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Personal Hygiene, Water Availability, and Environmental Sanitation with the Incidence of Stunting in Toddlers Aged 6–59 Months in the Working Area of the Singorojo I Public Health Center, Kendal Regency

Personal Higiene, Ketersediaan Air, dan Sanitasi Lingkungan dengan Kejadian Stunting pada Balita Usia 6–59 Bulan di Wilayah Kerja Puskesmas Singorojo I, Kabupaten Kendal

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ABSTRACT

Backgrounds: Stunting is a chronic nutritional problem in Indonesia. The increase in the incidence of stunting in Indonesia is influenced by various factors such as maternal, nutritional, socioeconomic, and environmental factors. Personal hygiene of mothers and children, access to basic sanitation, and clean water are associated with high stunting rates in the Singgorojo 1 Public Health Center.

Objectives: Determined the relationship between personal hygiene, water availability, and environmental sanitation with the incidence of stunting in toddlers aged 6–59 months.

Methods: Observational analysis used a case-control design. Data were collected through interviews using questionnaires and observation of children. The affordable population of this study was toddlers aged 6-59 months in the working area of the Singgorojo Health Center 1. The sample used was 50 toddlers aged 6-59 months. The sampling technique was carried out by consecutive sampling. Data analysis used Chi-Square, Fisher Exact, and Logistic Regression tests.

Results: The relationship between personal hygiene (OR=5.762; p=0.012; 95% CI=1.363–24.362), water availability (OR=4.571; p=0.349; 95% CI=0.473–44.170), and environmental sanitation with stunting incidence (OR=9.333; p=0.001; 95% CI=2.431–35.839). The results of the multivariate analysis of the relationship between personal hygiene (OR=3.867; p=0.111; =1.353; 95% CI=0.732–20.423), water availability (OR=10.305; p=0.066; =2.333; 95 % CI =0.858–123.732), and environmental sanitation with stunting incidence (OR=10.535; p=0.002; =2.355; 95% CI=2.419–45.887).

Conclusions: Personal hygiene and environmental sanitation are associated with stunting in toddlers aged 6–59 months.

INTRODUCTION

Stunting is a condition of a child's body with short stature, as evidenced by a length or height that is less than normal compared to children of the same age based on gender. Based on height for age Z-Score (HAZ), the classification of stunting is divided into 2: short and very short. Toddlers are said to be short or stunted if their HAZ measurements are ≥-3 SD to ≤-2 SD. Toddlers are said to be very short or severely stunted if they get HAZ <-3 SD. Stunting in Indonesia is still a fundamental problem in human development[1]. The high prevalence of stunting in Kendal Regency is caused by water availability, inadequate environmental sanitation, and inadequate personal hygiene. The Integrated Development Strategy Data for Kendal Regency shows that the water supply and sanitation system in Singorojo District is still poor[2]. Poor access to clean water and environmental sanitation can indirectly affect children's nutritional status through infectious diseases. The risk of infectious diseases in children can increase due to inadequate food safety and environmental sanitation[1,3].

In 2019, there were around 149 million children under five in the world who were stunted[4]. Indonesian Basic Health Research (Riskesdas) 2018 reported that 30.8% of toddlers in Indonesia were stunted, with a small percentage of 19.3% and a severely stunted 11.5%[4]. This

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prevalence has decreased compared to the previous year's period, from 37.2% to 30.8%, although it is still higher than the WHO standard of 20%. The prevalence of stunting in Central Java in 2019 was 30.8% of the total stunted toddlers in Indonesia, while in Kendal Regency, it was 27.82% of the total stunted toddlers in Central Java[5,6]. Medical record data for the Singgorojo 1 Health Center, Kendal Regency, as of May 2021, shows that 183 toddlers were diagnosed with stunting.

Several factors, such as genetics, maternal nutrition during pregnancy, poor parenting, low socio-economic status, and the environment, cause stunting. Poor sanitation, food safety that is not maintained, and access to drinking water that is not proper are some of the environmental factors that contribute to the high prevalence of stunting in Indonesia[1]. Stunting, if not appropriately handled, has the risk of causing other diseases as adults, such as obesity, diabetes mellitus, heart disease, or stroke[7]. Therefore, research is needed in the hope that the results can contribute to efforts to reduce stunting in Indonesia, especially the Kendal Regency.

METHODS

This study used an observational analytic and case-control design, conducted in July 2021 in the work area of the Singgorojo I Health Center. The study population was toddlers aged 6-59 months in the Work Area of the Singorojo I Health Center as of May 2021. The sample size was calculated using an unpaired categorical analytic formula and obtained at least 19 samples in each case and control group. The sampling technique uses the consecutive sampling method. Sampling was carried out in 2 villages, namely Getas Village and Singgorojo Village. Case inclusion criteria are toddlers experiencing stunting, normal birth length, and weight, not moving from the house when the toddler was born until the research was carried out, and mothers of toddlers who want to be respondents. Case exclusion criteria were toddlers with congenital disabilities, diagnosed with a chronic disease, the parents of the toddlers were not at home when the research took place, and parents of toddlers were not willing to be respondents or resign. The control inclusion criteria are toddlers not stunting; is a neighbor of a stunted toddler; normal birth length and weight; did not move from the house when the toddler was born until the research was carried out; and mothers of toddlers want to be respondents.

The dependent variable is the incidence of stunting, while the independent variables are personal hygiene, water availability, and environmental sanitation. The diagnosis of stunting was obtained from the medical records of the Singgorojo I Health Center and measurements of the height based on HAZ. HAZ <-2 SD is categorized as stunting, and HAZ ≥-2 SD is called not stunting. Data collection for independent variables was carried out by interview using a questionnaire totaling 34 questions, and observations were made on children and the environment around the house. The score obtained is classified into 2, namely good and poor. It would be good if a score of ≥6 is obtained on the personal hygiene variable, ≥4 on the water availability variable, and ≥7 on the environmental sanitation variable. Data were analyzed using Chi-Square, Fisher Exact, and Logistic Regression. This research has received permission from the Medical / Health Research Bioethics Commission, Faculty of Medicine, Sultan Agung Islamic University Semarang No.91/III/2021/Bioethics Commission.

RESULTS AND DISCUSSION

Table 1 shows the demographic data characteristics of the respondents. Most stunted and non-stunted toddler mothers are aged 31-35 (36%) and 19-31 (28%). Most mothers' occupations are housewives (68%), with the last education being a high school graduate (40%). Majority family income ≥ Kendal UMR (74%). The majority of mothers have children ≤ 2 (80%). The majority of stunted toddlers are female (52%), while the majority of non-stunted toddlers are male (56%). Most stunted and non-stunted toddlers are aged 19-31 months (36%), with the majority height being 84-93 cm (38%). The p-value for all of the respondent's demographic data is > 0.05, so all demographic data is unrelated to the incidence of stunting.

Table 1. Demographic data of mothers and toddlers aged 6-59 months in the work area of the Singgorojo I Health Center of May 2021, Indonesia

Data	Children's Nutritional Status				p-value
	Stunting		Not Stunting		
Mother's age (years)	**n**	**%**	**n**	**%**	0.569
20 – 25	1	4	4	16	
26 – 30	6	24	8	32	
31–35	9	36	7	28	
36–40	6	24	4	16	
41–45	3	12	2	8	
Mother's Occupation (%)					0.108
Self-employed	4	16	3	12	
Private sector employee	4	16	0	0	
TKI	2	8	0	0	
IRT	13	52	21	84	
Laborer	1	4	1	4	
Etc	1	4	0	0	
Educational background (%)					0.749
Did not graduate from elementary	2	8	1	4	
school	5	30	4	16	

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Data	Children's Nutritional Status				p-value
	Stunting		Not Stunting		
Graduated from elementary school	8	32	6	24	
Middle school graduate	9	36	11	44	
High school graduate	1	4	3	12	
Bachelor					
Number of children (%)					0.157
>2	7	28	3	12	
≤ 2	18	72	22	88	
Family income (%)					0.747
< UMR	7	28	6	24	
≥ UMR	18	72	19	76	
Gender of the toddler (%)					0.571
Man	12	48	14	56	
Woman	13	52	11	44	
Toddler Age (months)					0.705
6 – 18	4	16	5	20	
19– 31	7	28	11	44	
32–44	7	28	5	20	
45–57	5	20	3	12	
>57 months	2	8	1	4	
Toddler height (cm)					0.485
64–73	3	12	2	8	
74–83	9	36	6	24	
84–93	10	40	9	36	
94 – 103	3	12	7	28	
≥ 104	0	0	1	4	

Chi-Square test; *) p-value is significant if <0.05

Table 2 shows that poor personal hygiene can increase the risk of stunting in toddlers by 5.8 times compared to good personal hygiene (p=0.012; OR=5.762; 95% CI=1.363-24.362). The table also shows that poor environmental sanitation can increase the risk of stunting in toddlers by 9.3 times (p=0.001; OR=9.333; 95% CI=2.431=35.839). The table also shows no relationship between the availability of water used for drinking and daily sanitation and the incidence of stunting (p>0.05).

Table 2. Relationship between personal hygiene, water availability, and environmental sanitation with stunting incidents among mother and toddlers aged 6-59 months in the work area of the Singgorojo I Health Center of May 2021, Indonesia

Variable	Stunting events				p-value	OR	CI
	Stunting		Not Stunting				
	n	%	n	%			
Personal Hygiene							
Bad	11	44	3	12	0.012*	5.762	1.363 – 24.362
Good	14	56	22	88			
Water Availability							
Bad	4	26	1	4	0.349	4.571	0.473 – 44.170
Good	21	84	24	96			
Environment Sanitation							
Bad	16	64	4	16	0.001*	9.333	2.431 – 35.839
Good	9	36	21	84			

Chi-Square test; *) p-value is significant if <0.05

Table 3 is the result of multivariate analysis using a logistic regression test. The purpose of this analysis is to find out which variable is dominantly related to the dependent variable[8]. From this analysis, it is known that environmental sanitation is the dominant factor related to stunting.

Table 3. Multivariate analysis between personal hygiene, water availability, and environmental sanitation with stunting incidents among mothers and toddlers aged 6-59 months in the work area of the Singgorojo I Health Center of May 2021, Indonesia

Variable	Coefficient	p-value	OR (95% CI)
Personal Hygiene	1.353	0.111	3.867 (0.732 –20.423)
Water Availability	2.333	0.066	10.305 (0.858 – 123.732)
Environment sanitation	2.355	0.002*	10.535 (2.419 – 45.887)

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Constant	-10.608	0.002*	<0.001

Logistic Regression test; *) p-value is significant if <0.05

From the data analysis, it can be seen that there is a relationship between personal hygiene and the incidence of stunting. This finding aligns with research by Sham and Sunuh (2020) with a cross-sectional design on 289 children under two years old in Central Sulawesi, which concluded that there was a significant relationship between handwashing with soap and stunting (p<0.001)[9]. Mothers' habit of washing hands with soap affects the nutritional status of children under five.

Washing hands with soap is an effort to protect oneself from disease. The hand is a part of the human body that can transfer germs through direct contact between hand and hand or through an intermediary of the object being held. Hands that touch feces, animal feces, or unsterile human body fluids and then touch food or drink without washing your hands with soap can make the food or drink contaminated with germs so that the germs enter the digestive tract[10]. Food or drink contaminated with germs can cause disturbances in the digestive system, such as diarrhea. If a toddler suffers from diarrhea, it can lead to malabsorption of nutrients, and if it is allowed to continue and not be balanced with adequate nutritional intake, it can lead to stunting[11].

In this study, not only the washing behavior of the mother's hands was assessed, but the cleanliness of the nails, hair, skin, bathing habits, and brushing the teeth of the toddlers were also assessed. Based on the interviews and observations, most toddlers already walking often play on the ground. Several toddlers were found playing on the ground barefoot. During observation, most toddlers found that their nails were long and dirty, and some even used nail polish. Soil can be a medium for transmitting diseases such as helminthiasis or diarrhea[12]. Children who often play on the ground and after playing on the ground do not wash their hands with soap and whose nails are long and dirty have a higher potential for infectious diseases due to ingesting microorganisms that are in the dirt of their nails or hands with the food or drink they consume, which can cause malabsorption of substances.

From the data analysis, it is known that there was no relationship between water availability and stunting. Based on field observations, most respondents in the stunted and non-stunted groups used good clean water sources, namely mountain springs. Villagers use the mountain springs as a source of drinking water for bathing, washing, and toilets (MCK) every day[13]. The mountain spring water is collected in a water storage tank and then flows to the villagers' houses through *pralon* pipes. From the observations that have been made, the majority of mountain springs, which are sources of clean water for drinking water needs and MCK activities, meet the physical parameters of clean water, namely water that is odorless, colorless, tasteless, and not cloudy. Observations for biological and chemical parameters of clean water were not carried out due to limited equipment.

This study was in line with Lestari et al. (2014) with a case-control design in 110 children aged 6-24 months in Aceh province, which concluded that there was no significant relationship between the availability of clean water sources and stunting (p=0.46; OR=1.73; 95% CI=0.39 – 7.63). Based on the results of this study, only 9.1% of stunted toddlers whose parents had poor availability of clean water. Most of the respondents in the study used tap water from PDAM as their daily drinking water[14]. Permenkes No. 32 of 2017 states that clean water must be physically, biologically, and chemically feasible. This water can be used for bathing, brushing teeth, washing cutlery and groceries, washing clothes, and can be used as drinking water[15].

Water is a medium that can be an intermediary for the spread of germs. There are various diseases caused by water, one of which is water borne disease and water washed disease[16]. Waterborne diseases transmit disease through water contaminated with germs and then consumed by humans, so the germs also enter the human digestive tract. Water-washed diseases transmit disease through the environment around clean water sources that are not kept clean. If the environment is not watertight, then the wastewater used for washing can re-enter so that the source of clean water is polluted and susceptible to contamination by germs. One of the diseases that polluted clean water sources can cause is diarrhea[16]. Diarrhea can result in malabsorption of nutrients, and if a toddler who is still growing has diarrhea continuously and is not matched with adequate nutritional intake, it can result in stunting[11].

From the data analysis, it can be seen that there was a relationship between environmental sanitation and stunting. This finding aligns with research by Wulandari et al. (2019), who concluded that environmental sanitation is related to stunting (p=0.008)[17]. In this study, environmental sanitation was assessed, consisting of access to healthy latrines, ownership of septic tanks, ownership of trash cans, and ownership of Waste Water Disposal Channels (SPAL). A latrine is a place for disposing of human feces that needs to be kept clean. If they are not kept clean, latrines can become a permanent medium for insects that can spread disease through insects such as flies or cockroaches that are contaminated with feces and then spread the disease to humans through the food or drink they infest[16]. Garbage is the residue of human activities whose management must be carried out properly so that it does not have a negative impact on the environment. Adverse effects can be caused, such as causing odor if left alone, causing air pollution when burned, and can cause flooding when disposed of into rivers[16]. Besides causing odor, household wastewater can contain microorganisms that can cause disease in the digestive system through contaminated water[16]. Good maternal/caregiver hygiene and sanitation practices can be an inhibiting factor for stunting, according to research conducted in the working area of the Kotakulon Public Health Center, Bondowoso Regency, which shows that good hand washing habits have a risk of 0.12 times that their toddler will experience stunting[18].

The limitation of this study was the variable availability of water, and researchers only researched the

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physical quality of clean water and drinking water sources without examining the quality of clean water from microbiological and chemical aspects. The limitation also lies in using sampling techniques, namely non-probability sampling, so the research results cannot yet represent the target population in the working area of the Singgorojo 1 Health Center, Kendal Regency.

CONCLUSIONS

Most respondents have good personal hygiene, water availability, and poor environmental sanitation. Personal hygiene and environmental sanitation are related to stunting. Poor personal hygiene can increase the risk of stunting in toddlers 5.8 times compared to good personal hygiene. Poor environmental sanitation can increase the risk of stunting 9.3 times compared to good environmental sanitation.

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