

Factors Associated with the Degree of Dehydration in Toddlers with Diarrhea at Sele Be Solu General Hospital, Sorong City

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ABSTRACT/ ABSTRAK

ABSTRACT. Diarrhea remains a major cause of morbidity and mortality among children under five years of age, particularly in low- and middle-income countries, with dehydration representing its most serious complication. This study aimed to analyze factors associated with the degree of dehydration among toddlers with diarrhea at Sele Be Solu General Hospital, Sorong City. An analytic observational study with a cross-sectional design was conducted involving 93 toddlers diagnosed with diarrhea. The independent variables were history of exclusive breastfeeding, family Clean and Healthy Living Behavior (CHLB), parental or caregiver knowledge about diarrhea, child age, and family economic status, while the dependent variable was the degree of dehydration. Data were collected using structured questionnaires and analyzed using the Chi-square test with a significance level of $p < 0.05$. Exclusive breastfeeding ($p = 0.029$), parental or caregiver knowledge ($p < 0.001$), and child age ($p < 0.001$) were significantly associated with the degree of dehydration. In contrast, family CHLB ($p = 0.228$) and family economic status ($p = 0.343$) were not significantly associated. These findings highlight the importance of breastfeeding and caregiver knowledge in relation to dehydration severity among toddlers with diarrhea.

ABSTRAK. Diare masih menjadi salah satu penyebab utama morbiditas dan mortalitas pada balita, terutama di negara berpendapatan rendah dan menengah, dengan dehidrasi sebagai komplikasi yang paling serius. Penelitian ini bertujuan menganalisis faktor-faktor yang berhubungan dengan derajat dehidrasi pada balita yang mengalami diare di RSUD Sele Be Solu Kota Sorong. Penelitian analitik observasional dengan desain *cross-sectional* ini melibatkan 93 balita yang didiagnosis diare. Variabel independen meliputi riwayat pemberian ASI eksklusif, Perilaku Hidup Bersih dan Sehat (PHBS) keluarga, pengetahuan orang tua atau pengasuh mengenai diare, usia balita, dan status ekonomi keluarga, sedangkan variabel dependen adalah derajat dehidrasi. Data dikumpulkan menggunakan kuesioner terstruktur dan dianalisis dengan uji Chi-square pada tingkat signifikansi $p < 0,05$. Hasil penelitian menunjukkan bahwa pemberian ASI eksklusif ($p = 0,029$), pengetahuan orang tua atau pengasuh ($p < 0,001$), dan usia balita ($p < 0,001$) berhubungan secara signifikan dengan derajat dehidrasi. Sebaliknya, PHBS keluarga ($p = 0,228$) dan status ekonomi keluarga ($p = 0,343$) tidak menunjukkan hubungan yang signifikan. Temuan ini menunjukkan pentingnya pemberian ASI eksklusif dan peningkatan pengetahuan orang tua atau pengasuh dalam mendukung upaya pencegahan dehidrasi pada balita yang mengalami diare.

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INTRODUCTION

Diarrhea remains a major public health problem contributing substantially to morbidity and mortality among toddlers worldwide. Although diarrheal mortality has declined over recent decades, it continues to be a leading cause of death in children under five years of age, particularly in low- and middle-income countries. The World Health Organization (WHO) reports approximately 1.7 billion episodes of childhood diarrhea annually, with hundreds of thousands of deaths, predominantly due to dehydration-related complications. Dehydration resulting from fluid and electrolyte loss is the most serious complication of diarrhea and requires prompt management to prevent hypovolemic shock, electrolyte disturbances, and death (World Health Organization [WHO], 2024).

In Indonesia, diarrhea remains among the infectious diseases with high incidence in toddlers. This age group is particularly vulnerable due to immature immune systems, developing nutritional status, and elevated risk of exposure to infectious agents from the environment. Regional health data indicate that diarrhea remains a leading cause of healthcare visits in West Papua Province. At Sele Be Solu General Hospital, Sorong City, 1,078 diarrhea cases were recorded during 2022–2023, underscoring that this condition remains a significant public health concern requiring targeted attention.

The degree of dehydration in toddlers with diarrhea is influenced by various factors related to child characteristics and family environment. Exclusive breastfeeding is known to provide protection against gastrointestinal infections through antibodies, immunological factors, and bioactive substances that support infant immune maturation. Additionally, implementation of Clean and Healthy Living Behavior (CHLB) at the household level reduces exposure to diarrhea-causing microorganisms through improved hygiene and sanitation practices. Other contributing factors include parental knowledge regarding diarrhea prevention and management, child age (related to immune system maturity), and socioeconomic conditions affecting access to healthcare, sanitation, and nutritional adequacy (Florez et al., 2018; Guarino et al., 2020; Kementerian Kesehatan Republik Indonesia, 2022, 2024).

Previous studies have reported inconsistent findings regarding factors influencing dehydration severity in diarrheal toddlers. Asmar (2021) reported that age, duration of diarrhea, and frequency of diarrhea were associated with dehydration severity, whereas nutritional status showed no significant association. Another study by Christy (2020) found that maternal knowledge and employment status were associated with dehydration occurrence, while maternal age, education level, and family income were not significantly associated. These discrepancies indicate that factors influencing dehydration severity may vary across populations and regions, warranting further investigation.

To date, research simultaneously evaluating the relationship between exclusive breastfeeding, family CHLB implementation, parental or caregiver knowledge, child age, and family economic status with dehydration severity among toddlers in Sorong City remains very limited. Identifying these factors is crucial for developing more effective prevention strategies and interventions to reduce diarrhea-related dehydration. Therefore, this study aimed to analyze factors associated with the degree of dehydration in toddlers with diarrhea at Sele Be Solu General Hospital, Sorong City. The findings are expected to provide scientific evidence for enhancing promotive and preventive efforts, particularly through

increasing exclusive breastfeeding coverage, parental education, and strengthening diarrhea prevention programs in healthcare facilities and communities.

RESEARCH METHOD

This was an analytic observational study using a cross-sectional design, whereby independent and dependent variables were measured simultaneously without follow-up. This design was employed to analyze associations between risk factors and dehydration severity in toddlers with diarrhea. The study was conducted at Sele Be Solu General Hospital, Sorong City, Southwest Papua. The study population comprised all toddlers diagnosed with diarrhea who met inclusion criteria during the study period from May to June 2025. The sample consisted of 93 respondents selected according to predefined inclusion and exclusion criteria. Data were collected using questionnaires administered to parents or caregivers, supplemented by medical record data.

The dependent variable was degree of diarrhea-related dehydration, classified according to WHO guidelines into no dehydration, mild/moderate dehydration, and severe dehydration. Independent variables included history of exclusive breastfeeding, family Clean and Healthy Living Behavior (CHLB) implementation, parental or caregiver knowledge about diarrhea, child age, and family economic status. Each variable was measured using instruments that underwent validity and reliability testing prior to use.

Data were analyzed using statistical tests. Descriptive analysis was performed to describe respondent characteristics and variable distributions in terms of frequencies and percentages. Bivariate analysis was conducted using the Chi-square test to assess associations between each independent variable and dehydration severity. A $p\text{-value} < 0.05$ was considered statistically significant. Ethical approval was obtained prior to data collection. All respondents received explanations regarding the study objectives and provided informed consent for participation.

RESULTS

Table 1. Respondents Characteristics

Respondent Characteristic	Frequency	Percentage (%)
Gender		
Male	53	57.0
Female	40	43.0
Parent/Caregiver Education		
Elementary school	1	1.1
Junior high school	10	10.8
Senior high school	50	53.8
Diploma	16	17.2
Bachelor's degree	16	17.2
Parent/Caregiver Occupation		
Unemployed	57	61.3
Employed	36	38.7

Table 1 shows that among the 93 toddlers included in the study, 53 (57.0%) were male and 40 (43.0%) were female. Most parents or caregivers had completed senior high school (53.8%), followed by diploma and bachelor's degree education (17.2% each), junior high school (10.8%), and elementary school (1.1%). Regarding occupation, 57 (61.3%) parents or caregivers were unemployed, whereas 36 (38.7%) were employed.

Table 2. Degree of Dehydration in Diarrheal Toddlers

Variable	Frequency	%
No dehydration	23	25.0
Mild/moderate dehydration	52	56.5
Severe dehydration	17	18.5

Table 2 indicates that mild/moderate dehydration was the most common category, affecting 52 toddlers (56.5%). No dehydration was observed in 23 toddlers (25.0%), while severe dehydration occurred in 17 toddlers (18.5%).

Table 3. Association Between Exclusive Breastfeeding and Dehydration Severity

Breastfeeding Status	No Dehydration	Mild/Moderate Dehydration	Severe Dehydration	p-value
Exclusive breastfeeding	16	17	4	0.029
Non-exclusive breastfeeding	10	34	11	

Table 3 demonstrates a statistically significant association between exclusive breastfeeding and dehydration severity among toddlers ($p = 0.029$). Toddlers who received exclusive breastfeeding were more frequently classified as having no dehydration, whereas mild/moderate and severe dehydration were more common among those who did not receive exclusive breastfeeding.

Table 4. Association Between Family CHLB and Dehydration Severity

CHLB	No Dehydration	Mild/Moderate Dehydration	Severe Dehydration	p-value
Good	0	4	1	0.228
Adequate	3	14	12	
Poor	12	33	13	

Table 4 shows no statistically significant association between family Clean and Healthy Living Behavior (CHLB) and dehydration severity among toddlers ($p = 0.228$).

Table 5. Association Between Knowledge Level and Dehydration Severity

Knowledge Level	No Dehydration	Mild/Moderate Dehydration	Severe Dehydration	p-value
Good	17	5	0	<0.001
Adequate	7	7	1	
Poor	15	51	26	

Table 5 indicates a statistically significant association between parental or caregiver knowledge and dehydration severity ($p < 0.001$). Good knowledge was more frequently observed among parents of toddlers without dehydration, whereas poor knowledge was more common among those whose children experienced mild/moderate or severe dehydration.

Table 6. Association Between Child Age and Dehydration Severity

Age Group	No Dehydration	Mild/Moderate Dehydration	Severe Dehydration	p-value
12–36 months	1	52	20	<0.001
48–<60 months	18	2	0	

Table 6 shows a statistically significant association between child age and dehydration severity ($p < 0.001$). Mild/moderate and severe dehydration were more frequently observed among children aged 12–36 months than among those aged 48 to <60 months.

Table 7. Association Between Family Economic Status and Dehydration Severity

Economic Status	No Dehydration	Mild/Moderate Dehydration	Severe Dehydration	p-value
Very high	0	2	1	0.343
High	4	5	4	
Moderate	5	12	5	
Low	17	32	5	

Table 7 shows no statistically significant association between family economic status and dehydration severity among toddlers ($p = 0.343$).

DISCUSSION

Association Between Exclusive Breastfeeding and Dehydration Severity

This study demonstrated a significant association between exclusive breastfeeding and dehydration severity among toddlers with diarrhea. Toddlers who received exclusive breastfeeding had a lower proportion of severe dehydration than those who were not exclusively breastfed. These findings are consistent with previous studies demonstrating that exclusive breastfeeding protects against gastrointestinal infections and reduces the risk of diarrheal complications (Black et al., 2021; Lamberti et al., 2011; Rollins et al., 2016; Victora et al., 2016).

Breast milk contains numerous immunological components, including secretory immunoglobulin A (sIgA), lactoferrin, lysozyme, oligosaccharides, cytokines, and growth factors, which inhibit pathogenic bacterial colonization, maintain intestinal mucosal integrity, and enhance mucosal immune responses. Furthermore, the high water content of breast milk helps maintain fluid balance during diarrheal episodes, thereby reducing the likelihood of severe dehydration. Consequently, toddlers who are not exclusively breastfed are more susceptible to recurrent gastrointestinal infections and more severe dehydration.

These findings further support the recommendations of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), which advocate exclusive breastfeeding during the first six months of life as one of the most effective strategies for reducing diarrhea-related morbidity and mortality among children under five years of age (United Nations Children's Fund [UNICEF], 2021; World Health Organization [WHO], 2017).

Association Between Family Clean and Healthy Living Behavior (CHLB) and Dehydration Severity

This study found no statistically significant association between family Clean and Healthy Living Behavior (CHLB) and dehydration severity among toddlers with diarrhea. CHLB is widely recognized as an important preventive measure against diarrheal diseases because it includes appropriate hand hygiene, safe water use, adequate sanitation, proper waste disposal, and environmental cleanliness.

The absence of a significant association may be explained by several factors. First, the distribution of CHLB practices among respondents was relatively homogeneous, reducing variability between comparison groups. Second, CHLB was assessed using self-reported questionnaires, which may have introduced information bias. Third, dehydration severity is determined not only by environmental hygiene but also by other factors, including pathogen virulence, frequency of vomiting, baseline hydration status, and caregivers' ability to initiate oral rehydration therapy promptly.

Although no significant association was identified, CHLB remains an essential component of diarrhea prevention. Therefore, community-based health promotion programs emphasizing personal hygiene and environmental sanitation should continue to be strengthened as part of comprehensive diarrhea prevention strategies.

Association Between Parental or Caregiver Knowledge and Dehydration Severity

This study demonstrated a highly significant association between parental or caregiver knowledge regarding diarrhea and dehydration severity. Parents or caregivers with better knowledge were more likely to have children with no or mild dehydration than those with limited knowledge.

Adequate knowledge enables caregivers to recognize the early signs of dehydration, administer oral rehydration therapy appropriately, continue breastfeeding and feeding during diarrheal episodes, and seek timely medical care when danger signs occur. Conversely, inadequate knowledge may delay appropriate management, resulting in prolonged fluid loss and an increased risk of severe dehydration.

These findings are consistent with the study conducted by Christy (2020), which demonstrated that maternal knowledge significantly influences dehydration outcomes among toddlers with diarrhea. Improving parental knowledge through health education provided at healthcare facilities, integrated health service posts (*Posyandu*), and community-based educational programs may therefore contribute to reducing diarrhea-related complications.

Association Between Child Age and Dehydration Severity

Child age was significantly associated with dehydration severity in this study. Younger toddlers had a greater risk of experiencing severe dehydration than older children.

This finding may be explained by the physiological characteristics of younger children, who have a higher proportion of body water, smaller fluid reserves, and greater fluid requirements relative to body weight. Moreover, their immune systems are still developing, making them more susceptible to gastrointestinal infections. Younger children also tend to experience more rapid fluid loss during diarrheal episodes because of frequent bowel movements, thereby increasing the risk of dehydration.

These findings are consistent with the WHO guidelines for the management of childhood illnesses and the *Nelson Textbook of Pediatrics*, both of which indicate that

children younger than three years are at substantially higher risk of dehydration and hospitalization due to acute diarrhea (Nelson Textbook of Pediatrics, 2024; World Health Organization [WHO], 2022).

Association Between Family Economic Status and Dehydration Severity

This study found no statistically significant association between family economic status and dehydration severity among toddlers with diarrhea. Family economic status may influence access to nutritious food, clean water, sanitation facilities, and healthcare services. Financial constraints may also delay healthcare utilization or limit access to appropriate oral rehydration therapy.

However, the influence of economic status on dehydration severity is likely indirect and mediated through other factors, including parental education, caregiver knowledge, environmental sanitation, and healthcare accessibility. Therefore, public health interventions should focus not only on improving socioeconomic conditions but also on strengthening health literacy and ensuring equitable access to primary healthcare services.

The findings of this study have important implications for pediatric health programs, particularly in Southwest Papua. Increasing exclusive breastfeeding coverage, improving caregiver knowledge regarding home-based diarrhea management, and promoting early recognition of dehydration signs should become priorities within primary healthcare services. Strengthening health education through *Posyandu* and community health centers (*Puskemas*) may improve caregivers' ability to recognize dehydration early and seek timely treatment, thereby reducing the risk of severe dehydration.

This study has several limitations. First, the cross-sectional design precludes causal inference because exposure and outcome variables were measured simultaneously. Second, several variables were collected through caregiver interviews, making the findings susceptible to recall and information bias. Finally, because the study was conducted in a single hospital, the results may not be generalizable to toddlers living in other regions with different demographic, socioeconomic, and cultural characteristics.

CONCLUSION

This study found that exclusive breastfeeding, parental or caregiver knowledge about diarrhea, and child age were significantly associated with the degree of dehydration among toddlers with diarrhea at Sele Be Solu General Hospital, Sorong City. In contrast, family Clean and Healthy Living Behavior (CHLB) and family economic status were not significantly associated with dehydration severity in this study. These findings suggest that both child-related and caregiver-related factors may contribute to the severity of dehydration in toddlers with diarrhea. Strengthening exclusive breastfeeding practices and improving parental or caregiver knowledge regarding diarrhea prevention, early recognition of dehydration, and appropriate home management may support efforts to reduce the severity of dehydration among toddlers. However, because this study employed a cross-sectional design, the observed associations should not be interpreted as causal relationships.

Healthcare providers should continue to promote exclusive breastfeeding and provide regular education for parents or caregivers on diarrhea prevention, early recognition of dehydration, oral rehydration therapy, and appropriate care-seeking practices through hospitals, primary healthcare centers, and community-based health programs. Particular attention should be given to families with younger toddlers, as this age group was more

frequently associated with dehydration. Future studies are recommended to use prospective cohort or longitudinal designs with larger and more diverse populations to further investigate factors associated with dehydration severity in children with diarrhea and to evaluate additional clinical and environmental determinants that were not assessed in the present study.

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