

The Relationship of Gender, School Sanitation and Personal Hygiene with Helminthiasis at Juhar Karo Regency in North Sumatera Province, Indonesia

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Abstract

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BACKGROUND: Helminthiasis is a parasitic disease in human that causes a disturbance in food absorption and lead to malnutrition. The disease slowly impacts on the intelligence. The incidence of helminthiasis in Indonesia remains high, ranging from 2.5% to 62%. A preliminary study found that the proportion of helminthiasis in children is 31.25%.

AIM: The aim of the study to analyse the relationship between age, school sanitation and personal hygiene with helminthiasis elementary school children in Juhar Karo Regency in 2019.

METHODS: This was an observational study with a cross-sectional design. Subjects were children in grades IV, V and VI with and without helminthiasis. A total of 194 children selected by proportional random sampling were enrolled. Data were collected by interview, observation, and stool examination with the Kato-Katz method.

RESULTS: The proportion of helminthiasis in boys was 51.0%, the proportion of poor sanitation in school was 36.6%, and the proportion of poor personal hygiene was 67.5%. Personal hygiene was significantly associated with the incidence of helminthiasis (RP = 6.052; 95% CI = 3.029-12.902; P-value = 0.001). Improved personal hygiene may prevent the occurrence of helminthiasis.

CONCLUSION: The proportion of helminthiasis in elementary school students in this region was 50.0%. Personal hygiene has been shown to be related to helminthiasis. In this study, subjects with poor personal hygiene had a chance of 6.052 times greater to experience helminth infection compared to subjects who had good personal hygiene.

Introduction

Helminthiasis is one of the infectious diseases that remain a public health problem, particularly in Indonesia. This disease affects food absorption, nutritional status and reduces health condition, especially in elementary school children [1].

World Health Organization (WHO, 2017) estimated more than 1.5 billion people or 24% of the world population to be infected with soil-transmitted helminth (STH), and more than 880 million of children

need treatment due to this parasitic disease [2]. The increased numbers of helminth infections in primary school children may be caused by behavioural factors including not washing hands before eating, or after defecating, not using sandals when leaving the house and not cutting the nails regularly. This situation can also be exacerbated by poor living environments such as no latrines and high humidity environment [3].

The Indonesian Ministry of Health (2017) proved that the prevalence of helminthiasis in Indonesia ranged from 2.5% to 62% [4]. The prevalence reported above is supported by the results of a survey conducted in several regencies in 2011,

where the prevalence of helminthiasis in Lebak and Pandeglang to be 62% and 43.3%, respectively; Sleman regency at 21.8%; Karangasem regency at 51.3%; West Lombok regency at 29.5%; Mataram City at 24.5%; and West Sumba at 29.6%[1].

A study by Martila et al., (2015) reported elementary school students in Pantai Jayapura, Papua had 50% prevalence of helminthiasis [5]. The numbers were dominated by infections by *Ascaris lumbricoides* (48.5%), followed by *Trichuris trichiura* (28.6%) and hookworm (14.3%). While other study reported prevalence as high as 59.3% in Wera district, Bima regency [6].

The initial survey conducted by the North Sumatra Health Office in 2014 found that in some North Sumatra regencies, the prevalence of helminthiasis was 29%; 25% was caused by *A. lumbricoides*, and 1% each was due to *T. trichiura* and hookworms. This prevalence decreased to 22.5% in 2016 [7].

In Karo regency, the prevalence was 41.1% in 2014 with *A. lumbricoides* as the predominant species. In 2017, this prevalence increased to 57.6% with *A. lumbricoides* at 41.4% and *T. trichiura* at 16.2% [7]. A repeat survey in 2018 in two elementary schools in Juhar District of Karo regency demonstrated a remaining high prevalence at 31.25%. This may be due to several risk factors like human habits and environmental factors. Saeni and Arief (2016) have shown the relationship between helminthiasis and personal habits. The prevalence of helminthiasis was significantly higher in children who did not wash their hands before eating (64.0%) and after defecation (62.2%) [8].

Furthermore, environmental sanitation factors like sanitation, sewage, and waste facilities, and housing conditions like dirt floor, access to clean water, availability of trash bin and wastewater disposal facilities are associated with the helminthiasis incidence [9], [10].

The aim of this study was to analyse the association between gender, school sanitation and personal hygiene with the incidence helminthiasis on elementary school students in Juhar Village, Juhar District, Karo Regency of North Sumatra Province.

Methods

Study Design

This study was an analytic observational study with a cross-sectional design.

Subjects

Enrolled subjects in this study were all students of grades IV to VI at the Public Elementary School in Juhar Village in 2019. Inclusion criteria included respondents who had settled in Juhar village in a minimum of 3 months and respondents who agreed to be the subject of the study and followed all study protocols. Exclusion criteria included respondents who consumed anthelmintic in the last 3 months and respondents who had siblings in the grades IV, V or VI.

Data Collection

Data was collected directly through interviews using questionnaires. School personal hygiene and sanitation data were taken using a questionnaire in the form of tested and standardised questions. The stool was collected in a labelled pot that had been distributed previously to school children. The label included the student's name, date of birth, gender, and class. A stool sample, a size of a thumb, was taken using an ice cream stick, then put in a stool pot and closed tightly. Stool examination was done in the laboratory using the Kato Katz method.

The following data were identified: gender, school sanitation, personal hygiene of each respondent. Data analysis was done by stages, with univariate analysis, bivariate analysis with Chi-Square test at a significance level of 0.05.

Results

Table 1 showed the baseline characteristics of the subjects. The majority of subjects were male (99, 51.0%). Poor school sanitation was found in 36.6% of subjects, and poor personal hygiene was found in 131 people (67.5%). While the prevalence of helminth infections was 50%.

Table 1: Baseline characteristics (n = 194)

Characteristics	n	%
Gender		
Male	99	51.0
Female	95	49.0
School sanitation		
Poor	71	36.6
Good	123	63.4
Personal hygiene		
Poor	131	67.5
Good	63	32.5

Bivariate analysis showed a significant relationship between personal hygiene and helminthiasis (PR = 6.052), which means that the helminth infection was 6 times more likely to occur in children with poor personal hygiene than those with good personal hygiene. However, there was no significant relationship between school sanitation ($P = 0.315$), gender ($P = 0.655$) and helminthiasis.

Table 2: Gender relationship, school sanitation and personal hygiene with helminthiasis accident in 2019

Variable	Helminthiasis				Total		p value	RP (CI=95%)
	(+)		(-)		n	%		
	n	%	n	%	n	%		
Gender								
Male	46	46.5	53	53.5	99	100	0.315	0.749 (0.426 - 1.317)
Female	51	52.7	44	46.3	95	100		
School sanitation								
Poor	37	38.1	34	35.1	71	100	0.655	1.143 (0.637-2.050)
Good	60	61.9	63	64.9	123	100		
Personal hygiene								
Poor	83	63.4	48	36.6	131	100	0.001	6.052 (3.029 -12.092)
Good	14	22.2	49	77.8	63	100		

failed to show a significant association between poor sanitation with helminthiasis.

On the other hand, we found a significant relationship between personal hygiene and the incidence of helminthiasis. A similar association has been shown in other studies with children with poor personal hygiene had an increased risk to experience helminthiasis [14], [15], [16], [17].

Personal hygiene is very important in efforts to control the risk factors for helminthiasis. This can be done through efforts to improve personal hygiene or environmental cleanliness. Poor personal hygiene of a person may cause helminthiasis which is often influenced by the poor behavior of children such as not washing their hands after defecation, not using the soap when washing hands, not washing their feet and hands with soap after playing on the ground, not using footwear when playing and going out of the house, fail to maintain the cleanliness of nails, and consuming uncooked water [4].

Based on the results of the study, it can be concluded that helminth infection in this study can be influenced by various factors, one of which is personal hygiene. Poor personal hygiene will be at risk of contracting an infection, especially by STH. This has been shown in several other studies where respondents with poor personal hygiene experienced more infections than children who had good personal hygiene. Poor personal hygiene will aggravate the incidence of helminthiasis in elementary school students because at the age of the elementary school they are not able to independently manage their personal hygiene. And good personal hygiene is an important requirement in preventing and breaking the chain of the spread of infectious diseases such as helminthiasis.

The regulation by the Ministry of Health of Indonesia (2017) on helminthiasis prevention including reducing the prevalence of helminth infections by killing the worms through mass treatment to reduce the intensity of infections (number of worms per person), in order to improve health level. But the treatment of worms must be accompanied by the efforts to live clean and healthy, improved environmental sanitation, and nutritious food intake. For this reason, there is a need for cross-program cooperation and cross-sector collaboration between the government and the private sector. So continuous communication and understanding between these sectors will be achieved, and helminthiasis can be prevented in the short and long term [4].

In conclusion, the proportion of helminthiasis in elementary school students in this region was 50.0%. Personal hygiene has been shown to be related to helminthiasis. In this study, subjects with poor personal hygiene had a chance of 6.052 times greater to experience helminth infection compared to subjects who had good personal hygiene.

Discussions

Stool examination on 194 elementary school students in Juhar Village, Juhar District, Karo Regency showed 50% positivity for STH infection. This prevalence is considered high, which is similar to other findings in other parts of Indonesia [4].

There are 25 villages in Juhar District, Tanah Karo Regency with a population of 15,937 people and mainly works as farmers. Our previous study has shown that this area is disadvantaged areas as seen from the numbers of houses that still had not met the good environmental sanitation standards. During our observations, many houses still had the sewage run into their yard. School environmental sanitation facilities such as toilets were provided but not well maintained so they could not be used properly. Besides, there was also no sink for washing hands. As a result of inappropriate facilities, elementary school students can defecate anywhere near the school. This then leads to an increasingly uncontrolled spread of worms. This was also supported by the poor hygiene behaviour of elementary school children like lack of attention to nail hygiene, and not wearing footwear when playing on the schoolyard.

In this study, we found no significant relationship between gender and helminthiasis. This is in line with other studies by Ginting (2005) and Kartini (2014). These studies described that gender did not influence the incidence of helminth infection. In Karo region, the majority of occupation for both male and female is farming, therefore the same activities including washing, fetching water, farming and taking care of the house were done by both male and female [11], [12].

Similar to gender, school sanitation was also not associated with helminthiasis, as reported by Sumanto (2010) that school sanitation is not a risk factor for hookworm infection among school students [13]. In this study, school sanitation condition was assessed based on the condition of the bathroom, availability of public handwashing place in the canteen, bathroom tubs, and distance of garbage collection with a canteen < 20 meters. Despite poor condition found in all 4 studied schools, our study

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