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Prevalence and Risk Factors of Soil-transmitted Helminth Infections in Cattle Breeders in Mlaten Village, East Java

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ABSTRACT

Background: Soil-transmitted helminth infections are diseases caused by the ingestion of infective stages (in the form of eggs, larvae, cysticercoid, and plerocercoid) of worms (nematodes, cestodes, and trematodes) into the human gastrointestinal tract through the fecal-oral route. The risk factors associated with soil-transmitted helminth infections are environmental factors and hygiene factors. These factors are commonly found in agricultural areas. Therefore, we conducted research in Mlaten Village because the majority of the villagers work as cattle breeders. In addition, the surrounding community, especially cattle breeders, experienced excessive diarrhea that was probably caused by a lack of hygiene knowledge, poor sanitation, and low awareness of cattle care and management. This study aims to determine the prevalence and risk factors of soil-transmitted helminth infections in cattle farmers in Mlaten village, Mojokerto, East Java. **Methods:** This research was conducted using a survey method and cross-sectional study design with 30 cattle farmers as respondents. Human and cow feces were identified using a staining method in the form of 2% eosin. We also used questionnaires to determine the risk factors. The data obtained were presented descriptively and risk factors were analyzed using the chi-square test. **Results**: The results showed that the habit of cutting nails (OR= 0.083; CI 95%= 0.007-0.950; p<0.05), the habit of washing hands (OR= 0.000; CI 95%= 0.000-0.000; p<0.05), and the habit of washing hands with soap (OR= 0.040; CI 95%= 0.267-18.925; p<0.05) have a significant effect on the incidence of soil-transmitted helminth infections. **Conclusion:** The prevalence of soil-transmitted helminth infections is significant to personal hygiene risk factors.

1. Introduction

Soil-transmitted helminth infections are still a common health problem in the world, especially in developing countries such as Indonesia [1]. This disease is mainly caused by roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*), hookworms (*Necator americanus* and *Ancylostoma duodenale*), *Taenia sp, D. caninum*, and *D. latum.* Chronically infected individuals can suffer from a variety of clinical complications, including poor physical and mental development [2]. The transmission of soil-transmitted helminths is associated with poverty and poor living conditions, inadequate sanitation and water supplies, soil quality, and climate, poor personal and environmental hygiene, and poor health awareness [3].

According to the World Health Organization (WHO), more than 2 billion people of the world's population were infected with soil-transmitted helminth infections in 2019. Based on the results of a survey in several regions of Indonesia in 2011, the prevalence reached 78% in Sumatra, 79% in Kalimantan; 88% in Sulawesi, 92% in West Nusa Tenggara, and 90% in West Java [3]. A previous study reported that the prevalence of soil-transmitted helminths in 30 farmers in the Gatep neighborhood of South Ampenan Village was 90.00%, with details as follows: *Ascaris lumbricoides* (80.00%), *Trichuris trichiura* (6.67%), and *Necator americanus* (3.33%) [4].

Based on the results of research in East Java, especially in the Tikung Sub-District, Lamongan district, from 50 samples of cow dung at Sumber Jaya Ternak farm, 3 samples (6%) contained nematode worms and 47 samples (94%) were free of nematode worms. 3 samples (6%) contained nematode worms and 47 samples (94%) were free of nematode worms [5]. A study conducted in LPA Surabaya(Benowo Final Disposal Site, Surabaya) showed that the prevalence of soil-transmitted helminths was 73%. 6 species of worms (*Oesophagostomum sp., Trichostrongylus sp., Bunostomum sp., M. digitatus, T. vitulorum,* and *Trichuris sp)* were found in the cow feces samples [6]. The presence of disease disorders in cattle hampers animal husbandry activities because it affects milk production and livestock fertility [7]. Therefore, health monitoring is an essential part of cattle breeding as the health of livestock greatly influences the yields [8]. In addition, the health of the breeders is also important. An earlier study [9], showed that the prevalence of helminth infection was 19.2%, and the majority of the cattle farmers also experienced helminth infections when their cows are positive for parasitic worm eggs [10].

The major risk factors of soil-transmitted helminth infections are because helminth infections are transmitted through soil. An earlier study reported that 90.8% of those infected with soil-transmitted helminths live in unfavorable environmental conditions [11]. The study also showed that the personal hygiene of the respondents was poor and worm eggs were found in their feces [12]. As the environment is one of the main risk factors in soil-transmitted helminth infections, Mlaten Village, Mojokerto, East Java was an ideal research location because the environment largely consists of agricultural areas and the majority of the people work as traditional cattle breeders. In addition, a large number of people did not understand the importance of environmental sanitation and personal hygiene making the surrounding community vulnerable to excessive diarrhea. Thus, we attempted to identify the presence of intestinal nematode eggs and the state of risk factors (environmental sanitation and personal hygiene) in Mlaten Village, Mojokerto, East Java.

2. Materials and Method

This research was conducted using a survey method and cross-sectional study design. 30 respondents were selected using slovin formula. The inclusion criteria are cattle breeders and females and/or males aged 15-60 years at Mlaten Village, Mojokerto, East Java. Purposive sampling technique was used to conduct sampling by giving a questionnaire about risk factors (environmental sanitation factors and personal hygiene factors). There are two main types of data in the research. First was the observation of the presence of parasitic worm eggs by examining feces consisting of 30 samples of farmers' feces and 30 samples of cow manure using the staining method at the Integrated Biology Laboratory of Stikes RS Anwar Medika. The tools and materials used in the observations were Olympus CX 23 binocular microscope, 2% eosin, object glass, and cover glass. The second data was the risk factors questionnaire assessment. Both data were presented descriptively and analyzed using a chi-square test performed on SPSS.

3. Results and Discussion

3.1. Results

Table 1 shows that most respondents are male (80%). More than half of the respondents are 45-60 years (60%). In terms of educational background, almost half the respondents are high school graduates (46%). More details can be seen in Table 1 The results of fecal examination showed that from 30 feces samples of farmers, 13% of worm eggs were from *Ascaris lumbricoides* (6.7%) and *Trichuris trichiura* (6.7%). Meanwhile, from 30 samples of cow feces, 60% of parasitic

worm eggs were from *Ascaris lumbricoides* (33.3%). Based on Table 3, the habit of cutting nails (OR= 0.083; CI 95%= 0.007-0.950; p<0.05), the habit of washing hands (OR= 0.000; CI 95%= 0.000-0.000; p<0.05), the habit of washing hands with soap (OR= 0.040; CI 95%= 0.267-18.925; p<0.05) have significant effect on the incidence of soil-transmitted helminth infections. Farmers who regularly cut their nails have 0.083 times the chance of getting soil-transmitted helminth infections compared to farmers who do not have the habit. Farmer who washes their hands with soap is 0.040 times at risk of the incidence of helminth infections compared to farmers who do not wash their hands with soap.

Table 1. The Characteristics of Respondents

Variable	n	%
Gender		
Man	24	80
Female	6	20
Age (years)		
15-30	5	16
30-45	7	24
45-60	18	60
Educational Background		
Elementary school	7	24
Junior high school	9	30
Senior high school	14	46

Table 2. The Result of Parasitic Worm Egg from the Samples

Sample Type	The Types of Soil-transmitted Helminths					(+)	(-)
	Ascaris lumbricoides	*Trichuris trichiura*	*Taenia sp.*	*Dipylidium canium*	*Diphyllobothrium latum*		
Human Feces	2 (6.7%)	2 (6.7%)	0 (0%)	0 (0%)	0 (0%)	4 (13%)	26 (87%)
Cow Feces	10 (33.33%)	1 (3.33%)	5 (16.7%)	1 (3.33%)	1 (3.33%)	18 (60%)	12 (40%)

Table 3. Bivariate Analysis

Variable	Description	Soil-transmitted Helminth Infections						P value	OR (CI 95%)
		Non Infection		Infection		Total			
		F	%	F	%	F	%		
Environmental Sanitation Conditions									
Environmental Sanitation	Clean	25	89	3	11	28	100	0.114	0.120 (0.006-2.458)
	No	1	50	1	50	2	100		
Animal Feces Disposal Site	Separated	16	89	2	11	18	100	0.661	0.625 (0.076-5.172)
	Not Separated	10	83	2	17	12	100		
Environmental Cleaning Frequency	1-2 times a week	8	80	2	20	10	100	0.448	2.250 (0.267-18.925)
	3-4 times a week	18	90	2	10	20	100		
Individual Sanitary Hygiene									
Nail Cutting Habits	Yes	24	83	2	17	26	100	0.020	0,083 (0.007-0.950)
	No	2	50	2	50	4	100		
Hand Washing Habits	Yes	26	100	0	0	26	100	0.000	0.000
	No	0	0	4	100	4	100		
Hand Washing Using Soap	With soap	25	93	2	7	27	100	0.004	0.04 (0.002-0.657)
	Just water	1	33	2	67	3	100		

3.2. Discussion

Based on the results of research, worm eggs were found in the feces samples of both farmers (13%) and cattle (60%). The percentage of environmental sanitation was as follows: 3 people (11%) have good environmental sanitation while only 1 person (50%) has poor environmental sanitation. In terms of livestock feces disposal, 2 people (11%) dispose of the feces in a separate location and 2 others (17%) dispose of the feces in a non-separate location. For cleaning frequency, 2 farmers (20%) clean the environment 1-2 times a week, and 2 others (10%) clean the environment 3-4 times a week (Table 3).

The presence of intestinal nematode eggs indicates a health risk that can have an impact on animal husbandry activities. Research at Sumber Jaya Ternak farm, Tikung sub-district, Lamongan reported that 94% of cows were not infected with soil-transmitted helminths due to the awareness of farmers in feeding patterns and cow hygiene [5]. Based on the statistics, cattle farmers in Mlaten village already have good sanitation hygiene so no relationship was found between environmental sanitation and the incidence of intestinal worm infection. The finding of this research is in agreement with a study conducted in Palu City [13] and research on the incidence of ascariasis and trichuriasis in Padang City [14] which showed that there was no significant relationship between environmental sanitation and soil-transmitted helminth infections. Research conducted in Minahasa Regency [15] used three sanitation indicators. namely the condition of latrines/WC, availability of clean water, and waste disposal facilities. The results revealed that there is no significant relationship between the three indicators and the incidence of helminth infections.

Statistical data on animal feces disposal sites also concluded that no relationship between the incidence of helminth infections and animal feces disposal management was found because the livestock waste management was quite good. Despite the close distance between the cattle pen and the housing area, the transmission of helminthiasis could be prevented [16]. Livestock pens and manure disposal adjacent to the house can increase disease transmission. This is in line with a previous study that reported that there was no relationship between the distance of feces disposal site and STH infection with the incidence of diarrhea in children under five [17]. Proper treatment of fecal waste can reduce the number of diseases caused by flies. Thus, flies do not have a significant role in the spread of disease in humans. However, one study suggested that the condition of feces disposal sites has a significant relationship with the level of helminth infection [18]. feces disposal sites increase the risk of the spread of diseases transmitted by soil-transmitted helminth. An earlier study showed that there was a relationship between feces disposal facilities and the incidence of STH infection because 60% of respondents have disposal facilities [19].

Weekly cleaning does not statistically affect the incidence of intestinal nematode infection. This is in line with research on cattle breeders in Jombang Regency which showed that there was no significant relationship between daily pen cleaning and health complaints because the sanitation conditions of the cattle ranchers' pens were considered quite good [20]. A study conducted in Benua Kayong District [21] showed that no relationship was found between animal enclosure sanitation and the incidence of helminth infections in chicken breeders. Breeders in Benua Kayong Subdistrict were considered quite good at cleaning their livestock pens so that the transmission of diseases caused by soil-transmitted helminths can be prevented. A study reported that the incidence of soil-transmitted helminth infections was not influenced by sanitary hygiene alone, but also by other supporting factors such as adequate feeding and routine deworming [22]. In addition, good agricultural practices on farms and standard veterinary meat inspection also need to be applied [23].

The relationship between personal hygiene factors is different from environmental sanitation hygiene. All indicators of personal hygiene factors have a significant influence on the incidence of intestinal nematode infection. This can be seen from the p-value of the habit of cutting nails (0.020), washing hands (0.000), and washing hands with soap (0.004). (Table 3). 2 people regularly cut their nails (17%), and 2 others do not have the habit of cutting nails (50%). In terms of hand washing habits, 4 people (87%) have good hand washing habits. Specifically, 2 people (7%) wash their hands with soap while 2 others (67%) wash their hands with water. The statistical results of nail-cutting habits in Pekanbaru City showed that there was a relationship between nail-

cutting habits and soil-transmitted helminth infections [24]. Dirty nails can contain contaminated dirt thus leading to the ingestion of parasitic worm eggs when eating or putting hands on the mouth without washing them [25]. Research on garbage scavengers in Makassar City revealed that there was a relationship between nail-cutting habits and worm infections [26]. Lack of hygiene knowledge and hygiene awareness is one of the factors that influence the incidence of soil-transmitted helminth infections [27].

A previous study reported that there was a relationship between hand washing and the incidence of helminth infections [28]. Washing hands is an important activity because worm eggs can be ingested through contaminated nails [29]. Washing hands with soap also has a significant influence on the incidence of soil-transmitted helminth infections. This matches the result of a study that concluded that there was a relationship between the habit of washing hands with soap and the incidence of helminth infections [30]. Another study conducted in Bima also stated that there was a significant relationship between hand washing habits and the incidence of worm infection [31]. Washing hands with soap can remove parasitic worm eggs more than washing hands with water alone because the ingredients can reduce the number of germs and parasitic worms. Therefore, it is essential to wash hands with soap because water alone is not enough [32].

4. Conclusion

The prevalence of soil-transmitted helminth infections is influenced by personal hygiene factors. It is important to educate cattle farmers about clean and healthy living behavior (PHBS) by counseling and giving direct examples. The outreach program can be in the form of eliminating soil-transmitted helminths (STH) worm infections and providing examples of sanitation practices in houses and agricultural areas.

Declaration

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