Insights in Public Health Journal

https://doi.org/10.20884/1.iphj.2021.2.2.5334

Original Article

Epidemiology of Soil Transmitted Helminthiasis in Depok, West Java

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ABSTRACT

Soil transmitted Helminthiasis (STH) is one of the infectious diseases which is still a health problem in Indonesia, because it is still contagious in most parts of Indonesia. This disease can cause significant losses for sufferers such as decreasing health, nutrition, intelligence, and productivity. This study aims to determine the prevalence of helminthiasis in Depok City in 2019. This study used a cross sectional design which was carried out in 30 elementary schools in Depok City, West Java. The sample of selected grade 3 - 5 primary school students was taken by the Two Stage Cluster Sampling method. A total of 315 student faecal samples were examined by the Kato-Katz and 524 questionnaires about knowledge, environmental sanitation and personal hygiene were collected. The result of this survey is that the prevalence of worms in Depok City in 2019 is 0.32. With this result, the recommendation is that there is no need to give worm drug treatment in this region anymore. Based on the results of the questionnaire, knowledge about the symptoms and methods of prevention was quite good, personal hygiene also mostly in good criteria however there were still 88.2% who had not washed their hands with soap before meals, and 94.1% of children had not washed their hands with soap after defecation. Although the prevalence of helminthiasis in Depok City is relatively low, there is still a need to increase awareness about the behavior of washing hands with soap before eating and after defecation

Key words : helminthiasis, prevalence, personal hygiene

INTRODUCTION

Soil Transmitted Helminthiasis (STH) are one of the infectious diseases that are still a health problem in Indonesia, because they are still prevalent in most parts of Indonesia. Until now, STH are still considered a trivial thing by most people, even though when viewed from the long-term impact, worms can cause considerable losses for sufferers and their families (Yuwono et al., 2019). Soil Transmitted Helminthes (STH) infection is the most common cause of helminthiasis in the world, especially *Ascaris lumbricoides* (roundworm), *Necator americanus* and *Ancylostoma duodenale* (hookworm), and *Trichuris tricihura* (whipworm) (Amoah et al., 2018). This disease is transmitted by fecal-oral route which can be transmitted to humans through contact with worm eggs, such as food and drink contaminated with worm eggs, or contact with soil contaminated with worm eggs. The transmission of this disease is closely related to poor personal hygiene (Truscott et al., 2016).

STH infect more than 1.5 billion people, or 24% of the world's population, infected with soil-borne helminth infections worldwide. The infection is widespread in the tropics and subtropics, with the greatest number occurring in sub-Saharan Africa, the Americas, China, and East Asia. Worms usually attack preschool and school age children. More than 267 million preschool-aged children and more than 568 million school-age children live in areas where this parasite is transmitted intensively, and requires preventive care and intervention (WHO, 2019).

In general, the prevalence of STH in Indonesia is still very high, especially among the poor, with poor sanitation. The prevalence of helminthiasis varies between 2.5% - 62% (Widjaja et al., 2014; Yuwono et al., 2019). The high prevalence of worms can be caused by the tropical climate and high humidity which is suitable for the life of worms (Karshima, 2018). The impact of helminthiasis can lead to a decrease in health conditions, nutrition, intelligence, and productivity (Muller et al., 2011; Nwaneri & Omuemu, 2013). Worm infection can reduce nutritional status because it causes loss of iron and protein. Hookworms also cause

chronic intestinal blood loss which can lead to anemia. Worms increase nutrient malabsorption. In addition, roundworms may compete for vitamin A in the intestine. Some soil-borne worms also cause loss of appetite, reducing nutrient intake and physical fitness. Then infection with worms, *T. trichiura* can also cause diarrhea and dysentery (Yamamoto et al., 2000; Yap et al., 2014).

Risk factors associated with helminthiasis include environmental sanitation and personal hygiene. Several previous studies have mentioned several factors that increase the risk of helminthiasis such as hand washing habits, nail cutting habits, playing dirt habits, and the habit of not wearing footwear (Novianty et al., 2018a; Samuel et al., 2017).

Efforts to reduce the number of helminth infections in Indonesia need to carry out worm surveillance. Worm surveillance is an activity of systematic and continuous observation of data and information about the incidence of helminthiasis and conditions that affect the increase and transmission of helminths to obtain and provide information to direct effective and efficient countermeasures (Gunawardena et al., 2014). One of the helminthic surveillance activities is a helminth prevalence survey, which is conducted to determine the level of helminth prevalence in a district/city.

The prevalence of helminthiasis in West Java, especially in rural areas is still quite high. Previous research conducted on elementary school students in Cihanjuang Rahayu Village, West Bandung was 15.5% (Silitonga et al., 2013). Meanwhile, the prevalence of helminthiasis in other areas such as in Depok City is not yet known. The city of Depok, West Java has carried out the POPM (Mass Prevention Drug Delivery) activity, but the prevalence of helminthiasis in the area is not yet known. Therefore, the purpose of this study is to determine the prevalence of helminthiasis in Depok City to be able to determine the next steps for preventing helminthiasis. This study also added data collection regarding knowledge about symptoms and efforts to prevent worms, environmental sanitation and personal hygiene.

METHODS

This research is an observational study with a cross sectional design. This survey was carried out in 30 primary school in Depok City. This survey was conducted on March 12, 2019 – March 21, 2019 in Depok City, West Java. Data was collected by examining stool samples, interviewing with a questionnaire guide to the selected respondents, and observing. The sample in this worm survey is grade 3 -5 primary school students who were selected using the Two Stage Cluster Sampling method with a target of 600 respondents from 30 schools. and the Kato-katz method for examination of stool samples. The socialization of the implementation of the worm prevalence survey and the distribution of the questionnaire by the community health center staff was carried out the day before the stool sample was taken in the selected SD/MI, and then the questionnaire had to be filled out by the selected students who were present during the socialization of the implementation of the worm prevalence survey.

Interviews with structured questionnaire guidelines were conducted to describe the risk factors for helminthiasis in elementary school children in Depok City. The risk factors for which data were taken using a structured questionnaire included environmental sanitation (family latrines, clean water facilities), personal hygiene (cleanliness of nails, use of footwear, habit of washing hands before eating, habit of playing on the ground, habit of snacking, having pets), knowledge of children (knowledge of the signs of worms, knowledge of how to transmit worms, and knowledge of how to prevent worms), and the characteristics of children (gender and occupation of parents). Stool samples were taken the next day. The results of the analysis were carried out by calculating the prevalence of helminthiasis, by the formula :

$$\frac{\text{"Number of positive stool samples for worm eggs"}}{\text{"Number of stool samples examined"}} \times 100\%$$

In addition, descriptive data analysis was also carried out and displayed in a frequency distribution table.

RESULTS

Based on the results in the field, for the characteristics of children participating in the study, it is known that the gender distribution of respondents is almost the same between men and women, and most of them have a working father and mother. Characteristics of children can be seen in Table 1.

Table 1. Characterictics of children

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Gender			
a.	Man	266	50,8%
b.	Women	257	49,0%
	N	511	
	Missing	13	
Father's occupation			
a.	Employed	484	92,4%
b.	Unemployed	15	2,9%
	N	499	
	Missing	25	
Mother's occupation			
a.	Employed	316	60,2%
b.	Unemployed	136	26,0%
	N	452	
	Missing	72	

For the results of the sample examination, from 315 samples examined from 30 elementary schools, only 1 faecal sample from MI Ia'anatul Ikhwan was found that was positive for whipworm eggs (Trichuris trichiura), while the rest were negative for worm eggs. So based on the calculation of the formula, the prevalence of helminthiasis in Depok City in 2019 is 0.32%.

Then for the questionnaires distributed to students, the target of the questionnaires distributed in the selected SD/MI was 600 questionnaires, but only 524 were returned. Based on the univariate analysis, the detailed knowledge of students on the symptoms and efforts to prevent helminthiasis was found in Table 2. Based on Table 2, respondents who have sufficient knowledge about signs of worms are 373 people (71.2%). Respondents who have sufficient knowledge about the transmission of helminthiasis are 460 people (87.8%). Respondents who have sufficient knowledge about how to prevent helminthiasis are 343 people (65.5%). Based on 524 questionnaires that have been analyzed, as many as 514 respondents answered questions about knowledge of the signs of worms, 507 respondents answered questions about knowledge of how to transmit worms, and 509 respondents answered questions related to knowledge of how to prevent STH.

In addition to knowledge, data on environmental sanitation was also collected and the results can be seen in Table 3.

Based on Table 4, it is known that respondents who have latrines meet the requirements of 97.9%. Meanwhile, for clean water facilities, respondents who have clean water facilities that meet the requirements are 98.6%. Based on 524 questionnaires that have been analyzed, it is known that only 519 respondents answered questions related to latrines and as many as 517 respondents answered questions related to clean water facilities. Then, for the individual hygiene characteristics of students, several questions were also asked to the respondents.

Table 2. Respondents' knowledge of the symptoms and prevention of STH

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Variables	n	Percentage
Knowledge about the symtoms of STH		
Good	373	71,2%
Bad	141	26,9%
N	514	
Missing	10	
Knowledge about the transmission of STH		
Good	460	87,8%
Bad	47	9,0%
N	507	
Missing	17	
Knowledge about the prevention of STH		
Good	343	65,5%
Bad	166	31,7%
N	509	
Missing	15	

Table 3. Environmental conditions

Variables		n	Percentage
Lactrine			
a.	Qualified	513	97,9%
b.	Unqualified	6	1,2%
	N	519	
	Missing	5	
Clean Water Facilities			
a.	Qualified	516	98,6%

b.	Unqualified	1	0,2%
	N	517	
	Missing	7	

Table 4. Personal hygiene of respondents

Variables		n	%
Nail Hygiene			
a.	Clean	402	76,7%
b.	Dirty	95	18,1%
	N	497	
	Missing	27	
The use of footwear			
a.	Yes	442	84,4%
b.	No	64	12,2%
	N	506	
	Missing	18	
Habit of Washing Hands Before Eating			
a.	Using soap	57	10,9%
b.	No	462	88,2%
	N	519	
	Missing	5	
Habit of washing hand after defecation			
a.	Using soap	26	5,0%
b.	No	493	94,1%
	N	519	
	Missing	5	
Playing in the ground			
a.	Yes	97	18,5%
b.	No	399	76,1%
	N	496	
	Missing	28	

Based on Table 4, it is known that there are still many elementary school students who do not wash their hands with soap before eating (88.2%) and do not wash their hands with soap after defecation (94.1%).

DISCUSSION

Based on the results of the examination of 315 faecal samples in this study, only 1 sample that was positive for worm eggs was identified as whipworm eggs (Trichuris trichiura), while the rest were negative for worm eggs. This shows that the prevalence of helminthiasis in the Depok area is low, which is only 0.32%. With these results, according to Permenkes number 15 of 2017 concerning Guidelines for Worms Control, if the prevalence of helminthiasis in an area is less than 1%, there is no need to do POPM again.

The results of the low worm prevalence in Depok City are a good thing due to the low worm infection in this area. Compared to the results of prevalence surveys in other areas, the prevalence of helminthiasis in Depok is very low. The prevalence of helminthiasis in Malinau Regency, East Kalimantan Province was higher at 6.16% (Hairani et al., 2014), while in West Kupang it was 12% (Susilawati, 2017). This may be due to the fact that Depok City is an urban area with good enough sanitation and hygiene so that the helminthiasis rate is low.

In addition, these results are supported by the results of the respondents' knowledge which is quite good about the symptoms, modes of transmission and methods of preventing helminthiasis. Some of the respondents in this study showed that they had good knowledge. By having good knowledge, it is likely that respondents will also carry out good preventive behavior as well. This is also seen in previous studies which revealed a correlation between knowledge and behavior, especially regarding the problem of worm infection. By having good knowledge about the signs and symptoms of helminthiasis, how it is transmitted, it is hoped that a person can practice clean and healthy living habits (Curtale et al., 1998).

For environmental sanitation, the results of this study stated that most respondents reported that environmental sanitation was good. 97.9% of respondents already have healthy latrines, and 98.6% already have access to clean water. Environmental sanitation conditions that are already good and meet these requirements may explain the low prevalence of helminthiasis in the Depok City area. Previous research has suggested that better sanitation will lead to a reduced prevalence of soil-borne helminth infections and can prevent fecal contamination from spreading in the household (Steinbaum et al., 2019). Usually, helminth infections are associated with low coverage of healthy latrines and access to water. clean. In some cases of

worm infection, low coverage of healthy latrines and open defecation (BABS) behavior can cause worm eggs from the patient's feces to be more easily transmitted to other people. Likewise, lack of access to clean water can increase the risk of helminth infections (Ziegelbauer et al., 2012).

Behavior that has not been good in the results of this study is the low habit of washing hands with soap before eating, and after defecating. Most of the respondents still have not done the habit of washing their hands with soap. Dirty hands or contaminated with worm eggs can be transmitted fecal-oral when the person eats or drinks. Based on a meta-analysis study, the habit of washing hands with soap can reduce the incidence of helminthiasis with a decrease of 33% (Strunz et al., 2014). Washing hands with soap can kill worm eggs so that the chain of transmission of helminth infections can be broken. The habit of washing hands with soap can reduce many diseases that are transmitted through the fecal-oral route (Novianty et al., 2018b). The fact found in this study that hand washing habits are still low, but the prevalence of worms is small may be caused by other environmental conditions that do not support the development of worms. So it is possible that there are indeed few worm eggs in the study area. Even so, recommendations for hand washing should still be increased to prevent helminthiasis and other diseases, especially those transmitted by fecal-oral route (Ercumen et al., 2019).

This study shows that the prevalence of worm infection in elementary school children in Depok City, West Java is quite low, only 0.32%. Therefore it is not necessary to do POPM again. Knowledge about helminth infections and environmental sanitation in the form of healthy latrines and access to clean water are good. However, it is necessary to continue to increase awareness to wash hands with soap before eating or after defecating because most of the respondents have not yet done this.

ACKNOWLEDGMENTS

We thank to the Jakarta Center for Environmental Health and Disease Control Engineering (BBTKLPP) which helped carry out the research.

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