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Original Article

Assessment of Pharmacological Management of Acute Watery Diarrhea in Pediatric Patients: A Collaborative Study Between the Departments of Pharmacology and Pediatrics at a Tertiary Care Hospital

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Abstract

Background: Acute watery diarrhea(AWD) is aleading-cause of morbidity and mortality among children under five, especiallyinlow-and middle-income countries like Bangladesh. Effective management with oralrehydration solution (ORS) and zinc supplementation is critical to reduce complications and improve recovery. This study aimed to assess pharmacological management practices for pediatric AWD, including adherence to guideline-based therapy, use of ORS, zinc, adjunct therapies, and antibiotics.

Methods: Adescriptive, observational study was conducted at Community Based Medical College, Bangladesh, from January to December 2025. A total of 167 children aged 6 months to 12 years with AWD were enrolled. Data on demographics, clinical features, pharmacological management, and outcomes were collected using a structured questionnaire and review of medical records. Data were analyzed with SPSS version 25 using descriptive statistics and chi-square tests.

Results: Of the 167 patients, 95 (56.9%) were male and 72 (43.1%) female, with the majority aged 1–5 years (53.9%). Mild to moderate dehydration was observed in 74.8% of cases. ORS was administered to 160 patients (95.8%)and zinc to 145(86.8%). Antibioticswere prescribe-din 110 cases (65.9%), predominantly ciprofloxacin (45.5%) and azithromycin (31.8%). Adjunct therapies such as antiemetics and recontrol were used less frequently. Clinical outcomes were favorable: 150 patients (89.8%) recovered fully, 12 (7.2%) recovered with minor complications, and 5 (3%) were referred or did not recover.

Conclusion: Guideline-based management with ORS and zinc resulted in high recovery ratesamong pediatricAWDpatients. Challengesremain regarding unnecessary antibiotic use and underutilization of adjunct therapies. Reinforcing rational pharmacological practices is essential to optimize outcomes and reduce the burden of pediatric diarrhea in Bangladesh.

Keywords: Acute watery diarrhea, Pediatrics, Oral rehydration solution, Zinc supplementation, Antibiotic use, Bangladesh

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Introduction

Acute watery diarrhea (AWD) remains one of the leading causes of morbidity and mortality in children under five years of age globally, with the greatest burden in low- and middle-income countries such as Bangladesh.1,2 According to the World Health Organization (WHO), diarrheal diseases account for an estimated 1.7 billion cases annually, contributing significantly to pediatric hospitalizations and being the second leading cause of death among children under five.3,4 Despite the widespread promotion of oral rehydration therapy (ORT) and improvements in sanitation,AWD continues to exert a substantial public health impact, particularly in settings with limited access to healthcare, clean water, and nutritional support 5,6 The

cornerstone of AWD management is prompt correction of fluidandelectrolytelossesusingoralrehy drationsolutions (ORS).5,6 ORS hasdramatically reduced mortality from diarrhea over the past few decades by preventing dehydration and maintaining hydration status.5,6 In addition to fluid therapy, zinc supplementation has been recognized as anessential adjunctin pediatric diarrhea management. Zinc is critical for immune function, mucosal integrity, and cellular metabolism, and supplementation has been shown to reduce the duration, severity, and recurrence of diarrheal episodes.7,8 Randomized controlled trials in pediatric populations have demonstrated that zinc supplementation significantly accelerates recovery and decreases the likelihood of subsequent diarrheal episodes, particularly in children who are malnourished or at risk of micronutrient deficiencies.2,3,4 Adjunct pharmacological therapies, such as racecadotril, have also been studied to optimize management ofAWD. Racecadotril, an enkephalinase inhibitor, reduces intestinal hypersecretion and effectively decreases stool output without affecting intestinal motility.8,9 Clinical trials have demonstrated its efficacy in improving clinical outcomes in children when added to standard ORS and zinc therapy.8,9However, the routine use of antibiotics is not recommended in uncomplicated AWD, exceptin specific cases suchascholeraorinvasivebacterialinfections, asindiscriminateantibioticusecontributes toantimicrobialresistanceandincreaseshealthcarecostswithoutimproving clinical outcomes.10,11 In Bangladesh, studies have shown that antibiotics are frequently prescribed for children with AWD despite clear international guidelines recommending their use only in specific situations.5,6,12 Socioeconomic factors, including poverty, malnutrition, and limitedparentaleducation, further exacerbatetheburden of AWD in Bangladesh. Childrenfrom resource-poor households are more likely to experience prolonged illness, inadequate fluid intake, and delayed access to healthcare services.4,6 Additionally, hospital-based studies highlight inconsistencies in the prescription patterns of pharmacological therapies, with underutilization of zinc and overprescription of antibiotics being common problems.5,6,12 These observations underscore the need for locally-relevant research to assess current pharmacological management strate giesandensurethatchildrenreceiveevidence-basedcare. Given the ongoing morbidity associated with pediatric AWD and the potential for optimization of treatment protocols, a comprehensive evaluation of current practices is crucial. This collaborative study between the Departments of PharmacologyandPediatricsatCommunityBasedMedicalCollege, Bangladesh, aimstoassesspharmacological management approaches in pediatric AWD, focusing on the patterns of ORS, zinc supplementation, adjunct therapies, and antibiotic use. By analyzing prescribing patterns, treatment adherence, and clinical outcomes, the study seekstoidentifyareasforimprovementandcontributetotherationaluseofpharmacologicalinterventions in children.1–15 Through this investigation, the study will provide valuable insight into the integration of global guidelinesintolocalclinicalpractice,highlightpotentialgapsinthemanagementofAWD,andpromoteevidence-based strategies to enhance recovery, reduce unnecessary antibiotic use, and ultimately improve pediatric health outcomes in Bangladesh.1–15

Methods

This study was a descriptive, observational, hospital-based study conducted to assess the pharmacological management of acute watery diarrhea (AWD) in pediatric patients. It was a collaborative effort between the Departments of Pharmacology and Pediatrics at Community Based Medical College, Bangladesh. The study aimedtoevaluatecurrentprescribingpatterns,adherencetostandardtreatmentguidelines,andclinicaloutcomes in children presenting with AWD. The study wascarried outover a 12-month period, from January to December 2025, and included a total of 167 pediatric patients aged 6 months to 12 years who presented with acute watery diarrheaatthepediatricoutpatientdepartmentandpediatricwardofCommunityBasedMedicalCollegeHospital. Children eligible for the study were those aged 6 months to 12 years who had acute watery diarrhea, defined as the passage of threeormoreloose orwaterystoolsper daywith a durationoflessthan14days.Caregiverswere required to provide written informed consent for their children's participation. Children with bloody diarrhea, chronic diarrheal disorders, severe comorbid conditions requiring intensive care, or immunodeficiency were excluded. Patients whose caregivers refused consent or were lost to follow-up were also excluded. Data were collected using a structured pre-tested questionnaire, along with a review of medical records and prescriptions. Informationrecordedincludeddemographicdetailssuchasage,sex,residence,andsocioeconomicstatus,clinical data including duration and frequency of diarrhea, presence of dehydration, nutritional status, and associated symptoms,aswellasdetailsofpharmacologicalmanagementsuchastheuseoforalrehydrationsolution(ORS), zinc supplementation, adjunctive therapies like racecadotril, and antibiotics. Treatment outcomes, including duration of diarrhea, recovery status, and any adverse events, were also documented. Informed consent was obtainedfromallcaregivers,andpatientconfidentialitywasstrictlymaintained. Collecteddatawereenteredinto SPSSversion25foranalysis.Descriptivestatisticswereusedtosummarizedemographiccharacteristics,clinical features,andprescribingpatternsintermsoffrequenciesandpercentages. Comparative analyses were conducted where relevant, for instance, to evaluate outcomes among children receiv

ing ORS with or without zinc supplementation. The study also assessed adherence to WHO and national treatment guidelines for AWD management. Associations between-categorical variables were analyzedusing Chi-square-tests,withap-valueof less than 0.05 considered statistically significant.

The primary outcomes of the study included patterns of pharmacological management of AWD, adherence of prescribers to established guidelines, and clinical outcomes, such as duration of diarrhea, recovery rates, and adverse effects. This methodology was designed to provide a comprehensive evaluation of current pharmacological practices in pediatric AWD management, identify gaps in adherence to guidelines, and suggest strategies for optimizing therapy and improving clinical outcomes in Bangladesh.

Results

A total of 167 pediatricpatientswithacutewaterydiarrheawereincludedinthestudy. Ofthese, 95 (56.9%) were maleand 72(43.1%) were female, reflectingaslightmalepredominance. Regarding age distribution, the majority of patients were in the 1–5 years age group (53.9%), followed by childrenless than 1year-old(35.9%),whileonly 10.2% were older than 5 years. Assessment of dehydration status revealed that 30 patients (18%) had no dehydration, 70 patients (41.9%) had mild dehydration, 55 patients (32.9%) had moderate dehydration, and 12 patients (7.2%) had severe dehydration. Analysis of pharmacological management showed that ORS was administered to 160 patients (95.8%), indicating near-universal adherence to rehydration guidelines. Zinc supplementation was given to 145 patients (86.8%), reflecting strong implementation of WHO-recommended adjunct therapy.Antibiotics were prescribed to 110 patients (65.9%), while antiemetic therapy was used in 40 patients (23.9%), highlighting variability in supportive pharmacological practices. Among the antibiotics used, ciprofloxacin was the most commonly prescribed (45.5%), followed by azithromycin (31.8%), metronidazole (18.2%), and other antibioticsin a smallproportion of patients (4.5%). Clinical outcomeswere favorablefor the majorityofchildren.150patients(89.8%)recoveredfully,while12patients(7.2%)recoveredwithcomplications, and 5 patients (3%) were referred or did not recover during the study period. Overall, the results indicate high adherence to guideline-based rehydration and zinc therapy, with moderate antibiotic use and generally positive clinical outcomes among pediatric patients with acute watery diarrhea.

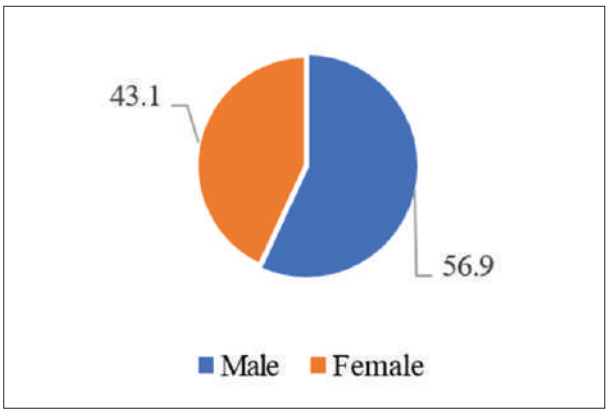

Figure1. Pie Chart Distribution of Gender

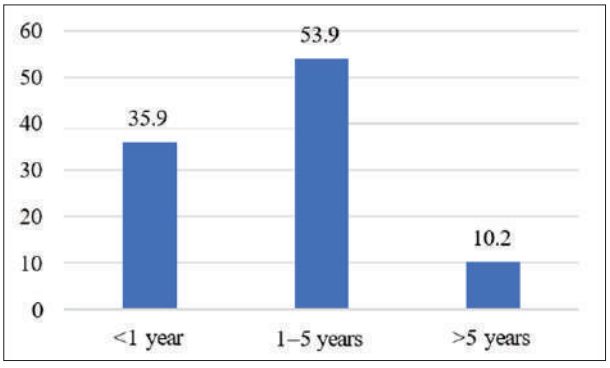

Figure 2. Clunn Chart Showed Distribution of Age

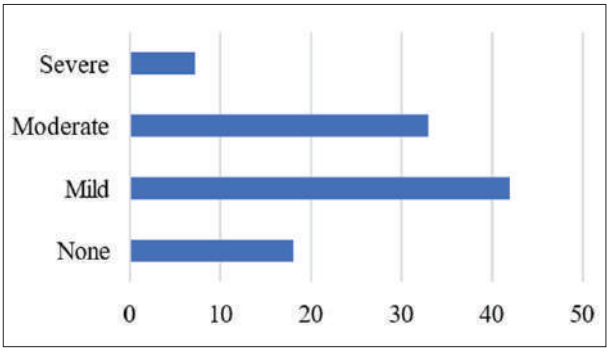

Figure 3. Ber Chart Showed Distribution of Dehydration Status

TableI: Pharmacological Management of AWD

Medication	Given	Not Given	Percentage Given
ORS	160	7	95.8
Antibiotic	110	57	65.9
Zinc	145	22	86.8
Antiemetic	40	127	23.9

TableII: Antibiotic Types Used

Antibiotic Type	Frequency	Percentage
Ciprofloxacin	50	45.5
Azithromycin	35	31.8
Metronidazole	20	18.2
Others	5	4.5

TableI II: Clinical Outcomes

Outcome	Frequency	Percentage
Recovered	150	89.8
Recovered with Complication	12	7.2
Referred/Not Recovered	5	3

Discussions

Acute watery diarrhea (AWD) remains a significant cause of morbidity among children under five years, particularly in low- and middle-income countries like Bangladesh. The current study involving 167 pediatric patients demonstrates high adherence to guideline-based management with oral rehydration solution (ORS) and zincsupplementation,reflectingimprovedimplementationofWHO-recommendations.ORSwasadministeredto 95.8% of patients, consistent with the global emphasis on rehydration as the cornerstone of therapy.10,11,13Zinc supplementation was given to 86.8% of patients, aligning with evidence that zinc accelerates recovery, reduces stool frequency, and prevents subsequent episodes of diarrhea in children.1–4,7,14 These findings corroborate systematic reviews and randomized trials showing that zinc supplementation significantly shortens diarrheal duration and enhances immune response in pediatric populations.1,2,3,4,15Despite the high utilization of ORS and zinc, antibiotics were prescribed to 65.9% of patients. This reflects a persistent trend of antibiotic overuse in pediatricdiarrheamanagementinBangladesh,similartopreviousstudiesreportingfrequentnon-guideline-based antibiotic prescriptions.5,6,9 While antibiotics are indicated in specific cases such as cholera, invasive bacterial diarrhea, or severe malnutrition, their routine use in uncomplicated AWD is discouraged due to the risk of antimicrobial resistance and unnecessary healthcare costs.9,10 The predominance of ciprofloxacin (45.5%) and azithromycin(31.8%)amongprescribedantibioticsfurtherunderscorestheneedforrationalprescriptionpractices and adherence to standard guidelines.6,9Adjunct therapies such as antiemetics and racecadotril were used less frequently, with antiemetics administered to 23.9% of patients and racecadotril being a rarely utilized adjunct. Racecadotril has been demonstrated to effectively reduce stool volume without altering intestinal motility, providinganevidence-basedoptionforsymptomaticmanagement.8Limiteduseofracecadotrilinthiscohortmay reflect accessibility issues, cost, or lack of awareness among prescribers. Optimizing the use of adjunct pharmacologicalagentsinappropriatecasesmayfurtherenhanceclinicaloutcomeswhileminimizingunnecessary medicationuse.Clinicaloutcomesinthisstudywerelargelypositive,-with89.8%ofpatientsrecoveringfullyand 7.2% recovering with minor complications. Only 3% were referred or did not recover during the study period. Theseoutcomeshighlighttheeffectivenessof guideline-based therapy combining ORSand zinc,consistentwith previous reports demonstrating high recovery rates when rehydration and micronutrient supplementation are appropriately applied.1,2,4,14The study also highlights important socio-demographic trends. Children aged 1–5 years constituted the majority of the study population (53.9%), and mild to moderate dehydration was common (74.8%),reflectingthetypicalclinicalpresentationofAWDinthisagegroup.12Malechildrenwereslightlymore affected than females, a trend consistent with other epidemiological studies in Bangladesh [5]. These findings emphasize the need for targeted education for caregivers regarding early recognition of dehydration and timely healthcare-seeking,particularlyinhigh-riskagegroups.Overall,theresultsunderscorethatadherenceto WHO and national guidelines—particularly the combined use of ORS and zinc—remains central to effective managementofpediatricAWD.7,10,11However,thestudyalsoidentifiespersistentchallenges,includingantibiotic overuse and suboptimal utilization of adjunct therapies. Addressing these gaps through prescriber education, policy reinforcement, and caregiver awareness campaigns is critical to improving clinical outcomes and minimizing unnecessary pharmacological interventions.5,6,9 This study confirms that evidence-based pharmacological management, emphasizing ORS and zinc supplementation, achieves high recovery rates in pediatric AWD, while highlighting the need for rational antibiotic use and judicious application of adjunct therapies. Strengthening adherence to guideline-directed care in Bangladesh will continue to reduce morbidity, prevent complications, and contribute to sustainable improvements in child health.1–15

Conclusion

The study demonstrates that the management of acute watery diarrhea in pediatric patients at Community Based Medical College, Bangladesh, is largely aligned with

recommended treatment protocols. The high use of oral rehydration solution and zincsupplementation contributed to favorable clinical outcomes,with the vast majority of children recovering fully and only a small proportion experiencing complications or requiring referral. These findingshighlightthatappropriaterehydrationtherapycombinedwithmicronutrientsupplementationremainsthe cornerstone of effective management of pediatric diarrhea. Despite these positive outcomes, certain challenges were observed. Antibiotics were prescribed in a considerable number of cases, often without clear clinical indications, suggesting a pattern of overuse that could contribute to unnecessary medication exposure and antimicrobial resistance.Additionally, adjunct therapies such as antiemetics and racecadotril were underutilized, indicatingpotentialopportunitiestoenhancesupportive-careforselectedpatients.Overall,thestudyconfirmsthat while guideline-directed management is being implemented effectively, there is still room for improvement in rational pharmacological use and optimizing therapeutic strategies.

Recommendation

Efforts should be made to ensure that antibiotics are used only when clinically indicated, while continuing to promotethenear-universaluseoforalrehydrationsolutionandzinc-supplementation.Healthcareprovidersshould receive regular training and updates to reinforce adherence to treatment guidelines.The use of adjunct therapies canbeconsideredinappropriatecasestoimprovepatientcomfortandreducethedurationofsymptoms.Educating caregivers about early recognition of dehydration, proper administration of ORS and zinc, and avoiding unnecessary antibiotics is essential for improving outcomes. Periodic audits of prescriptions and treatment practicescanhelpmonitoradherencetoprotocolsandreduceirrationalmedicationuse. Insummary,maintaining guideline-based care with a focus on rehydration and zinc supplementation, rationalizing antibiotic use, and optimizingsupportivetherapiescanenhancerecoveryandreducetheburdenofpediatricdiarrhea,ensuringsafer and more effective management for children.

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