

Profile of Drug Therapy Use with Acute Diarrhea in Children

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ABSTRACT

Diarrhea is a health problem in the world, including Indonesia. Acute diarrhea is often defined as gastroenteritis, which is diarrhea that appears quickly and can be accompanied by several symptoms such as nausea, vomiting, fever, and abdominal pain that lasts for less than 14 days. This study aims to determine the profile of acute diarrhea medication use in children at the Class IV DKT Kediri Hospital in 2023. Data collection was retrospective using a purposive sampling method. Data analysis was descriptive with and processed in depth using Microsoft Excel to obtain an overview of the number and percentage. The results of the study showed that the characteristics of patients based on gender, the most suffering from acute diarrhea were women as many as 44 people (55%), the largest age group was 0-<1 year 12 patients (36.37%), the most common type of diarrhea suffered was mild/moderate dehydration acute diarrhea as many as 28 patients (84.85%). The most commonly prescribed drug to treat acute diarrhea was zinc as many as 31 people (93.94%). The conclusion of this study is that the most commonly prescribed drug to treat acute diarrhea in children is zinc

INTRODUCTION

Diarrhea is defined as an increase in the frequency of bowel movements due to an infection. A child is considered to have diarrhea if their bowel movement volume is measured to be greater than 10 ml/kg per day. The stool consistency is loose, contains a lot of fluid (watery), and is frequent (generally more than three bowel movements in 24 hours) (Kemenkes RI, 2011).

Diarrheal disease is a global health problem, including in Indonesia. According to the WHO and UNICEF, approximately 2 billion cases of diarrhea occur worldwide each year, and approximately 1.9 million children under five die from diarrhea each year, the majority of which occur in developing countries. Of all deaths in children under five due to diarrhea, 78% occur in Africa and Southeast Asia. The 2013 Basic Health Research (Riskesdas) showed that the period prevalence of diarrhea was 3.5%, lower than the 2007 Riskesdas (9%). In the 2013 Riskesdas, samples were taken over a shorter period. The incidence of diarrhea for all age groups in Indonesia was 3.5%. A 2004 WHO-UNICEF joint statement recommended that oral rehydration salts (ORS), zinc tablets, breastfeeding and food, and selective antibiotics be the main components of diarrheal disease management (Kemenkes RI, 2017).

Acute diarrhea is often defined as gastroenteritis, a rapidly developing diarrhea that can be accompanied by symptoms such as nausea, vomiting, fever, and abdominal pain that lasts for less than 14 days. Clinically, the causes of acute diarrhea are divided into four groups: infection, malabsorption, food poisoning, and antibiotic-associated diarrhea. Infections can be caused by bacteria, viruses, fungi, and parasites (protozoa, worms). Of these various causes, the most common is diarrhea caused by viral infections. The most common causes in the field and clinically are diarrhea caused by infections and poisoning (Kemenkes RI, 2017).

The pathogenesis of acute diarrhea includes: a). The entry of living microorganisms into the small intestine after successfully passing through the gastric acid barrier, b). These microorganisms multiply in the small intestine, c). The microorganisms release toxins (diarrheagenic toxins), d). The toxins cause hypersecretion which then causes diarrhea (Kemenkes RI, 2017).

Based on the results of research conducted by Wulandari et al, (2022), it shows that the highest percentage of drug use is zinc 27.97%, liporolac 22.99%, cefixime 15.71%, RL infusion 14.56%, ceftriaxone 9.58%, interlac 8 people 3.07%, metronidazole 2.68%, oralit 1.15%, cefotaxime 1.15%, lacto-B 0.77%, asering infusion 0.38%. Other research shows that the drugs used are oralit sachets (1,440), 20 mg zinc tablets (2,300), and cotrimoxazole syrup Kunaedi et al, (2021). According to the results of research conducted by Siswidiyasari et al, (2014), the drugs used were antibiotics (89.13%), no antibiotics (10.87%), Ringer's lactate (93.48%), dextrose (13.04%), zinc (65.22%), antiemetics (58.69%), antipyretics (54.35%), antacids (2.17%), H2 blockers (23.91%), probiotics (21.74%), synbiotics (34.78%), CRO (10.87%), dexamethasone (4.35%), digestive enzymes (2.17%), nystatin (2.17%).

LITERATURE REVIEW

Based on the results of research conducted by Wulandari et al, (2022), it shows that the characteristics of patients based on gender are 44 women (55%), 36 men (45%); 24 people (30%) aged 0-<1 year, 16 people (20%) aged 2-<3 years, 15 people (18.75%) aged 1-<2 years, 13 people (16.25%) aged 4-5 years, 12 people (15%) aged 3-<4 years; type of acute watery diarrhea without dehydration 41 people (51.25%), mild/moderate dehydration acute watery diarrhea 36 people (45%), severe dehydration acute watery diarrhea 3 people (3.75%); Clinical symptoms of loose stools in 80 people (44.20%), fever in 38 people (20.99%), vomiting in 37 people (20.44%), mucus in stools in 19 people (10.50%), nausea in 4 people (2.21%), bloody stools in 3 people (1.66%), zinc medication in 73 people (27.97%), liporolac in 60 people (22.99%), cefixime in 41 people (15.71%), ringer lactate (RL) infusion in 38 people (14.56%), ceftriaxone in 25 people (9.58%), interlac in 8 people (3.07%), metronidazole in 7 people (2.68%), oralit in 3 people (1.15%), cefotaxime in 3 people (1.15%), lacto-B in 2 people (0.77%), asering infusion in 1 person (0.38%).

According to the results of research conducted by Kunaedi et al, (2021), it was seen that at the age of 0-12 months as many as 74 people (30.84%), 13-24 months 72 people (30%), 25-36 months 54 people (54%), 37-48 months 29 people (12.08%), 49-60 months 11 people (4.58%); male gender 138 people (57.5%), female 102 people (42.5%); number of sachets of oral rehydration salts (1,440), 20 mg zinc tablets (2,300), and cotrimoxazole syrup (11). Distribution of data on toddlers with diarrhea based on the dosage or rules of use of zinc tablets and cotrimoxazole syrup according to the dosage or rules of use. While the appropriate oral rehydration salts at the age of ≤ 4 months (43.75%), inappropriate (56.25%); 4 - <12 months appropriate (61.36%), not appropriate (38.64%); 12 months - 24 months appropriate (35.86%), not appropriate (64.14%); 24 months - 60 months appropriate (40.90%), not appropriate (59.10%).

The results of another study conducted by Siswidiasari et al, (2014), showed that the gender was male (69.57%), female (30.43%), with ages 0 - <1 year (60.87%), 1 - <5 years (34.78%), 5 - <14 years (4.35%), and the highest classification of diarrhea was mild acute diarrhea with dehydration (63.04%), acute diarrhea without dehydration (36.96%). The use of antibiotics (89.13%), no antibiotics (10.87%), ringer lactate (93.48%), dextrose (13.04%), zinc (65.22%), antiemetics (58.69%), antipyretics (54.35%), antacids (2.17%), H2 blockers (23.91%), probiotics (21.74%), synbiotics (34.78%), CRO (10.87%), dexamethasone (4.35%), digestive enzymes (2.17%), nystatin (2.17%). The condition of diarrhea patients when discharged from the hospital was cured (67.39%), starting to recover (32.61%) with a length of treatment of 3 days (69.57%), 4 days (23.91%), 5 days (6.52%).

Several studies have shown that zinc supplementation can reduce stool volume and frequency by an average of 30%. Zinc also reduces the duration and severity of persistent diarrhea. When administered routinely to children, both long-term and short-term, zinc has been shown to be effective in preventing both acute and persistent diarrhea and can provide benefits in reducing the prevalence of diarrhea caused by dysentery and shigellosis. The recommendation for zinc supplementation for diarrhea is for 10-14 days, as it has been shown to reduce

the severity and duration of diarrhea, as well as the risk of diarrhea returning 2-3 months after the onset of the disease (Ulfah M, 2012).

ORS is a mixture of electrolyte salts such as sodium chloride (NaCl), potassium chloride (KCl), trisodium citrate hydrate, and anhydrous glucose. The purpose of ORS is to prevent dehydration by replacing fluids and electrolytes lost during diarrhea. The mixture of salts and glucose in electrolytes is well absorbed by the intestines of diarrhea sufferers. Oral rehydration therapy is the therapy of choice for replacing lost fluids and electrolytes in children with acute watery diarrhea without dehydration and with mild/moderate dehydration. In cases of severe dehydration, intravenous fluids such as Ringer's lactate can be administered (Amaliah et al, 2021).

Ringer's lactate (RL) is a sterile physiological saline solution with acid and base content similar to blood plasma. Ringer's lactate contains NaCl, KCl, CaCl₂, and sodium lactate per liter. The purpose of Ringer's lactate is to rapidly restore osmolarity and electrolytes intravenously. Ringer's lactate is commonly given to patients with diarrhea who are experiencing severe dehydration or who have the potential to become severe and require rapid intravenous rehydration (Siswidiyasari et al, 2014).

Probiotics are microorganisms that live in the host's body in sufficient quantities that will provide good health benefits for the host. Probiotic bacteria will help the process of nutrient absorption and prevent disturbances in water absorption, which will affect the improvement of stool consistency. Probiotics will produce hydrogen ions that will lower intestinal pH by producing lactic acid, so that the resulting acidic environment will be able to inhibit the growth of pathogenic bacteria (Dewi et al, 2021). According to research conducted by Shinta, single probiotics such as *L. reuteri* or a combination of *L. acidophilus*-LGG are effective in reducing the frequency and duration of acute diarrhea, the administration of these probiotics can be used as a standard procedure in the treatment of acute diarrhea in children (Shinta et al, 2011).

The antibiotics used are cephalosporin antibiotics such as cefixime, ceftriaxone and cefotaxime and metronidazole. This is in line with research conducted by Rokhma et al., where in their research the antibiotics used for acute diarrhea are third-generation cephalosporin antibiotics and metronidazole. Cephalosporin antibiotics are antibiotics that are active against broad-spectrum gram-positive-negative bacteria (Rokhmah et al, 2022). The mechanism of action of cephalosporin antibiotics is by inhibiting bacterial cell wall synthesis. These cephalosporin antibiotics will damage the peptidoglycan that makes up the cell walls of gram-negative and gram-positive bacteria, so that the osmotic pressure inside the bacterial cell is greater than outside the cell. This causes damage to the bacterial cell wall and will lead to lysis (Meila, 2016). Metronidazole is a broad-spectrum antiprotozoa that is effective against protozoa and anaerobic pathogenic bacteria, metronidazole is also an option for diarrhea (Pujiastuti & Ardin, 2016). Metronidazole is the drug of choice for treating diarrhea caused by amoebas and giardiasis caused by protozoa (Farthing et al, 2013). The mechanism of action of the antibiotic metronidazole is by inhibiting bacterial DNA synthesis

and damaging DNA through oxidation, which causes DNA chain breaks and causes bacterial death (Meila, 2016).

METHODOLOGY

This study is an observational study with a retrospective study design on the treatment of diarrhea in patients with acute diarrhea. Data collection was conducted through a search of medical records of patients with acute diarrhea at the Class IV DKT Hospital in Kediri between July and December 2023. The sampling technique used in this study was a non-probability technique with a purposive sampling type. The population in this study was all medical records of patients with diarrhea in children with a sample of 33 people. Samples in this study that met the inclusion criteria were pediatric patients diagnosed with acute diarrhea, complete and easy-to-read medical records, an age range between 0-14 years, type of medication, and dosage. Data analysis was conducted descriptively and processed in depth using Microsoft Excel to obtain an overview of the number and percentage.

RESEARCH RESULTS

Gender Characteristics

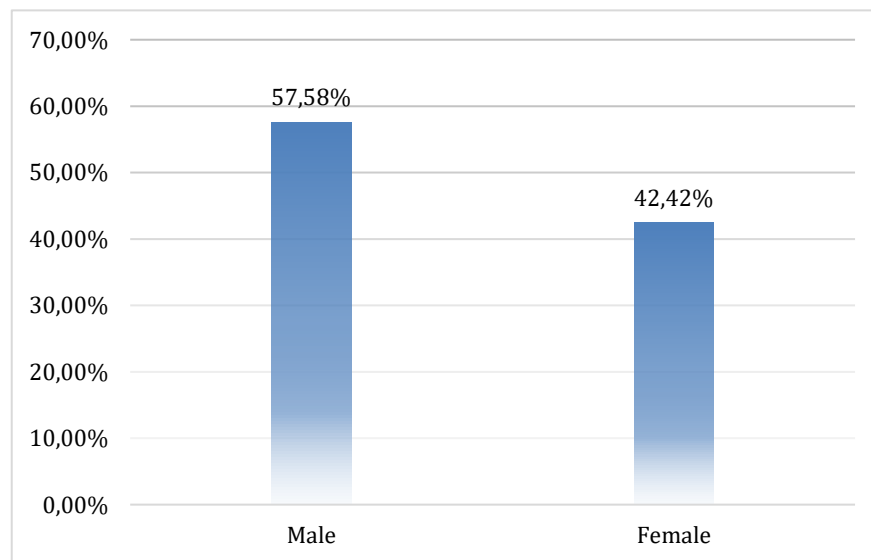


Figure 1. Gender Characteristics

Based on the research results, males were more likely to suffer from diarrhea, with 19 cases (57.58%), compared to 14 cases (42.42%). This may be due to boys' more active behavior, especially when playing outside. This activity and finger-biting behavior are triggers for diarrhea. This puts male patients at a higher risk of developing diarrhea than female patients.

Age Characteristics

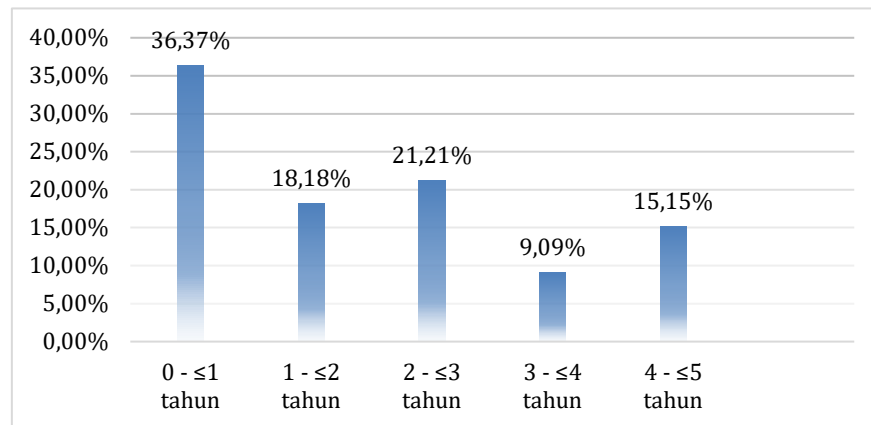


Figure 2. Age Characteristics

From the results of the study, it was found that the age group 0-<1 year was the age group with the highest percentage of cases, namely 12 patients (36.37%), 1-<2 years 6 patients (18.18%), 2-<3 years 7 patients (21.21%), 3-<4 years 3 patients (9.09%), and 4-5 years 5 patients (15.15%). At the age of 0-<1 year is the age group with the highest percentage of cases, this is wrong apart from being caused by children aged 0-<1 year having an immune system that is not yet perfect compared to children aged 4-5 years or in adults, it can also be caused by factors of the use of formula milk in babies and its sanitation. Whether it is because the formula milk is less suitable, the environment, the process of providing and clean water can also be a trigger for diarrhea.

Characteristics of Dehydration Degree

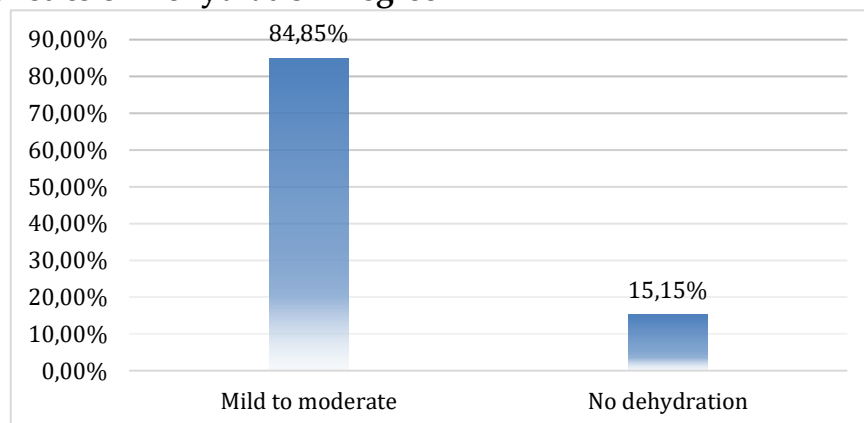


Figure 3. Characteristics of the degree of dehydration

The results of the study showed that the degree of dehydration in acute diarrhea patients was mild/moderate acute diarrhea with dehydration in 28 patients (84.85%) and acute diarrhea without dehydration in 5 patients (15.15%).

Diarrhea Medication Usage Profile

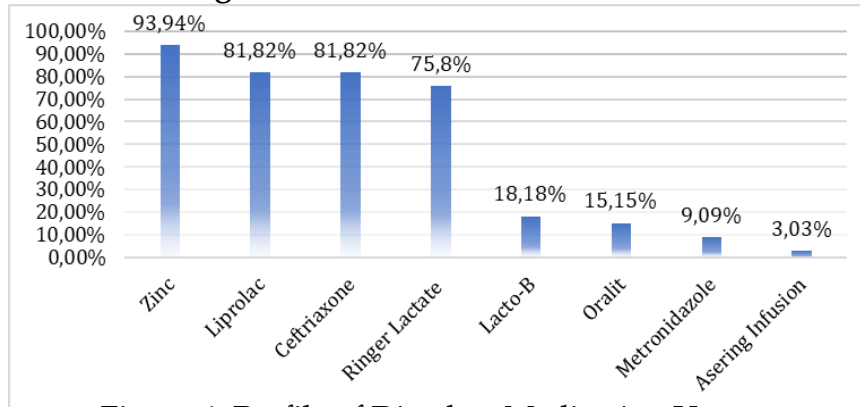


Figure 4. Profile of Diarrhea Medication Use

The profile of the use of diarrhea drugs that were often given to patients was zinc for 31 people (93.94%), liprolac for 27 people (81.82%), ceftriaxone for 27 people (81.82%), ringer lactate (RL) infusion for 25 people (75.76%), lacto-B for 6 people (18.18%), oralit for 5 people (15.15%), metronidazole for 3 people (9.09%), and asering infusion for 1 person (3.03%).

DISCUSSION

Acute diarrhea, also often defined as gastroenteritis, is a rapid onset of diarrhea that can be accompanied by symptoms such as nausea, vomiting, fever, and abdominal pain that lasts for less than 14 days. Approximately 80% of cases are caused by viruses, while bacterial infections more often manifest as bloody diarrhea. Chronic diarrhea is characterized by excessive loss of water and electrolytes in the stool. This is accompanied by increased frequency of bowel movements, increasingly loose stool consistency, or increasing stool volume over a period of more than 14 days. Persistent diarrhea is diarrhea that begins as acute but lasts for more than 14 days. It can begin as acute watery diarrhea or dysentery. Persistent diarrhea is often caused by bacteria or parasites that enter a child's body. The Ministry of Health has established five pillars for diarrhea management for all cases of diarrhea suffered by toddlers, whether they are being treated at home or being treated in hospital, namely: rehydration with oral rehydration salts can reduce nausea and vomiting, zinc is given for 10 consecutive days, breast milk and food are continued, antibiotics, and advice to the mother or caregiver (Kemenkes RI, 2010).

Diarrhea experts have developed a new ORS formula with a lower osmolarity level. The osmolarity of the new solution is closer to that of plasma, thus reducing the risk of hypernatremia. This new ORS solution is a low-osmolarity solution. Its safety is similar to that of the current ORS, but its effectiveness is superior to that of the old ORS formula.

This new ORS solution with low osmolarity also reduces the need for intravenous supplementation and can reduce stool output by up to 20% and vomiting by up to 30%. Furthermore, this new ORS solution has been recommended by WHO and UNICEF for acute non-cholera diarrhea in children (Kemenkes RI, 2017).

Zinc reduces the duration and severity of diarrhea. It can also restore children's appetite. The use of zinc has become popular in recent years due to its strong evidence base. Several studies have proven this. Administering zinc at the onset of diarrhea for the next 10 days significantly reduces patient morbidity and mortality. It was found that administering zinc to children with cholera can reduce the duration and volume of stool/fluid excreted. Zinc is a micronutrient absolutely essential for maintaining optimal health. Although in very small amounts, physiologically, zinc plays a role in cell growth and division, antioxidants, sexual development, cellular immunity, dark adaptation, taste, and appetite. Zinc also plays a role in the immune system and is a potential mediator of the body's defense against infection (Kemenkes RI, 2017).

The rationale for using zinc in the treatment of acute diarrhea is based on its effects on immune function, the structure and function of the gastrointestinal tract, and the repair process of the gastrointestinal epithelium during diarrhea. Zinc supplementation for diarrhea can increase water and electrolyte absorption by the small intestine, accelerate intestinal epithelial regeneration, increase the number of apical brush borders, and enhance the immune response, accelerating the clearance of pathogens from the intestine. Zinc treatment is suitable for developing countries such as Indonesia, which have many problems with zinc deficiency due to low levels of welfare and inadequate immunity. Zinc supplementation can reduce the frequency and volume of bowel movements, thereby reducing the risk of dehydration in children. Zinc dosage for children: a). Children under 6 months: 10 mg (1/2 tablet) per day, b). Children over 6 months: 20 mg (1 tablet) per day. Zinc is given for 10-14 consecutive days even if the child has recovered from diarrhea. For infants, zinc tablets can be dissolved in boiled water, breast milk, or oral rehydration salts. For older children, zinc can be chewed or dissolved in boiled water or oral rehydration salts (Kemenkes RI, 2017).

Irrational antibiotic administration will actually prolong the duration of diarrhea because it disrupts the balance of intestinal flora and causes *Clostridium difficile* to grow and cause diarrhea that is difficult to treat. Furthermore, irrational antibiotic administration will accelerate bacterial resistance to antibiotics and increase unnecessary medical costs. Multiple studies have found an increase in resistance to commonly used antibiotics such as ampicillin, tetracycline, chloramphenicol, and trimethoprim-sulfamethoxazole over the past 15 years. Antibiotic resistance occurs through the following mechanisms: drug inactivation through enzymatic degradation by bacteria, changes in the structure of bacteria targeted by antibiotics, and changes in membrane permeability to antibiotics (Kemenkes RI, 2017).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the research conducted, it can be concluded that the most frequently prescribed drug was zinc, as many as 31 people (93.94%).

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