, bacteriological pattern, and associated risk factors among children presenting with acute gastroenteritis.

Methods: This hospital-based observational study included 250 children aged 6–24 months admitted with acute gastroenteritis. Demographic details, clinical manifestations, feeding practices, maternal education, and sanitary conditions were recorded. Stool samples were collected and processed using standard microbiological techniques to identify bacterial pathogens. Statistical analysis was performed to assess associations between demographic, environmental, and clinical factors with disease severity.

Results: Most children belonged to the 6–12 months age group (71.2%), with a slight male predominance (54%). Fever (90.4%) and vomiting (54.4%) were the most frequent symptoms. The majority had less than 5 diarrhoeal episodes per day (64.4%), while some dehydration was observed in 64.8% of cases. Stool culture revealed Escherichia coli (22.4%), Salmonella (14%), Klebsiella (8.4%), and Shigella (8%), while 47.2% showed no bacterial growth. Poor sanitary conditions, lower maternal education, and inappropriate feeding practices showed significant association with increased diarrhoeal frequency ($p < 0.05$).

Conclusion: Acute gastroenteritis remains a significant pediatric health problem. Improving sanitation, promoting exclusive breastfeeding, enhancing maternal awareness, and ensuring early medical intervention are essential for reducing morbidity and complications.

Keywords: Acute gastroenteritis, Children, Diarrhoea, Bacterial pathogens, Dehydration, Sanitation.

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Introduction

Acute gastroenteritis (AGE) is one of the most common causes of morbidity and mortality among children worldwide, particularly in developing countries. It is characterized by the sudden onset of diarrhea with or without vomiting, fever, and abdominal pain, resulting from infection and inflammation of the gastrointestinal tract.

The disease primarily affects infants and young children due to their immature immune system, poor hygiene practices, and increased exposure to contaminated food and water. According to global health estimates, diarrheal diseases remain a leading cause of illness among children under five years of age and contribute significantly to pediatric hospital admissions and healthcare burden in low- and middle-income countries [1]. Acute gastroenteritis can be caused by a wide variety of pathogens, including viruses, bacteria, and parasites. Among these, viral agents such as rotavirus, norovirus, adenovirus, and astrovirus are recognized as the most common etiological agents in young children, especially in community settings. However, bacterial pathogens continue to play a major role in severe and hospitalized cases. Common bacterial causes include Escherichia coli, Salmonella spp., Shigella spp., Campylobacter jejuni, and Vibrio cholerae. These organisms invade or colonize the intestinal mucosa and produce toxins that disrupt fluid absorption and secretion, resulting in diarrhea and dehydration [2].

The burden of bacterial gastroenteritis varies widely depending on geographic location,

sanitation, nutritional status, and seasonal factors. In developing countries, inadequate sanitation, unsafe drinking water, overcrowding, and poor food hygiene significantly increase the risk of bacterial transmission. Children are particularly vulnerable due to their developing immunity and frequent exposure to contaminated environments. Furthermore, malnutrition and micronutrient deficiencies often exacerbate the severity and duration of diarrheal illnesses in this population [3].

Clinical manifestations of acute gastroenteritis in children range from mild self-limiting diarrhea to severe dehydration and systemic complications. The most common symptoms include frequent loose or watery stools, vomiting, abdominal cramps, fever, and irritability. Severe cases may present with dehydration, electrolyte imbalance, metabolic acidosis, and shock, which can be life-threatening if not promptly managed. The degree of dehydration remains the most important clinical indicator of disease severity and guides the management strategy [4].

Early identification of the causative organism is important for effective management and prevention of complications. While most cases of viral gastroenteritis require only supportive therapy, bacterial infections may necessitate targeted antimicrobial therapy, particularly in cases associated with dysentery, prolonged diarrhea, or systemic illness. Laboratory investigations such as stool microscopy, culture, and sensitivity testing are essential for identifying bacterial pathogens and determining antimicrobial susceptibility patterns. These investigations also help in monitoring emerging antibiotic resistance among enteric bacteria, which has become a growing public health concern [5].

Bacteriological analysis of stool samples provides valuable information about the distribution of pathogens responsible for gastroenteritis in a specific population. Such studies help in understanding the epidemiology, seasonal variation, and antibiotic sensitivity patterns of enteric organisms. This information is crucial for developing effective treatment guidelines and implementing preventive strategies such as improved sanitation, safe drinking water, and vaccination programs. In recent years, the introduction of rotavirus vaccines has significantly reduced the burden of viral gastroenteritis; however, bacterial infections continue to contribute substantially to pediatric diarrheal disease in many regions [6].

Another important aspect of gastroenteritis in children is the emergence of multidrug-resistant bacterial strains. Inappropriate and excessive use of antibiotics has led to increasing resistance among common enteric pathogens such as E. coli, Shigella, and Salmonella. This poses challenges in the clinical management of severe infections and highlights the need for regular surveillance of bacterial isolates and their antimicrobial susceptibility profiles [7]. Despite advances in medical care and public health measures, acute gastroenteritis remains a major pediatric health problem in developing countries. Factors such as poor sanitation, contaminated water supply, inadequate breastfeeding practices, and low socioeconomic status contribute to the high incidence of the disease. Understanding the clinical presentation and bacteriological profile of acute gastroenteritis is essential for early diagnosis, appropriate treatment, and prevention of complications [8].

Therefore, clinical and bacteriological studies of acute gastroenteritis in children are important for identifying the common pathogens responsible for the disease and evaluating their antimicrobial sensitivity patterns. Such research provides valuable data for clinicians and public health authorities to improve management protocols, reduce morbidity and mortality, and formulate effective preventive strategies for pediatric diarrheal diseases [9,10].

The aim of the present study was to know the clinical features of acute diarrhoea in children, to identify the common bacterial pathogens isolated in cases of diarrhoea, and to correlate the clinical profile with the isolated bacterial pathogens along with the associated morbidity and mortality.

Material and Methods

Source of data: Children from 6 month to 2 years of age with history of acute diarrhoeal episode (less than 14 days duration) admitted to the pediatric wards in KVG Medical College and Hospital Sullia.

A total of 250 cases were included in the study for the period from Nov.2013 to Dec. 2014.

Method of collection of data: By taking detailed history followed by thorough physical examination.

Sampling procedure: All the children above 6 month of age and below 2 years of age presenting with acute diarrhoea and fulfilling the inclusion and exclusion criteria were included in the study.

Inclusion Criteria:

1. Abrupt onset of four or more loose stools per day
2. Less than 14 days duration
3. Age between 6 months to 2 years.

Exclusion Criteria:

1. All cases who received antibiotics before collect of stool sample were excluded.

2. Children less than 6 month.
3. Children more than 2 years.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using SPSS software version 27.0 (SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The unpaired t-test was used to compare continuous variables between independent groups, and the paired t-test was applied for within-group comparisons. Categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate.

A p-value of <0.05 was considered statistically significant.

Result

Table 1: Demographic Characteristics of the Study Population

Variable	Category	Number of Cases	Percentage (%)	p-value
Age (months)	6–12	178	71.2	**0.041**
	13–18	38	15.2	
	19–24	34	13.6	
Sex	Male	135	54	**0.218**
	Female	115	46	
Residence	Rural	178	71.2	**0.032**
	Urban	72	28.8	
Socioeconomic status	Class I	3	1.2	**0.015**
	Class II	14	5.7	
	Class III	110	43.9	
	Class IV	112	44.8	
	Class V	11	4.4	

Table 2: Clinical Characteristics of Children with Acute Gastroenteritis

Parameters		Number of Cases	Percentage (%)	p-value
Clinical Feature	Fever	226	90.4	**<0.001**
	Vomiting	136	54.4	
Frequency of diarrhoea	<5 stools/day	161	64.4	**0.001**
	5–10 stools/day	60	24	
	>10 stools/day	29	11.6	
Degree of dehydration	No dehydration	53	21.2	**<0.001**
	Some dehydration	162	64.8	
	Severe dehydration	35	14	

Table 3: Bacteriological Profile of Acute Gastroenteritis

Pathogen Identified	Number of Cases	Percentage (%)	p-value
E. coli	56	22.4	**0.002**
Salmonella	35	14	
Shigella	20	8	
Klebsiella	21	8.4	
No growth	118	47.2	

Table 4: Duration of Hospital Stay among Children with Acute Gastroenteritis

Duration of Hospital Stay	Number of Cases	Percentage (%)	p-value
<1 day	25	10	**0.004**
1–3 days	24	9.6	
4–5 days	103	41.2	
6–7 days	55	22	
>7 days	43	17.2	

Table 5: Maternal Education, Feeding Practice and Diarrhoeal Frequency

Variable	Category	Number of Cases	p-value
Mother education	Primary school	32	**0.017**
	Higher primary	35	
	High school	122	
	PUC	31	
	Above PUC	26	
Frequency of diarrhoea vs education	<10 episodes	221	**<0.001**
	>10 episodes	29	
Feeding practice	Exclusive breastfeeding	26	**<0.001**
	Mixed/others	224	

Table 6: Environmental and Nutritional Factors Associated with Diarrhoea

Variable	Category	Number of Cases	Percentage (%)	p-value
Sanitary practice	Good	134	53.6	**0.001**
	Bad	116	46.4	
Nutritional status (IAP classification)	Normal	156	62.4	**0.012**
	Grade I	59	23.6	
	Grade II	17	6.8	
	Grade III	10	4	
	Grade IV	8	3.2	
Frequency of stools vs dehydration	<5/day	161	64.4	**<0.001**
	5–10/day	60	24	
	>10/day	29	11.6	

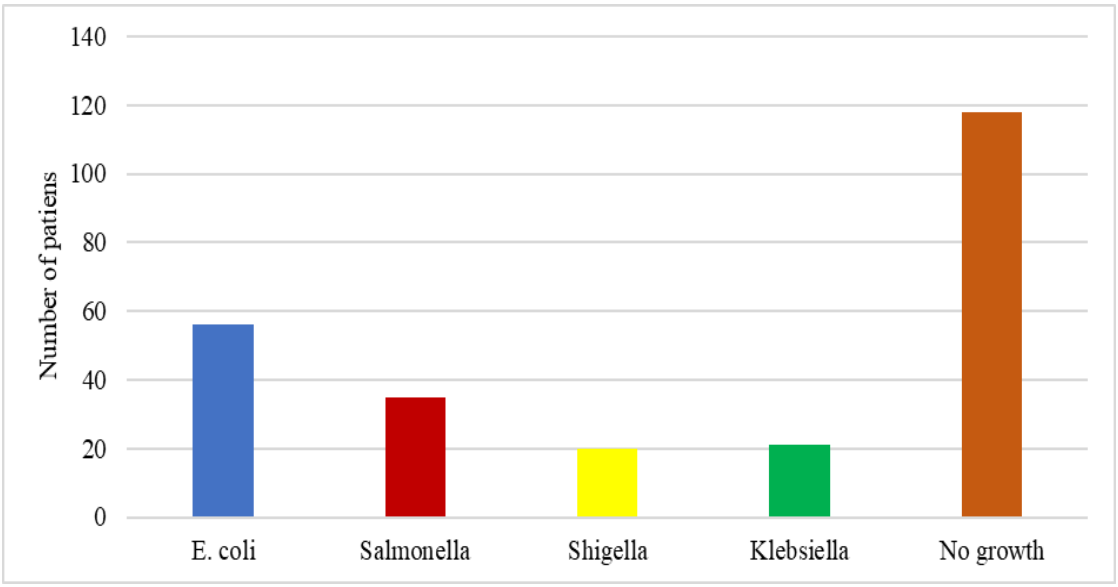

Figure 1: Bacteriological Profile of Acute Gastroenteritis

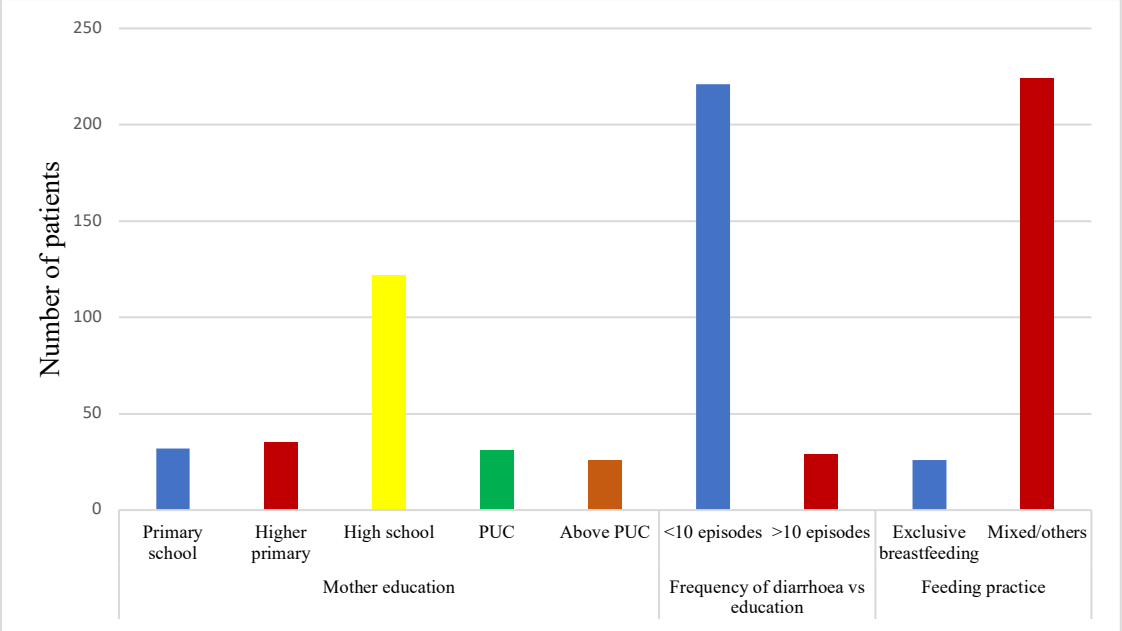

Figure 2: Maternal Education, Feeding Practice and Diarrhoeal Frequency

Table 1: Demographic Characteristics of the Study Population: A total of 250 children with acute gastroenteritis were included in the study. The majority of children belonged to the 6–12 months age group (178 cases, 71.2%), followed by 13–18 months (38 cases, 15.2%) and 19–24 months (34 cases, 13.6%), showing a statistically significant age distribution ($p = 0.041$). Males constituted 135 cases (54%), while females accounted for 115 cases (46%), with no statistically significant difference ($p = 0.218$). Most children were from rural areas (178 cases, 71.2%), whereas 72 cases (28.8%) were from urban areas, which showed statistical significance ($p = 0.032$). Regarding socioeconomic status, the majority belonged to Class IV (112 cases, 44.8%) and Class III (110 cases, 43.9%), while only 3 cases (1.2%) belonged to Class I, showing a significant association ($p = 0.015$).

Table 2: Clinical Characteristics of Children with Acute Gastroenteritis: Among the clinical features observed, fever was present in 226 children (90.4%), and vomiting was seen in 136 children (54.4%). Regarding the frequency of diarrhoea, the majority of children had <5 stools per day (161 cases, 64.4%), followed by 5–10 stools/day (60 cases, 24%) and >10 stools/day (29 cases, 11.6%), which showed a statistically significant distribution ($p = 0.001$). In terms of the degree of dehydration, some dehydration was the most common finding seen in 162 cases (64.8%), followed by no dehydration in 53 cases (21.2%) and severe dehydration in 35 cases (14%). The association between diarrhoeal severity and dehydration was statistically highly significant ($p < 0.001$).

Table 3: Bacteriological Profile of Acute Gastroenteritis: Stool culture analysis revealed that no bacterial growth was detected in 118 cases (47.2%), suggesting a possible viral etiology in many children. Among bacterial pathogens, Escherichia coli was the most common organism isolated in 56 cases (22.4%), followed by Salmonella in 35 cases (14%), Klebsiella in 21 cases (8.4%), and Shigella in 20 cases (8%). The distribution of bacterial pathogens among children with acute gastroenteritis was statistically significant ($p = 0.002$).

Table 4: Duration of Hospital Stay: The majority of children required hospital stay of 4–5 days (103 cases, 41.2%), followed by 6–7 days in 55 cases (22%) and >7 days in 43 cases (17.2%). Shorter hospital stays were observed in 25 cases (10%) with <1 day stay and 24 cases (9.6%) with 1–3 days stay. The duration of hospitalization showed a statistically significant distribution among the study population ($p = 0.004$).

Table 5: Maternal Education, Feeding Practice and Frequency of Diarrhoea: Most mothers had high school education (122 cases, 48.8%), followed by higher primary education (35 cases, 14%), primary schooling (32 cases, 12.8%), PUC (31 cases, 12.4%), and above PUC education (26 cases, 10.4%), which showed a significant association with diarrhoeal frequency ($p = 0.017$). Children of mothers with lower educational status experienced higher frequency of diarrhoeal episodes, particularly >10 episodes/day, which was statistically highly significant ($p < 0.001$). Regarding feeding practices, exclusive breastfeeding was observed in only 26 children, whereas mixed or other feeding practices were seen

in 224 children, showing a highly significant association with the occurrence of bacterial pathogens ($p < 0.001$).

Table 6: Environmental and Nutritional Factors Associated with Diarrhoea: Assessment of environmental factors revealed that 116 children (46.4%) belonged to households with poor sanitary practices, whereas 134 children (53.6%) had good sanitary conditions, with a significant association between poor sanitation and increased diarrhoeal frequency ($p = 0.001$).

Nutritional assessment based on IAP classification showed that 156 children (62.4%) were normally nourished, while 94 children (37.6%) had some degree of malnutrition, including Grade I (59 cases, 23.6%), Grade II (17 cases, 6.8%), Grade III (10 cases, 4%), and Grade IV (8 cases, 3.2%), which was statistically significant ($p = 0.012$). Furthermore, the frequency of stools showed a strong association with the severity of dehydration, where children with >10 stools/day predominantly had severe dehydration, demonstrating a highly significant relationship ($p < 0.001$).

Discussion

The present study evaluated the demographic profile, clinical characteristics, bacteriological pattern, and associated risk factors among children with acute gastroenteritis. In the present study, the majority of children affected were in the 6–12 months age group (71.2%), indicating that infants are particularly vulnerable to diarrhoeal diseases. Similar findings were reported by Kim et al. [11], who observed that children below 24 months had significantly higher severity and incidence of gastroenteritis, suggesting that immature immunity and exposure to contaminated food or water contribute to increased susceptibility in this age group. Furthermore, the present study showed a slight male predominance (54%), which is consistent with the findings of Uddin et al. [12], who reported that 47–53% of gastroenteritis cases occurred in male children, possibly due to behavioral and environmental exposure differences.

Regarding the etiological pattern, the present study demonstrated that Escherichia coli (22.4%) was the most commonly isolated bacterial pathogen, followed by Salmonella (14%), Klebsiella (8.4%), and Shigella (8%), while 47.2% of stool samples showed no bacterial growth, suggesting a possible viral etiology. These findings are comparable with the observations of Al-Mashahedah et al. [13], who reported that E. coli accounted for approximately 44% of bacterial diarrhoeal cases, making it the most prevalent bacterial pathogen among children with diarrhoea. Similarly, Chung et al. [14] reported that Salmonella species were among the most frequent bacterial pathogens in hospitalized children with acute gastroenteritis, emphasizing the importance of bacterial surveillance in pediatric diarrhoeal diseases. Other studies have also highlighted that viral agents such as rotavirus and norovirus are responsible for a significant proportion of cases where bacterial pathogens are not detected [15].

In the present study, fever (90.4%) and vomiting (54.4%) were the most common clinical manifestations among children with acute gastroenteritis. Similar clinical presentations were reported by Cornejo-Tapia et al. [16], who observed that fever, vomiting, and frequent diarrhoeal episodes were common presenting symptoms in pediatric gastroenteritis cases. The frequency of stools was also significantly associated with the degree of dehydration ($p < 0.001$) in the present study, where children with >10 stools per day were more likely to develop severe dehydration. This observation is supported by Luo et al. [17], who reported that increased stool frequency was strongly associated with greater disease severity and prolonged hospitalization in children with acute diarrhoea.

Environmental and nutritional factors also played an important role in the occurrence of diarrhoeal diseases. The present study found that poor sanitary practices and malnutrition were significantly associated with increased diarrhoeal frequency ($p = 0.001$). These findings are consistent with previous studies indicating that poor hygiene, unsafe drinking water, and inadequate sanitation contribute significantly to the burden of childhood diarrhoea in developing countries [18].

Similarly, maternal education and feeding practices were found to influence the frequency of diarrhoeal episodes, with children of less educated mothers experiencing higher rates of severe diarrhoea. Comparable results were reported by Farfán-García et al. [19], who emphasized that maternal awareness and proper hygiene practices play a crucial role in preventing gastrointestinal infections in children.

The present study also showed that the majority of children required 4–5 days of hospital stay (41.2%), indicating moderate disease severity. Similar hospitalization patterns were observed in other epidemiological studies of pediatric gastroenteritis, where most children required 3–5 days of hospitalization depending on dehydration severity and pathogen type [20]. Overall, the findings of the present study are consistent with previously published literature and highlight the continued burden of acute gastroenteritis among infants and young children, particularly in settings with poor sanitation and limited health awareness.

Conclusion

The present study highlights the significant burden of acute gastroenteritis among children, particularly in the 6–12 months age group, which constituted the majority of cases. Male children were slightly more affected than females, and most patients belonged to rural areas and lower socioeconomic groups, indicating the influence of environmental and social determinants on disease occurrence. Clinically, fever, vomiting, and increased frequency of diarrhoea were the most common presenting features, with some dehydration being the predominant clinical finding. Microbiological analysis revealed that Escherichia coli was the most commonly isolated bacterial pathogen, while a large proportion of cases showed no bacterial growth, suggesting a possible viral etiology.

The study also demonstrated that poor sanitary practices, lower maternal education, inappropriate feeding practices, and malnutrition were significantly associated with increased diarrhoeal severity. These findings emphasize the importance of improving hygiene, promoting exclusive breastfeeding, enhancing maternal awareness, and strengthening early clinical management to reduce morbidity and hospitalization due to childhood gastroenteritis.

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