International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

Clinical, Paraclinical Features and Pathogens Causing Acute Diarrhea in Children Under 5 at Tay Nguyen Regional General Hospital

Linh Bui Thi Mai[1], Duc Cao Tien[1], Van Nguyen Thi Hong[1]
[1]Pediatrics Department, Buon Ma Thuot Medical University, Dak Lak, Vietnam-630000
Email address: btmlinh@bmtuvietnam.com

Abstract**:** *Diarrhea is one of the leading causes of death in children, with treatment depending on the causative agents. The study aimed to: (1) determine the prevalence of microbial agents causing acute diarrhea, and (2) assess the epidemiological, clinical, paraclinical features, and treatments based on pathogen groups. A cross-sectional descriptive study was conducted on children aged 1 to 59 months diagnosed with acute diarrhea at Tay Nguyen Regional General Hospital from May to December 2023. Results: 30.3% had bacterial infections, 27.9% viral infections, and 13.9% co-infections of both bacteria and viruses. The leading pathogens were Norovirus (33.6%), DEC (20.0%), Campylobacter spp. (19.4%), and Adenovirus (15.1%). Bacterial infections presented with fever (68%), vomiting (48%), mucoid stools (56%), bloody stools, and 74% received antibiotics. Viral infections typically included vomiting (87.3%), fever (56.5%), and upper respiratory infections (21.8%), with 60.9% receiving antibiotics. Conclusion: The primary pathogens were Norovirus and DEC. Viral diarrhea was marked by frequent vomiting, watery stools, and often concurrent upper respiratory symptoms, while bacterial diarrhea was more commonly associated with high fever and mucoid or bloody stools*.

Keywords: *Acute diarrhea, bacteria, virus, Norovirus.*

I. INTRODUCTION

Diarrhea is a common health issue and one of the leading causes of death in children under the age of 5. According to the World Health Organization statistics from 2024, approximately 1.7 billion cases of diarrhea occur annually, resulting in about 444,000 deaths in children under 5 [1]. In developed countries, viral agents are the leading cause of acute diarrhea, whereas bacteria and parasites are more prevalent in developing nations [2]. Recent years have seen a shift in the prevalence of acute diarrhea agents due to the widespread use of the Rotavirus vaccine, significantly altering the incidence rates of various pathogens [3]. In developing countries, limitations in financial resources, testing capacities, and the overuse of antibiotics for children with acute diarrhea are common, making clinical presentations crucial in diagnosing the pathogens [4]. Therefore, it is necessary to update the epidemiology of causative agents and provide additional evidence regarding the clinical and paraclinical characteristics of acute diarrhea in children based on the pathogen groups.

II. OBJECTIVES

(1) Determine the prevalence of microbial agents causing acute diarrhea;

(2) Assess the epidemiological, clinical, paraclinical features, and treatments base on pathogen groups.

III. RESEARCH METHODOLOGY

A. Study design

A cross-sectional descriptive study.

B. Sample

Base on the non-probability convenience sampling criteria, 165 cases was obtained during the study period. Inclusion criteria: Age between 1 and 59, passage of 3 or more loose or watery stools within 24 hours, admission within 3 days after disease onset, informed consent obtain from legal guardians. Exclusion criteria: Presence of severe comorbid condition or chronic underlying diseases, prolonged diarrhea lasting more than 14 days, failure to obtain a stool sample within 24 hours admission.

Eligible patients who met the inclusion criteria were enrolled after obtaining parental consent. Stool samples were collected using a rectal catheter. Clinical data were obtained from medical histories and follow-up during treatment. Stool samples were tested for viral pathogens using multiplex real-time RT-PCR.

C. Data processing

Data were entered using Epidata 3.1 and analyzed with Stata 17.0. Results are presented in table form with information on frequency, percentage, mean, OR and 95% CI.

D. Approval

The study was approved by the scientific council of Buon Ma Thuot Medical University and was accepted by the research subjects. The research subjects clearly explained before collecting information. In addition, we do not use this information for any other purpose.

IV. RESULT AND DISCUSSION

A. Proportions of microbial agents causing acute diarrhea

Using multiplex real-time RT-PCR, pathogens were detected in 72.1% of cases: bacteria (30.3%), viruses (27.9%), and bacteria–virus coinfection (13.9%).

Recent studies by Q. K. Tran at Vinh Long General Hospital and N. M. T. Bui at Children's Hospital 1 reported viruses as the leading cause of acute diarrhea [5], [6]. Studies from Tanzania and India also showed high proportions of viral

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diarrhea, ranging from 50% to 70% [7], [8]. However, in our study, bacterial diarrhea predominated at 30.3%. Differences in diagnostic methods and study locations may explain the variations in pathogen detection rates among studies.

TABLE I: Distribution of microbial agents in acute diarrhea

Contents	Frequency (n)	Rate (%)
Bacteria	50	30.3
- Single bacterial infection	39	23.6
- Mixed bacterial infection	11	6.7
Virus	46	27.9
- Single viral infection	41	24.8
- Mixed viral infection	5	3.0
Bacteria – virus infection	23	13.9
Negative	46	27.9

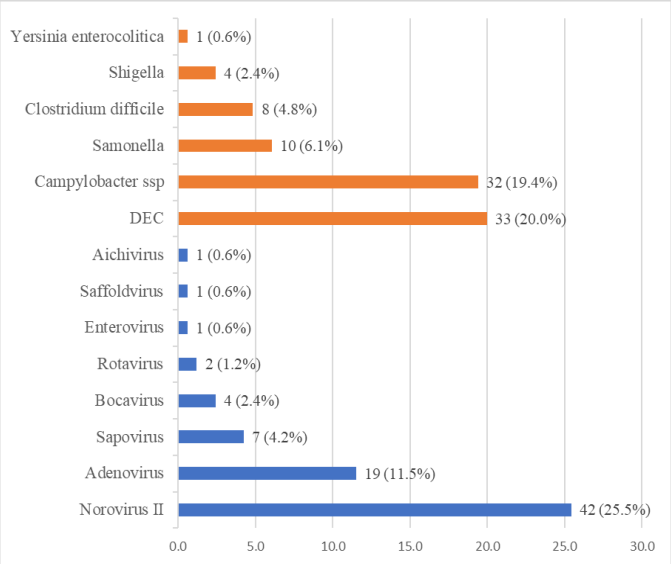

Fig. 1. Proportion of detected pathogens

Fig. 1 shows that, *Norovirus* was the leading agent (33.6%) among viruses, followed by *Adenovirus* (15.1%) and *Sapovirus* (5.9%). Other viruses had low prevalence (<5%). Since the introduction of Rotavirus vaccines in 2006, the prevalence of *rotavirus*-associated diarrhea has declined significantly [3], which may explain the low rate observed in our study.

Among bacteria, *DEC* was most common (20.0%), followed by *Campylobacter*, *Salmonella*, *C. difficile*, and *Shigella*. These findings are consistent with previous studies [4], [6], [7]. Variations in bacterial prevalence may reflect differences in living conditions, diet, and hygiene practices, but *E. coli* and *Campylobacter* remain major pathogens in pediatric diarrhea.

B. Epidemiological, clinical, paraclinical features, and treatments by pathogen groups

The table shows that bacterial diarrhea occurred mainly in children aged 6–<12 months (42.0%), with a male-to-female ratio of 1.3, predominantly among the Kinh (58%) and Ede (30%) ethnic groups; 16% had received rotavirus vaccination. Viral diarrhea was more common in children aged 12–<24 months (41.3%), with a male-to-female ratio of 1.3, mainly among the Kinh (56.5%) and Ede (30.4%) ethnic groups; 19.6% were vaccinated against rotavirus. The differences between the two groups were not statistically significant.

TABLE II: Epidemiological, medical history by pathogen groups

Contents	Bacteria		Virus		p
	n = 50	Rate (%)	n=46	Rate (%)	
Age (month)					
<6	7	14,0	1	2,2	>0,05
6 – 11	21	42,0	17	37,0	
12 – 23	5	10,0	19	41,3	
≥ 24	17	34,0	9	20,0	
Gender					
Male	28	56,0	26	56,5	>0,05
Female	22	44,0	20	43,5	
Ethnicity					
Kinh	29	58,0	26	56,5	>0,05
E-de	15	30,0	14	30,4	
Others	6	12,0	6	13,1	
Rotavirus vaccination					
Yes	8	16,0	9	19,6	>0,05
No	42	84,0	37	80,4	

TABLE III: Clinical, paraclinical features by pathogen groups

Contents	Bacteria		Virus		p
	n=50	Rate (%)	n=46	Rate (%)	
Onset symptoms					
Vomiting	4	8,0	25	53,3	**<0,01**
Fever	32	64,0	7	15,2	**<0,01**
Diarrhea	13	26,0	10	21,7	>0,05
Respiratory symptoms	1	2,0	4	8,7	>0,05
Stool characteristics					
Mucoid stools	28	56,0	11	23,9	**<0,05**
Bloody stools	11	22,0	1	2,2	**<0,05**
Vomiting status					
Present	24	48,0	36	78,3	**<0,05**
> 5 times/day	5	20,8	17	47,2	**<0,05**
Fever status					
Present	34	68,0	26	56,5	>0,05
High fever	15	44,1	7	26,9	>0,05
Upper respiratory infection	3	6,0	10	21,8	**<0,05**
Dehydration					
No dehydration	49	98,0	44	95,6	>0,05
Some dehydration	1	2,0	2	4,4	
Blood test					
Leukocytosis	10	20,0	9	19,6	>0,05
Anemia	20	40,0	17	37,0	>0,05
Thrombocytosis	15	30,0	12	26,1	>0,05

In this study, viral diarrhea commonly began with vomiting (53.3%) and was often accompanied by upper respiratory tract infection (21.8%). Similar findings have been reported in Ho Chi Minh City, although with varying frequencies [4], [6]. In contrast, bacterial diarrhea typically presented with high fever (68.0%) and mucoid (56.0%) or bloody stools (22.0%), with little or no vomiting. These differences were statistically significant and consistent with the results of N. M. T. Bui and Thompson [4], [6]. The distinct clinical patterns between bacterial and viral diarrhea may help guide the initial etiological diagnosis in children hospitalized with acute diarrhea.

Most children (80.4%) had leukocyte counts within the normal range, and the prevalence of leukocytosis did not differ between bacterial and viral groups, consistent with previous

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studies [6]. Therefore, leukocytosis is nonspecific for infection, and its absence does not exclude bacterial diarrhea.

TABLE IV: Hospitalization and treatment

Contents	Bacteria		Virus		p
	n = 50	Rate (%)	n=46	Rate (%)	
Hospital stay					
1 – 4 days	14	28,0	18	39,1	>0,05
5 – 7 days	26	42,0	21	45,7	>0,05
>7 days	10	20,0	7	15,2	>0,05
Treatment					
Antibiotics	37	74,0	28	60,9	>0,05
ORS	42	84,0	41	89,1	>0,05
IV fluids	22	44,0	25	54,4	>0,05
ZinC	36	72,0	35	73,8	>0,05
Rrobiotics	50	100,0	46	100,0	>0,05
Racecadotril	15	30,0	20	43,5	>0,05

The study found that intravenous fluid therapy was required in 54.4% of viral diarrhea cases, higher than in bacterial cases. This greater demand was likely due to frequent vomiting, which limited oral rehydration at admission. Overall, the rate of fluid administration in both groups was higher than that reported by N. M. T. Bui [6], with most cases requiring fluids because of profuse stool output and persistent vomiting.

Antibiotics are essential in treating bacterial diarrhea; however, due to limited financial resources and diagnostic capacity, treatment decisions often relied on clinical judgment. As a result, inappropriate prescriptions occurred, with antibiotics being administered in 60.9% of viral diarrhea cases-significantly higher than the 26.7% reported N. M. T. Bui at Children's Hospital 1 [6].

VI. Recommendations

Hospitalized cases of acute diarrhea due to *Norovirus* and *Adenovirus* were relatively high and showed an increasing trend. Further studies on these pathogens are recommended to strengthen preventive measures.

The high rate of antibiotic use in viral diarrhea (60.9%) highlights the need to improve access to local diagnostic tools for pathogen identification in order to reduce unnecessary antibiotic prescriptions.

References

[1] World Health Organization, "Diarrhoeal disease," 2024. Available: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease

[2] GBD Diarrhoeal Diseases Collaborators, "Estimates of global, regional, and national morbidity, mortality, and aetiologies of diarrhoeal diseases: a systematic analysis for the Global Burden of Disease Study 2015," *Lancet Infectious Diseases*, vol. 17, no. 9, pp. 909–948, 2017.

[3] E. Burnett, "Global impact of rotavirus vaccination on diarrhea hospitalizations and deaths among children under 5 years old: 2006–2019," *Journal of Infectious Diseases*, vol. 222, no. 10, pp. 1731–1739, 2020.

[4] C. N. Thompson, "A prospective multi-center observational study of children hospitalized with diarrhea in Ho Chi Minh City, Vietnam," *American Journal of Tropical Medicine and Hygiene*, vol. 92, no. 5, pp. 1045–1052, 2015.

[5] Q. K. Tran, "Fourteen microbial pathogens causing acute diarrhea in children at Vinh Long General Hospital," *Journal of Medical Research*, vol. 174, no. 1, pp. 117–125, 2024.

[6] N. M. T. Bui, "Epidemiological, clinical, paraclinical, treatment characteristics, and microbial pathogens causing acute diarrhea in children from 1 month to under 5 years admitted to the Gastroenterology Department, Children's Hospital 1," M.S. thesis, Univ. Medicine and Pharmacy, Ho Chi Minh City, Vietnam, 2023.

[7] E. A. Hugho, "Enteric pathogens detected in children under five years old admitted with diarrhea in Moshi, Kilimanjaro, Tanzania," *Pathogens*, vol. 12, no. 4, pp. 1–12, 2023.

[8] S. Goldar, "Occurrence of viral gastroenteritis in children below 5 years: A hospital-based study from Assam, India," *Indian Journal of Medical Microbiology*, vol. 37, no. 3, pp. 415–417, 2019.

[9] V. P. T. Pham, "Clinical and paraclinical characteristics of acute diarrhea in children aged 2 months to 5 years at Hue Central Hospital," *Journal of Medicine and Pharmacy – Hue University of Medicine and Pharmacy*, vol. 1, no. 21, pp. 24–29, 2021.

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