



The Incidence of Stunting and the Frequency and Duration of Diarrhea in Toddler

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Abstract

Infectious diseases (diarrhea) that repeatedly cause children's health to increase in the pattern of children's appetite which can lead to less nutritional status of children. This study was to analyze the relationship between the incidence of stunting and the frequency and duration of diarrhea in children under five in the Kenjeran Health Center Surabaya Working Area. Analytical research design with cross sectional design in 4 villages in Kenjeran Health Center. Data retrieval is done by questionnaire sheet and observation using microtoise, sample technique uses Sampling Probability by using Stratified Random Sampling as many as 152 children. Data were analyzed using the Spearman Rho statistical test. The results of research on children under five who experience the incidence of stunting with the frequency and duration of diarrheal disease indicate children who experience stunting and longer frequency. The Rho Spearman Test showed differences in the incidence of stunting with the frequency of diarrhea $p = 0.005$ ($p < \alpha = 0.05$), duration of diarrhea $p = 0.003$ ($p < \alpha = 0.05$). The implication of this study is that stunting is related to the frequency and duration of diarrheal diseases, so that posyandu activities can add counseling about children's health that requires the treatment of diarrhea in children under five in the Kenjeran Health Center Surabaya.

Introduction

In health development for the 2015-2019 period, efforts to improve the nutritional status of the community, including reducing the prevalence of stunting, are a priority for national development with a target of reducing the prevalence to 28% (Kementrian Kesehatan RI, n.d.). Stunting is a toddler with nutritional status based on body height according to age with a z-score less than -2SD while a toddler is categorized as very short if the z-score is less than -3SD (WHO et al., 2018). A stunting toddler is a toddler who is chronically malnourished due to lack of nutrient intake for a long time and is usually followed by frequent illness (Khoeroh & Indriyanti, 2017). The literature said that stunted children experience repeated infection with symptoms, including diarrhea (Checkley

et al., 2014) with a duration of diarrhea in children 15 days per year (Alberto, Karen, T, & John, 2016).

Nowadays, the stunting incidence is one of the nutritional problems experienced by toddlers around the world. According to WHO data in 2008, diarrhea is the first cause of toddler mortality in the world. In Indonesia, diarrhea is one of the main health problems, this is due to the high morbidity rate of diarrhea which causes a lot of mortality, especially among toddlers. Diarrhea morbidity rate in Indonesia is around 200-400 incidents per 1000 population annually. Thus, it is estimated that in Indonesia, there are about 60 million diarrhea sufferers found per year, most (70% -80%) of them are toddler (Munggaran et al., 2015). In 2017 22.2% or about 162 million toddlers in

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the world were stunted (States, 2012). Based on the 2018 Basic Health Research, the proportion of malnutrition and poor nutrition status in toddlers is 17.7%, while the proportion of very short and short height in toddlers is 30.8%. The prevalence of diarrheal diseases is 12.3% (Riset Kesehatan Dasar, 2018). Based on the results of a preliminary study conducted on 10 toddlers, it was found that 4 children with stunting had a history of diarrhea with a frequency of suffering from diarrhea > 3 times a day when they were sick for up to 3 days.

Stunting in children causes a decrease in the body's immune system and increases the risk of developing infectious diseases (Lestari, Margawati, & Rahfiludin, 2014). Toddlers who experience acute diarrhea for more than two weeks every three months will have a greater risk of growing into stunting (Sunita, 2011). During diarrhea, bacteria enter the small intestine and multiply, the bacteria secrete toxins that affect the small intestinal mucosal cells (stimulate the enzyme adenylcyclase) and this enzyme converts Adenosine Tri Phosphate (ATP) into cyclic Adenosine Mono Phosphate (cAMP), with increasing cAMP there will be an increase secretion of Cl ions into the intestinal lumen which causes failure to be absorbed by the intestine (Sunita, 2011).

Stunting can be prevented by paying attention to nutritional status in the first 1000 days of a child's life, giving exclusive breastfeeding, providing nutritious food according to the body's needs, making clean as living habits, doing physical activity, to balance energy expenditure and nutrient intake into the body, so that the child not susceptible to infections such as diarrhea.

Method

The design used in this study was a correlation analytic study design with a cross-sectional approach. The total population was 720 toddlers and the sample size was 152 respondents.

The independent variable in this study was the incidence of stunting in toddlers in the Kenjeran Health Center in Surabaya and the dependent variables in this study were the frequency and duration of diarrhea in toddlers in the Kenjeran Health Center, Surabaya.

Independent variable was measured

using a tool to measure toddlers, namely the body measuring device (Microtoise) and the age of the toddler. The results of the toddler's height will be matched using the WHO z-score standard table, according to the Indonesian Ministry in 2011 the variable code BH / A uses the following assessment:

Category and Threshold of Children Nutrition Status Based on Index

Indeks	Nutrition Status Category	Threshold (Z-Score)
Height by Age (BH/A) on children aged 1- 3 years	Very Short	< -3SD
	Short	-3SD s/d < -2SD
	Normal	-2SD s/d 2SD

Source : (Kemenkes, 2010).

The dependent variables were measured using a questionnaire sheet. The dependent variables is the frequency and duration of diarrhea in toddlers in the Kenjeran Health Center, Surabaya.

This study was conducted on April 22 – May 22 2019 on the Kenjeran Health Center, Surabaya. The sampling technique in this study was Probability Sampling using Stratified Random Sampling. Kenjeran Community Health Center is divided into four areas / strata, Kenjeran village, Bulak village, Kedung Cowek village and Sukolilo village. Each stratum selected as a sample can represent the population of each variable.

Result and Discussion

General data in this research is the characteristics of respondents include the gender of toddlers who live with their parents, age of children, mother's education, maternal occupation, breastfeeding and breastfeeding complementary. Meanwhile, specific data include the incidence of stunting and the frequency and duration of diarrheal infectious diseases.

There were 76 normal toddler in the Kenjeran Health Centre Surabaya area (50%), based on the data of stunting incidence and maternal education, it was found that most of them have parents with high school education as many as 47 people, almost half of them who were categorized as short and very short toddler have parents with junior high school education, namely 15 children. The results of

Table 1. General data on the relation between stunting with the frequency and duration of diarrhea in toddlers on the Kenjeran Health Center, Surabaya.

General data		N	Frequency (f)	Percentage (%)
Gender	Male	152	79	52.0
	Female		73	48.0
Age	12-23 months	152	60	39.5
	24-36 months		92	60.5
Mother education	Senior High	152	69	45.4
	Junior High		44	28.9
	Elementary		30	19.7
	Graduate		9	5.9
Mother Occupation	House wife	152	113	74.3
	Private sectors		32	21.1
	Enterpreneur		5	3.3
	Government Employee		2	1.3
Breast feeding	Yes	152	41	27.0
	No		111	73.0
Breast feeding history	Exclusive	152	63	41.5
	Partial		54	35.5
	Predominant		35	23.0
	Porridge		78	51.4
Breastmilk substitution history	Formula Milk	152	49	32.2
	Fruits Juice		21	13.8
	Cerelac		4	2.6

Source : Primary Data, 2019

interviews with parents stated that they were mostly fishermen who do not have a regular income, so that the education problem was put aside. They thought that all that matter was that the children eat enough. The incidence of stunting is largely influenced by the low income and education of parents. Families with high incomes will have easier access to education and health so that the nutritional status of children can be better (Bishwakarma, 2011). Research in Semarang stated that the number of family members is a risk factor for stunting in toddlers aged 24-36 months (Nasikhah, 2012). According to Bishwakarma (2011) families with good economic status will be able to get better public services such as education. In addition, the families spending ability will increase so that family access to food will be better. Parents, especially mothers who have higher education,

can perform better child care than parents with lower education. Parents with lower education are more likely to come from families with low socioeconomic conditions, so it is hoped that the government will increase access to education for families with less socioeconomic conditions (Ikeda, Yuki, & Sibuya, 2013).

Researchers assume that maternal education plays an important role in the process of child growth, this is because the care of children is mostly carried out by the mother. The incidence of stunting in the working area of the Kenjeran Health Center in Surabaya was considered by mothers as a normal or common thing, it is caused by the mother's lack of knowledge about nutrition that the child must get since in the womb and the lack of health education about stunting in the area.

There were 44 toddlers (28.9%) who

Table 2 : Particular Data on the Relation between Stunting and the Frequency and Duration of Diarrhea in Toddlers in the Kenjeran Health Center, Surabaya.

Particular Data		N	f	%
Stunting Incident	Normal		76	50.0
	Short	152	44	28.9
	Very short		32	21.1
Diarrhea frequence in less than 6 months	Infrequently		76	50.0
	Never	152	54	35.5
	Frequently		22	14.5
Diarrhea duration in less than 6 months	Long		55	36.2
	Never	152	54	35.5
	Not long		43	28.3

Source : Primary Data, 2019

were categorized as stunting and 32 were very short (21%). The result of the interview with the mothers stated that the children were still exclusively breastfed for 1 year because the mother did not think she needed to spend money on formula milk. The nutritional status of pregnant women greatly affects the health and development of the fetus. Growth disorders in the womb can cause low birth weight (WHO, 2014). The use of milk bottles can increase the risk of diarrhea, because bottle is difficult to clean so that one that is not sterile in washing can become a breeding ground for bacteria such as *E. Coli* (Falasifa, 2015). Research in Nepal showed that babies with low birth weight have a higher risk of becoming stunted (Penny, 2013). Researchers assumed that mothers who have exclusively breastfed their children but the mother's nutrition during pregnancy is not fulfilled causing the child is born with a low birth weight which puts 1000 days of life for the child at risk of stunting.

Toddler who often experienced diarrhea within less than the last 6 months were as many as 22 children (14.5%) and those who had experienced diarrhea on more than the last 6 months were 55 children (36.2%). Based on the result of parental education data, there were 11 high school (SMA) educated mothers who often experienced diarrhea and 20 who had diarrhea for a long time. The results of interviews with parents stated that they had never received any education about the importance of maintaining a child's play environment to avoid infectious diseases so that the mother did not care about

the child's environment. According to Lailatul Mafazah (2013), factors that increase diarrhea include clean water for personal hygiene or household hygiene, water contaminated with feces, improper food storage. Research in Purwoharjo stated that the low availability of basic sanitation facilities owned by the community and personal hygiene, especially mothers with toddlers, is a factor in the occurrence of diarrhea (Lailatul Mafazah, 2013). Basic house sanitation and the behavior of housewives with the incidence of diarrhea showed a significant relation in the villages of NTT (Anyerdy and Azizah, 2013). Children who get good food but because they often have diarrhea or fever can suffer from malnutrition (Andayani, 2016).

Researchers assumed that the mothers have not been able to keep the environment clean for children's playgrounds. Children were not accustomed to washing their hands after playing, free to play anywhere without parental supervision. In addition, the children were often cared for by their grandmothers so that when the children cry, they ask for snacks that the children should not be able to eat, but the grandmother still buy them as it was not given too much.

There are 54 toddlers (35.5%) who have never had diarrhea within <6 months. Based on the results of breastfeeding data for children who have never had diarrhea, as many as 24 had history of exclusive breastfeeding. Observations from researchers showed that children who were exclusively breastfed for up to six months and

continued for \leq two years made the child less susceptible to disease. Exclusive breastfeeding is an effort to achieve optimal growth and development and is protected from diseases such as diarrhea (Eka Putri, 2013). Increased susceptibility to diarrhea, including not giving exclusive breast milk so that children are malnourished and immunodeficient (Wijaya, 2012). Environmental factors such as clean water facilities, waste handling, and disposal of feces also cause children to have frequent diarrhea (Wijaya, 2012). Children who are given exclusive breastfeeding have maximum immunity so that the body can be protected from pathogens from environments (Swa, Id, Kyaw, & Tun, 2019).

Researchers assumed that mothers understand the importance of giving exclusive breastfeeding to children until the age of the child is six months so that the child is not susceptible to diseases such as diarrhea, but sometimes the mothers mix water, tea and formula milk when the child was left for work because the mother did not know how to stock

breastmilk when the child was left for work and there still be children who had been given exclusive breastfeeding still has diarrhea, this possibility due to the mother after carrying out household activities did not wash her hands before breastfeeding activity.

The Spearman rho statistical test results significance value of $p = 0.005$ with a significant level of 0.01 ($\rho < 0.05$), it can be concluded that there is a relation between the incidence of stunting and the frequency of diarrhea in toddlers on Kenjeran Health Center Surabaya while from the Spearman rho statistical test resulting significance of $p = 0.003$ with a significant level of 0.01 ($\rho < 0.05$), It can be concluded there is a relation between the incidence of stunting and the duration of diarrhea in toddlers on Kenjeran Health Center, Surabaya.

Based on the results of the study, the normal category of children experiencing frequent diarrhea was 6 children (3.9%) and long duration diarrhea was 17 children (11.2%). Normal toddlers experiencing diarrhea are

Table 3. The Relation between Stunting and the Frequency and Duration of Diarrhea and URTI in Toddlers on the Kenjeran Health Center, Surabaya, May 2019.

Stunting Incident	Diarrhea Frequency							
	Frequently		Infrequently		Never		Total	
	f	%	f	%	f	%	n	%
Normal	6	3.9	33	21.7	37	24.3	76	100.0
Short	12	7.9	25	16.4	7	4.6	44	100.0
Very Short	4	2.6	18	11.8	10	6.6	32	100.0
Total	22	14.5	76	50.0	54	35.5	152	100.0

Spearman statistic test $\rho p=0.005$ ($\alpha=0.05$)

Source : Primary Data, 2019

Stunting Incident	Durasi Diare							
	Long		Not Long		Never		Total	
	f	%	f	%	f	%	n	%
Normal	17	11.2	22	14.5	37	24.3	76	100.0
Short	27	17.8	10	6.6	7	4.6	44	100.0
Very Short	11	7.2	11	7.2	10	6.6	32	100.0
Total	55	36.2	43	28.3	54	35.5	152	100.0

Spearman statistic test $\rho p=0.003$ ($\alpha=0.05$)

Source : Primary Data, 2019

one of them because the environment such as the house does not have a latrine (Saleh & Rachim, 2014). Long-term socioeconomic inequality increases the prevalence of diarrhea (Alam et al., 2019). Researchers assume that normal children who still have diarrhea were caused by the environment where the children live still does not meet the requirements for a healthy home. The short category children with frequent diarrhea was 12 children (7.9%) and long diarrhea duration was 27 children (17.8%) while the very short category with frequent diarrhea frequency was 4 children (2.6%) and long diarrhea duration was 11 children (7.2%). Research in Norway said that there is a relation between stunted children and diarrhea (Kismul, Acharya, Mapatano, & Hatløy, 2017). Diarrhea is a disease characterized by changes in the shape and consistency of feces that mushy and defecating more than 3 times a day (Saleh & Rachim, 2014). Each episode of diarrhea causes a loss of nutrition needed by children to grow, so diarrhea is the main cause of malnutrition (Saleh & Rachim, 2014). Research in Southern Ethiopia stated that diarrheal disease has a significant association with stunting (Batiro, Demissie, Halala, & Anjulo, 2017). Stunting is associated with recurrent infections and diarrhea is the most important infectious disease determining (Dinh et al., 2016). Researchers assume that stunted children are a chronic impact of continuous consumption of a low-quality diet supported by infectious diseases such as diarrhea and environmental problems.

The normal category with an infrequent diarrhea frequency was 33 children (21.7%) and 22 children (14.5%) were not long duration. According to research from Surakarta, pre-school age children have been encouraged to prevent diarrhea by washing their hands before or after eating (Listiyorini, Irdawati, & Zulaicha, 2012). Children of mothers with higher education are less prone to diarrhea (Alam et al., 2019). The incidence of diarrhea in children can be influenced by the cleanliness of the food purchased at the stall (Listiyorini et al., 2012). Researchers assume that normal children who experienced diarrhea were caused by purchased external food and after playing children do not wash their hands. The

short category with infrequent diarrhea was 25 children (16.4%) and not long duration as many as 10 children (6.6%), very short category with infrequent diarrhea was 18 children (11.8%) and not long diarrhea duration as many as 11 children (7.2%). Stunting children who have a history of diarrhea in the last 3 months and poor hygiene practices increase the risk of stunting 3,619 and 4,808 times (Desiyanti, 2017). Family food security and the incidence of infectious diseases experienced by toddler, especially diarrhea, are indicated to be factors that cause stunting (Safitri & Nindya, 2017). Researchers assume that one of the factors that causes children to have frequent diarrhea was the environment that was not supported by the knowledge of parents to care for their children and their environment.

The normal category toddlers who never experienced diarrhea as many as 37 children (24.3%). Education is one of the factors that affect a person's knowledge (Ernawati, 2012). pre-natal care, maternal breastfeeding practice, access to health facilities and mass media communication, and high immunization coverage that clearly explain diarrhea on children (Alam et al., 2019). People who are knowledgeable about diarrhea take action to reduce the risk by using clean water and conserving it (Ernawati, 2012). Researchers assume that mothers with at least high school education were able to care for and prevent their children from diarrhea because mothers more often seek information about children's health. The short category toddlers who never experienced diarrhea as many as 7 children (4.6%) and the very short category toddlers who never experienced diarrhea as many as 10 children (6.6%). In a study by Wiwien Fitrie et al (2016) stated that the frequency of diarrhea and URTI is not a factor in the incidence of stunting.

Conclusion

This study states that most of the toddlers in the Kenjeran Health Center, Surabaya, suffer frequent diarrhea (Based on the results of the Spearman rho statistical test, the significance value is $p = 0.005$ with a significant level of 0.01 ($p < 0.05$)) and in a long duration (based on test results. Spearman statistics rho significance value $p = 0.003$ with a significant level of 0.01

($p < 0.05$).

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