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# The relationship between nutritional status with length of stay in 1-5 years old children with diarrhea at Wangaya General Hospital Denpasar



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Susan Natalia Budihardjo<sup>1\*</sup>, I Wayan Bikin Suryawan<sup>1</sup>, Anak Agung Made Sucipta<sup>1</sup>

## ABSTRACT

**Background:** Diarrhea is still the second-largest cause of children under-five's mortality worldwide. Six million children die every year due to diarrhea and it mostly occurs in developing countries. The main cause of diarrhea deaths is due to malnutrition. In malnutrition there is an increase in the severity of diarrheal diseases, this makes malnutrition and diarrhea a vicious circle.

**Objective:** To investigate the relation between nutritional status and length of stay under-five children with diarrhea

**Method:** A cross-sectional study was conducted from August 2018 to January 2019 using the consecutive sampling methods. The subjects were children aged 1-5 years old hospitalized for diarrhea at Wangaya Hospital Denpasar that fulfills the inclusion and exclusion criteria. The characteristics of the subject such as

gender, children's age, birth weight, exclusive breastfeeding status, immunization status, degree of dehydration, mother's employment, and economic factor.

**Result:** A total of 42 patients were the subjects of the study. Of 10 subjects with wasted nutritional status, 7 (70%) subjects had long stays (> 4 days), and 3 (30%) others with a short length of stay (≤4 days). Most subjects aged 12-24 months were 52.4%. Most of the subjects were male (57.1%). The results of the analysis showed that nutritional status significantly affected the length of stay of diarrhea in children under five (p-value 0.001; PR 5.6; 95% CI 2.05-9.26).

**Conclusion:** There is a significant relationship between nutritional status with the length of stay in children under five.

**Keywords:** nutritional status, diarrhea, length of stay, children under five

**Cite this Article:** Budihardjo, S.N., Suryawan, I.W.B., Sucipta, A.A.M. 2020. The relationship between nutritional status with length of stay in 1-5 years old children with diarrhea at Wangaya General Hospital Denpasar. *IJBS* 14(2): 113-117. DOI: [10.15562/ijbs.v14i2.274](https://doi.org/10.15562/ijbs.v14i2.274)

<sup>1</sup>Department of Child Health  
Wangaya General Hospital,  
Bali-Indonesia

## BACKGROUND

Diarrhea is still the second-largest cause of under-five children's mortality worldwide (WHO in 2017). Globally, there are almost 1.7 billion cases of diarrhea in under-five children every year. And 6 million children were died every year because of diarrhea and it mostly happened in developing countries. About ¾ of child deaths happened in two WHO regions, Africa and Southeast Asia.<sup>1</sup>

One way to achieve the MDGs target (4<sup>th</sup> goal) was to reduce child mortality to 2/3 from 1990 to 2015. Based on Household Health Survey (SKRT), Mortality Studies, and Basic Health Research from year to year, was known that diarrhea has still been the most leading of mortality in under-five children in Indonesia. The main cause of death in diarrhea is improper management at home and in health facilities. To reduce mortality due to diarrhea, fast and precise management is needed.<sup>2</sup>

There were increasing the numbers of diarrhea in Indonesia from 6.897.463 in 2016 to 7.077.299 in 2017. Likewise, there were increasing the numbers of diarrhea in Bali from 112.126 in 2016 to 114.656 in 2017.<sup>3,4</sup> In 2015, the numbers of diarrhea cases in Denpasar were 12.999 over of 79.254 cases in

Bali (16,4% cases of diarrhea over diarrhea cases in Bali).<sup>5</sup>

Indonesia has found that the most cause of mortality in babies (29 days old – 11 months old) is diarrhea (31,4%). And the most cause of mortality in under-five children (12-59 months old) is diarrhea (25,2%).<sup>2</sup> The cases of diarrhea in children are closely related to the immune system of their bodies which still cannot work optimally. One of the risk factors which caused the immune system to be not optimal is the imbalance of nutrition status which leads to increasing the risk of diarrhea.<sup>6</sup>

Nutritional status is the expression of nutrition balance in the form of a certain variable and one of the risk factors for morbidity and mortality. Nutritional status can be measured by using a Z-score in several ways, including by measuring weight/age, height/age, and weight/height.<sup>6</sup>

From the data of Riskesdas, there were decreasing in total malnutrition prevalence in Indonesia from 2013, 2016, and 2017 respectively, by 19,6%, 11,1%, 9,5%. According to Riskesdas data from year to year, malnutrition prevalence's in Bali is the lowest among several provinces in Indonesia.<sup>3,4,7</sup>

Nutritional status disorder greatly affected the activity of the immune system in the body.

\*Corresponding autor:  
Susan Natalia Budihardjo;  
Department of Child Health  
Wangaya General Hospital, Bali-  
Indonesia;  
[susan\\_natalia\\_ljc@gmail.com](mailto:susan_natalia_ljc@gmail.com)

Received: 2020-09-05  
Accepted: 2020-11-09  
Published: 2020-12-01

According to Gupta, diarrhea cases were more common in children under 5 years due to malnutrition in India in 2014.<sup>8</sup> According to Brown KH et al in 2003, malnutrition increasing diarrhea incidence. Besides, it was also explained that there was a relationship between anthropometric indicators of nutritional status and the duration of diarrhea. In malnutrition, there were increases in diarrhea's severity. It was caused by the slowdown of enterocyte's regeneration after infection of invasive bacteria or viruses in malnutrition children.<sup>9</sup>

## METHOD

The type of this research is analytic observational with a cross-sectional study that aims to find the relationship of nutritional status with the length of stay under-five children with diarrhea in children aged 1-5 years old who were treated in Wangaya General Hospital Denpasar City. This research was conducted in the Kaswari room (children ward) at the Wangaya General Hospital Denpasar City from August 2018 to January 2019.

The minimum sample size in this study was 30 subjects who were selected using consecutive sampling and met the inclusion and exclusion criteria. The inclusion criteria of this study were

child patients aged 1–5 years who were treated with a diagnosis of diarrhea in the Kaswari Room at Wangaya General Hospital, Denpasar City, and received approval from the patient's guardian to participate in this study. While the exclusion criteria of this study including subjects who had congenital diseases, experienced certain syndromes, chromosomal abnormalities, immunocompromised, chronic diseases, metabolic disorders; subjects with comorbidities; subjects with malnutrition or obesity; subjects with persistent diarrhea (> 14 days); subjects with severe dehydration; the subject who requested a forced home.

Demographic data that will be recorded from the subjects such as gender, age, birth weight, current body weight and height, current nutritional status, exclusive breastfeeding status, immunization status, and disease diagnosis, degree of dehydration, maternal occupation, economic factors, and mother's education, duration of diarrhea, and length of stay. The assessment of nutritional status using the WHO grow chart. Meanwhile, the length of stay was obtained by recording the time from the first time the subjects were treated in the ward until they returned home.

The existing data were processed and analyzed using Statistical Product and Service Solution (SPSS) 24 for Macbook. The univariate analysis aims to describe the characteristics of the respondents in the study. While the bivariate analysis aims to assess the relationship between nutritional status and length of stay for children with diarrhea using the chi-square hypothesis test. The relationship between nutritional status and the length of stay in patients with diarrhea under-five is expressed in the prevalence ratio (PR) with a 95% confidence interval and a significance level of 5%.

## RESULT

During the period August 2018 to January 2019, 68 diarrhea patients were found who met the study inclusion and exclusion criteria. Of the 68 patients, 26 diarrhea patients were not included in the study (17 subjects with comorbidities, 3 subjects with poor nutrition, 3 subjects with obesity, 1 subject with immunocompromised, 1 subject with severe dehydration, and 1 subject requesting forced home). The characteristics of the research sample are listed in **Table 1**.

## RESPONDENT'S CHARACTERISTICS DISTRIBUTION

In **Table 1**, it can be seen that the sample of this study are grouped into two, malnutrition status and no malnutrition status. From all samples obtained, it

**Table 1. The Characteristics of the Research's Subjects**

Characteristic	Total	%
<b>Gender</b>		
Male	24	57.1
Female	18	42.9
<b>Age</b>		
12-24 months old	22	52.4
25-36 months old	10	23.8
37-60 months old	10	23.8
<b>Birth Weight</b>		
< 2500 grams	3	7.1
≥ 2500 grams	39	92.9
<b>Exclusive breastfeeding status</b>		
Exclusively breastfed	30	71.4
Not exclusively breastfed	12	28.6
<b>Immunization Status</b>		
Complete	39	92.9
Not complete	3	7.1
<b>Degree of Dehydration</b>		
Without Dehydration	2	4.8
Mild-moderate Dehydration	40	95.2
<b>Mother's occupation</b>		
Working	23	54.8
Not Working	19	45.2
<b>Economic Status</b>		
Sufficient economic	22	52.4
Less Economic	20	47.6

can be seen that the male gender is more than female with a ratio of 57.1% and 42.9%. The age group was divided into three groups of 12-24 months old, 25-36 months old, 37-60 months old with a percentage of 52.4%, 23.8%, 23.8%. The number of subjects with birth weight <2500 grams was 7.1%, much lesser than subjects with birth weight  $\geq$  2500 grams, which was 92.9%. Subjects who received exclusive breastfeeding were 71.4% were much more than those who did not receive exclusive breastfeeding were 28.6%. Almost all subjects who had a complete history of immunization according to age were 92.9%, while only 7.1% of subjects did not have a complete history of immunization according to age. The degree of dehydration was dominated by subjects with mild to moderate dehydration by 95.2% and the rest were subjects without dehydration by 4.8%. More than half were working mothers were 54.8%. And families with sufficient economic factors amounted to 52.4%, which is more than less economic factors (47.6%).

#### Analysis of the Relationship between Nutritional Status and Length of Stay for Children with Diarrhea

**Table 2** shows the results of the bivariate analysis using the chi-square test, the p-value was 0.001 with a confidence interval range (95% CI) of 2.05-9.26 means that the CI 95% does not include number 1 which means that the p-value is significant. The prevalence ratio (PR) is calculated to determine the magnitude of this relationship. The PR value was obtained at 5.6 (PR > 1), which means that children with diarrhea with malnutrition status can have five times greater risk of getting a longer length of stay when compared to children with diarrhea who didn't have malnutrition status.

#### DISCUSSION

As well known, the relationship between child nutrition and infectious diseases such as diarrhea is a two-way relationship, illness that could often be interfering with the nutritional status and poor dietary status can increasing the risk of infection. Infectious diseases such as diarrhea could change

the nutritional status through decreased food intake and intestinal absorption, increased catabolism, and nutrient sequestration required for tissue synthesis and growth.<sup>9</sup> On the other hand, in children with low nutritional status, diarrhea will usually occur more frequently and longer. The worse the nutritional condition of the child, the more frequent and heavier diarrhea will be. It was suspected that the intestinal mucosa of malnourished children was very susceptible to infection.<sup>10</sup>

Length of stay is influenced by age factor, comorbidity, hypermetabolism, and organ failure also nutritional deficiencies. Various studies suggest that the presence of malnutrition at the time of patient's hospital admission resulted in these patients having a longer length of stay compared to patients with good nutritional status, and have a higher risk of experiencing malnutrition during treatment.<sup>11</sup>

In this study, it was found that there were significant results between the relationship between malnutrition status and a longer length of stay for children with diarrhea with a p-value of 0.001. This is in line with research conducted by Palupi et al, Misbah, Saputri CS et al, Iskandar WJ et al, and Soewito M who said that there was a relationship between nutritional status and length of stay in under-five patients.<sup>6,12-15</sup> However, the results that are not in line are found in the study of Primayani D, Amin MR et al, with the results of the study that there was no relationship between nutritional status and length of stay for children under five with diarrhea.<sup>11,16</sup>

The malnutrition status in diarrhea cases experienced by children aged 1-5 years in this study was 23.8%. This number is lower when compared with the results of research conducted by Soewito M and Saputri CS et al, namely 27.1% and 26.8%, respectively.<sup>6,14</sup>

Males were more frequently found in this study, it were 57.1%, which is in line with the research of Iskandar WJ et al, where males were more common (56.8%).<sup>15</sup>

The age range most affected by diarrhea in this study was 12-24 months old, it was 52.4%. This is in line with research conducted by Iskandar WJ et al. From the distribution of malnutrition status based on age, the most age group was 12-24 months old, which was 11.9%, this is in line with some literature which says that diarrhea in children under five is more common among children aged 6-24 months old because children start to actively play and had more at risk of infection, but without a significant sex difference.<sup>15,16</sup>

The 2016 Indonesian Health Profile states that the complete basic immunization scope rate for

**Table 2.** Analysis of The relationship between Nutritional Status and Length of Stay

Nutritional Status	Length of Stay		Total	PR (CI 95%)	P value
	>4 days	$\leq$ 4 days			
Malnutrition	7 (70%)	3 (30%)	10 (100%)	5.60	0.001
Not malnutrition	4 (12.5%)	28 (87.5%)	32 (100%)	(2.05-9.26)	
<b>Total</b>	11 (26.2%)	31 (73.8%)	42 (100%)		

infants reaches 91.1%, while the scope of exclusive breastfeeding in Indonesia is still low, it was 29.5%.<sup>4</sup> This data is in line with the results of the author's study where almost all samples received complete immunization (92.9%). However, exclusive breastfeeding is not in line with the results of the study because the number of children who are exclusively breastfed in this study is quite high, it was 71.4%. In the literature, it was said that the baby's body was protected by antibodies which received through breast milk because the baby's body is not yet able to fight off bacteria or viruses that cause disease. Babies who are fully breastfed have four times greater protection against diarrhea.<sup>17</sup>

In this study, children with birth weight <2500 grams were found to be 7.1% less than children with birth weight  $\geq$ 2500 grams. This is in line with the research conducted by Kurniawati S et al, which said that only 9.2% of children with low birth weight suffered from acute diarrhea. However, this was not in line with the literature which states that children who have a history of low birth weight have a risk of experiencing diarrhea 1.9 times higher than children with a history of normal birth weight.<sup>18</sup>

Goldman RD et al, assessed the degree of dehydration using the Clinical Dehydration Scale (CDS) reported a positive relationship between the degree of dehydration and length of stay, which was the heavier the degree of dehydration, the longer the hospital stay.<sup>19</sup> In this study, the degree of dehydration was dominated by subjects with mild to moderate dehydration, by 95.2% and the rest were subjects without dehydration by 4.8%.

In this study, children under five with malnutrition with working mothers were 19.0% while those who the mothers did not work were only 4.7%. This was in line with the literature which stated that mothers who were busier at work had less time to paid attention to the nutritional intake of their children. Meanwhile, the nutritional status of children under five was closely related to infectious diseases such as diarrhea.

Families with less economic factors more frequently had under-five children with malnutrition, by 14.3% when compared to families with better economic conditions, which were 9.6%. Meanwhile, families with sufficient economic more frequently had under-five children without malnutrition, by 42.8%. This is in line with the literature which stated that for children who grew up in underprivileged families, often their nutritional needs were not fulfilled.

## LIMITATION

In this research, there were some limitations, such as the research design was cross-sectional, which was

had a lower level of evidence. Other than that, the short duration of the study and the small number of samples, also affected.

## CONCLUSION

There is a relationship between nutritional status and length of stay for under-five patients aged 1-5 years in the children ward of Wangaya General Hospital, Denpasar City. Most of the incidence of diarrhea in this study was found more frequent in males and the incidence occurred mostly at the age of 12-14 months old. Most of the incidence of diarrhea was found in the group of patients who were exclusively breastfed, complete immunization history, children under five with working mothers, and from families with sufficient economies.

## ETHICAL CLEARANCE

The current study has been approved by the Ethical Committee Wangaya General Hospital, Bali-Indonesia No.09/KOM-ETIK/VIII/2019.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the manuscript of this study.

## FUNDING

The authors are responsible for the study funding.

## AUTHOR CONTRIBUTION

All authors are equally contributed in this study from main concept, statistical analysis, until data synthesis, and manuscript preparation.

## REFERENCES

1. WHO. Diarrhoeal disease. World Health Organization. 2017. <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease> (diakses pada 10 Januari 2019)
2. Kementerian Kesehatan RI. Buletin Jendela Data dan Informasi Kesehatan. Situasi Diare di Indonesia. Jakarta: Kementerian Kesehatan RI. 2011.
3. Kemetrian Kesehatan RI. Data dan Informasi Profil Kesehatan Indonesia 2017. Jakarta: Kementerian Kesehatan RI. 2018.
4. Kementerian Kesehatan RI. Data dan Informasi Profil Kesehatan Indonesia 2016. Jakarta: Pusat Data dan Informasi Kementerian Kesehatan RI. 2017.
5. Dinas Kesehatan Provinsi Bali. Profil Kesehatan Provinsi Bali Tahun 2015. Bali: Dinas Kesehatan Provinsi Bali. 2016.
6. Soewito M. Hubungan Status Gizi dengan Lama Rawat Inap Pasien Anak Balita Diare Akut. Universitas Katolik Widya Mandala Surabaya. 2017
7. Kementerian Kesehatan RI. Riset Kesehatan Dasar. Jakarta: Balitbang Kemenkes RI. 2013.
8. Gupta A, Sarker G, Rout AJ, Mondal T, Pal R. Risk Correlates of Diarrhea in Children Under 5 Years of Age in Slums of Bankura, West Bengal. JGID. 2015;7(1):23-9.

9. Brown KH. Diarrhea and Malnutrition. *J Nutr.* 2003;133(1):328S-332S.
10. Suharyono. *Diare Akut.* Jakarta: Rineka Cipta. 2008.
11. Amin MR, Hartoyo E, Marisa D. Hubungan Status Gizi dengan Lama Hari Rawat Inap Pasien Anak Diare Akut. *Berkala Kedokteran.* 2016;12(2):143-152.
12. Palupi, Astya. Hubungan Status Gizi dengan Lama Diare Anak dengan Diare Akut di Ruang Rawat Inap RSUP DR. Sardjito Yogyakarta. Yogyakarta: Universitas Gadjah Mada. 2007.
13. Misbah. Perbedaan Anatara Status Gizi dengan Lama Rawatan Diare Akut Pada Balita di Ruang Rawat Inap Anak Rumah Sakit Dr. Zainoel Abidin Banda Aceh. Banda Aceh: Univesitas Syiah Kuala [artikel penelitian]. 2012.
14. Saputri CS. Hubungan Status Gizi dengan Lama Rawat Inap Pasien Diare Anak Usia 1-5 Tahun di RSUD Undata Palu Periode Januari-Desember 2015. Palu: Universitas Tadulako [artikel penelitian]. 2017.
15. Iskandar WJ, Sukardi W, Soenarto Y. Risk of Nutritional Status on Diarrhea Among Under Five Children. *Paediatrica Indonesiana.* 2015;55:235-8.
16. Primayani D. Status Gizi pada Pasien Diare Akut di Ruang Rawat Inap Anak RSUD SoE, Kabupaten Timor Tengah Selatan, NTT. *Sari Pediatri.* 2009;11(2):90-3.
17. Sukardi, Yusran S, Tina L. Faktor-Faktor yang Berhubungan dengan Diare pada Balita Umur 6-59 Bulan di Wilayah Kerja Puskesmas Poasia Tahun 2016. Kendari: Universitas Haluo Oleo [artikel penelitian]. 2016.
18. Kurniawati S, Martini S. Status Gizi dan Status Imunisasi Campak Berhubungan dengan Diare Akut. *Jurnal Wiyata.* 2016;3:126-32.
19. Goldman RD, Friedman JN, Parkin PC. Validation of the Clinical Dehydration Scale for Children with Acute Gastroenteritis. *Pediatrics.* 2008;122(3): 545-9. Supriasa IDN. Pendidikan dan Konsultasi Gizi. Jakarta: EGC. 2012.



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