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Effectiveness of Zinc Therapy with Zinc-Probiotic Combination Therapy on the Duration of Diarrhea During Hospitalization at Mawaddah Medika Hospital in October - December 2023

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ABSTRACT
Diarrhea is the third leading cause of death among children under five years old worldwide, with improper management both at home and in healthcare facilities being the primary cause. The World Health Organization (WHO) recommends zinc supplementation as a treatment for acute diarrhea, while probiotics, commonly used alongside fluid rehydration, are not yet included in WHO guidelines. This study used a single-blinded randomized Controlled Trial design to compare the effectiveness of zinc therapy versus a combination of zinc and probiotics on the duration of diarrhea during hospitalization at Mawaddah Medika Hospital. Children suffering from diarrhea who met specific inclusion and exclusion criteria were randomly assigned to two groups: one received zinc therapy, while the other received a combination of zinc and probiotics, along with standard treatments. The data were analyzed using the Mann-Whitney test. Eighty children participated in the study, with the majority (60.0%) aged 1-5 years, and 53.8% of the children were male. In the group receiving zinc therapy, diarrhea was approximately 8.54 hours shorter than in the zinc-probiotic combination group. However, the analysis revealed no significant difference in the duration of diarrhea between the two treatments ($p > 0.05$). Consequently, while no significant difference was found between zinc supplementation and zinc-probiotic combination therapy regarding the duration of diarrhea, further research is needed to explore the administration of these treatments in diarrhea patients.

Keywords: Diarrhea, Zinc, Probiotics.

I. Introduction

Diarrheal disease remains a significant public health concern in developing countries like Indonesia, due to its high rates of morbidity and mortality. Globally, it is the third leading cause of death among children under the age of five, accounting for approximately 1.7 billion cases and 443,832 deaths each year (World Health Organization, 2024). The leading cause of death from diarrhea is inadequate management, both at home and within healthcare facilities. To reduce mortality from diarrhea, prompt and appropriate treatment is essential. In Indonesia, the current standard management includes the "Lintas Diarrhea" program, which provides every child with diarrhea a combination of Oral Rehydration Salts (ORS), zinc tablets for 10 consecutive days, continued breastfeeding and feeding, antibiotics when indicated, and counseling for the

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mother or family (Ministry of Health of the Republic of Indonesia, 2015). Additionally, probiotics have been widely used as supportive therapy in cases of acute diarrhea in children, alongside fluid rehydration, although they are not yet included in the World Health Organization's official recommendations.

Children under the age of five are the most vulnerable to diarrhea (Hartman et al., 2023). At this stage of development, they begin to consume complementary foods and formula milk in addition to breast milk, increasing the risk of exposure to contaminated food and water that may contain diarrhea-causing pathogens (Bhutta et al., 2000). In cases of acute diarrhea, excessive zinc loss from the body can impair the immune system. A weakened immune response and prolonged diarrhea may negatively impact a child's nutritional status and damage the intestinal mucosa. Zinc supplementation plays a crucial role in the management of diarrhea by not only aiding in the repair of the intestinal lining but also enhancing the immune system, helping to reduce the risk of recurrent episodes of diarrhea (Bhutta et al., 2000; Canani et al., 2011). Probiotics are defined as live microorganisms that, when administered in adequate amounts, can benefit the host's health (Guarner et al., 2024). Studies have shown that the use of probiotics in cases of acute nonspecific diarrhea in infants and children can shorten the duration of diarrhea, reduce its frequency, and significantly promote weight gain. Probiotics function as non-pathogenic microorganisms included in the diet to modify the intestinal microbiota, leading to beneficial structural and functional changes in the gut. Additionally, probiotics may serve metabolic roles, such as aiding in the fermentation of undigested fiber and contributing to energy storage in the form of short-chain fatty acids (Alasiry et al., 2007).

II. Research Method

The data used in this study consisted of all pediatric patients diagnosed with diarrhea at Mawaddah Medika Hospital between November 2023 and December 2023. The research employed a single blind randomized controlled trial (RCT) design. The inclusion criteria for this study were children aged 0–18 years who were diagnosed with diarrhea. The exclusion criteria included children with severe dehydration or congenital abnormalities. Acute diarrhea was defined as the passage of liquid or soft stools three or more times per day, with or without blood or mucus, lasting less than 14 days. Diarrhea was considered resolved when the stool consistency returned to soft and remained so for at least 24 hours. The duration of diarrhea during hospitalization was measured in hours, starting from the time the patient was admitted until the diarrhea was deemed to have stopped.

Children with diarrhea who met the inclusion and exclusion criteria were randomly assigned to one of two groups: one group received zinc therapy alone, while the other received a combination of zinc and probiotic therapy, in addition to standard diarrhea treatment. Probiotics were administered in the form of powdered supplements for a duration of 10 days. Zinc was given at a dose of 20 mg once daily for children older than 6 months, and 10 mg once for those younger than 6 months, continued for 10 days regardless of whether the diarrhea had resolved. The collected data were entered into the SPSS version 24 software program for analysis. The data were averaged, and a mean comparison was conducted to evaluate the difference in the duration of diarrhea between the two groups using the Mann-Whitney test. A p-value of less than 0.05 was considered statistically significant in this study.

III. Results and Discussion

3.1. Analysis Result

Table 1. Presents The Distribution of Pediatric Patients with Diarrhea at Mawaddah Medika Hospital, Categorized by Age

Age	number of patients	Percentage%
0-12 Month	21	26.2%
1-5 Year	48	60.0%

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Age	number of patients	Percentage%
6-10 Years	8	10.0%
10-18 Years	3	3.8%

Table 1 shows that most children with diarrhea are in the age range of 1-5 years, comprising 48 children or 60.0% of the total sample, while the smallest group is in the 10-18 years age range, with only 3 children, accounting for 3.8% of the total sample.

Table 2. Shows the Distribution of Pediatric Patients with Diarrhea at Mawaddah Medika Hospital, Categorized by Gender

Gender	Number of patients	percentage %
Man	43	53.8%
Women	37	46.3%

Table 2 shows that out of the total sample of 80 children with diarrhea in this study, the majority were male, comprising 43 children or 53.8% of the total sample.

Table 3. Shows The Distribution of Pediatric Patients with Diarrhea at Mawaddah Medika Hospital Who Received Either Zinc Therapy or A Combination of Zinc and Probiotic Therapy

Therapy	Number of Patients	Percentage%
Zinc	40	50%
Zinc and Probiotics	40	50%

Table 3 shows that 40 children (50%) at Mawaddah Medika Hospital received zinc and probiotic therapy, while the other 40 children (50%) received zinc therapy alone.

Table 4. It shows the relationship between administering zinc alone and a combination of zinc and probiotics to pediatric patients with diarrhea at Mawaddah Medika Hospital and the duration of diarrhea following therapy.

	n	Duration of Diarrhea (Hours)	p
Zinc	40	33.21 ± 23.19	0.084
Zinc and Probiotics	40	41.75 ± 16.42	

Table 4 shows that in the group of children receiving zinc therapy alone, the average duration of diarrhea was 33.21 ± 23.19 hours, while in the group receiving the combination of zinc and probiotics, the average duration was 41.75 ± 16.42 hours. The duration of diarrhea in the zinc therapy group was 8.54 hours shorter than in the zinc-probiotic Combination Therapy Group. Based on the test results in Table 4, a significance value of 0.084 was obtained, indicating that the difference is not statistically significant, as the p-value is greater than 0.05. This suggests no significant difference exists between the effects of zinc therapy alone and the zinc-probiotic combination therapy on the duration of diarrhea in children during hospitalization.

3.2. Discussion

In this study, 80 pediatric patients aged 0-18 years who were hospitalized for diarrhea received IV fluid therapy, oral zinc supplementation, or a combination of zinc supplementation and probiotics. The results showed that the majority of children with diarrhea were boys, with a total of 43 children (53.8%). This finding aligns with research by Dewi et al., which found that boys are more likely to experience diarrhea, with an

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incidence of 54.7%, compared to girls (Dewi et al., 2023). This may be due to the fact that boys are generally more active outdoors, making them more susceptible to exposure to pathogens that cause diarrhea, such as E. coli and rotavirus (Vernanda et al., 2015).

The age group most affected by diarrhea was 1-5 years, with 48 children (60.0%) of the total sample. This finding is consistent with research indicating that diarrhea is most common in children aged 1-5 years. This is because toddlers are more vulnerable to infections, as their immune systems are not fully developed, and their ability to regenerate intestinal epithelial cells is still limited (Wahyuni & Riska, 2021; World Health Organization, 2024). This study found no significant difference between the effects of zinc therapy and zinc-probiotic combination therapy on the duration of diarrhea in children during hospitalization. These findings are consistent with research by Rahmanyani et al., which showed that the administration of zinc-probiotic combination therapy did not significantly shorten the duration of diarrhea in children compared to zinc therapy alone (Rahmanyani et al., 2014). While zinc-probiotic supplementation did not notably affect the severity of the disease in children with diarrhea, it was found to lead to faster recovery compared to the probiotic-only group (Abdulah et al., 2024). However, this study contradicted those findings, as the duration of diarrhea was shorter in the group that received zinc therapy alone. This discrepancy may be attributed to differences in the age range and the severity of diarrhea in patients upon hospital admission.

IV. Conclusion

There was no significant difference in the duration of diarrhea between pediatric patients treated with zinc therapy and those treated with zinc-probiotic combination therapy, indicating that there is no immediate need to administer both zinc and probiotics simultaneously in the initial management of diarrhea. However, further research is still needed to explore the effects of zinc-probiotic supplementation in patients with acute diarrhea, particularly those who present on the first day of symptoms, to provide more meaningful and significant results.

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