



Research Article

Identification of Soil-Transmitted Helminths in Soil of Sheep Farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency

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Abstract

Background: More than one and a half million of whole world population are infected by Soil Transmitted Helminths. The most common types of Soil Transmitted Helminths found in human are *Ascaris lumbricoides*, *Trichuris trichiura* and Hookworm (*Necator americanus* and *Ancylostoma duodenale*). Soil Transmitted Helminths infections are usually found on individuals with poor hygiene, low socioeconomic status, and high risk occupations, such as sheep farmer. Sheep farming in Indonesia is generally a small-scale farm with modest technology. Livestock herding on the pasture may cause the livestock to consume Soil Transmitted Helminths-contaminated grass. Soil is the medium for the maturing of Soil Transmitted Helminths fertilized egg into infective form. Modest handling aspect and poor sanitation allow Soil Transmitted Helminths to be found in farm soil. **Objective:** To identify Soil Transmitted Helminths in the soil of a sheep farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency. **Methods:** This observational descriptive study was conducted with cross-sectional approach. 100 of soil samples were collected per 8 square meters through quota sampling from a sheep farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency. The data was collected by carrying out flotation technique in laboratory.. **Results:** Soil Transmitted Helminths eggs were discovered in 17 (17%) out of 100 samples, Hookworm eggs in 14 samples (14%), and *Ascaris lumbricoides* eggs in 5 (5%) samples. **Conclusion:** There are Soil Transmitted Helminths in soil of the sheep farm in in Manggis Village, Serbajadi District, Serdang Bedagai Regency.

Keywords: identification, farm, soil-transmitted helminths

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1. Introduction

Soil Transmitted Helminths are a group of nematodes which infect human by coming in contact with egg or larvae that live and grow in warm and humid soil in tropical and subtropical countries [1]. Soil Transmitted Helminths infection is one of the global health problems widely found in developing countries, such as Indonesia [2]. The prevalence of Soil Transmitted Helminths (STH) in Indonesia is still relatively high and most infections are caused by *Ascaris lumbricoides* [3]. Soil Transmitted Helminths infection may decrease the level of health, nutrition, intelligence and productivity, which results in economic losses [4].

Soil Transmitted Helminths infection may be caused by various risk factors for transmission such as poor sanitation, unhygienic eating places, unclean cooking processes, not having adequate latrine facilities and also difficulties in accessing clean water. It can also be caused by poor hygiene, for example the habit of not washing hands before eating and after defecating, uncut nails [3]. Soil is a medium for the development of Soil Transmitted Helminths fertilized eggs into infective forms [5].

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Moist soil conditions and accumulated dirt are the right place for Soil Transmitted Helminths to live and thrive [6]. Several risk factors were found in the sheep farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency. Employees live in close proximity to the sheds, walk barefoot and use no gloves while handling and cleaning the sheds. Grazing livestock in grasslands will lead livestock to eat grass that may be infected by Soil Transmitted Helminths [7].

2. Methods

This observational descriptive study was conducted with cross-sectional approach over a fourmonth period from August to November 2021 in Manggis Village, Serbajadi District, Serdang Bedagai Regency. A hundred of 50 gram soil samples were collected per 8 square meters through quota sampling from a sheep farm and put in separate plastic container. Soil samples were transported to the parasitology laboratory of Medical Faculty of Universitas Sumatera Utara and kept away from direct sunlight.

The data was collected by carrying out flotation technique in laboratory. In brief, 50 grams of soil was homogenized in 250 ml of aquadest and poured into a 50 ml centrifuge tube by filtering the mixture with gauze then centrifuged at 2000 rpm for 2 minutes. Half a milliliter of precipitate was diluted and homogenized in 150 ml of MgSO₄ solution, put in a 15 ml centrifuge tube and centrifuged at 2500 rpm for 5 minutes. Drops of MgSO₄ were dripped onto the tube until the surface of the tube is convex. Cover glass was put on top of the surface and after 45 to 60 minutes lifted and lied on an object glass. Lastly, the preparate was examined under a microscope for the presence either eggs of *Ascaris lumbricoides*, *Trichuris trichiura*, or Hookworm.

3. Results

Based on the collected data, of the 100 soil samples which were examined for the presence of Soil Transmitted Helminths egg, Soil Transmitted Helminths eggs were discovered in 17 (17%) out of 100 samples, Hookworm eggs were found in 14 samples (14%), and *Ascaris lumbricoides* eggs were found in 5 (5%) samples. *Trichuris trichiura* was not detected in any of the samples examined.

Table 1. Frequency distribution of Soil Transmitted Helminths egg based on the sampling site

No	Sampling Site	Number of points	Positif		Negatif	
			n	%	n	%
1	Front yard	7	2	28,57	5	71,43
2	Side yard	17	2	11,76	15	88,24
3	Back yard	15	3	20	12	80
4	In front of the shed	18	10	55,56	8	44,44
5	Next to the shed	28	0	0	28	100
6	Behind the shed	12	0	0	12	100
7	Under the seat near the shed	1	0	0	1	100
8	Around the clothesline	1	0	0	1	100
9	Entrance gate	1	0	0	1	100
Total		100	17		83	

Based on **Table 1**, 2 (28,57%) out of 7 samples obtained from the front yard, 2 (11,76%) out of 17 from the side yard, 3 (20%) out of 15 from the back yard, 10 (55,56%) out of 18 from in front of the side were found containing Soil Transmitted Helminths. Based on Table 2, two soil samples contained Hookworm eggs and 1 soil sample contained *Ascaris lumbricoides* in the soil samples obtained from the front yard, 2 contained Hookworm eggs in the side yard.

Table 2. Frequency distribution of Soil Transmitted Helminths egg based on the species

No	Sampling Site	Species Telur Soil Transmitted Helminths				Total
		<i>Ascaris lumbricoides</i>	Hookworm	<i>Trichuris trichiura</i>	<i>Ascaris lumbricoides</i> + Hookworm	
1	Front yard	0 0%	1 1%	0 0%	1 1%	2 2%
2	Side yard	0 0%	2 2%	0 0%	0 0%	2 2%
3	Back yard	1 1%	2 2%	0 0%	0 0%	3 3%
4	In front of the shed	2 2%	7 7%	0 0%	1 1%	10 10%
5	Next to the shed	0 0%	0 0%	0 0%	0 0%	0 0%
6	Behind the shed	0 0%	0 0%	0 0%	0 0%	0 0%
7	Under the seat Near the shed	0 0%	0 0%	0 0%	0 0%	0 0%
8	Around the clothesline	0 0%	0 0%	0 0%	0 0%	0 0%
9	Entrance gate	0 0%	0 0%	0 0%	0 0%	0 0%
Total		3 3%	12 12%	0 0%	2 2%	17 17%

4. Discussion

Most frequent species of Soil Transmitted Helminths which causes infection are *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus* and *Ancylostoma duodenale* [8]. *Ascaris lumbricoides* and Hookworm eggs were found in the soil of a sheep farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency. *Ascaris lumbricoides* eggs were found in 5% of 100 soil samples, Hookworm in 14% of 100 soil samples, while *Trichuris trichiura* were not found in any of the soil samples.

In this research, *Ascaris lumbricoides* eggs were found in two forms which were infectious corticaed and unfertilized corticated. The flotation method used in this study has low ability to recover *Ascaris lumbricoides* egg in unfertilized form. *Ascaris lumbricoides* eggs generally has lower specific gravity than most flotation solutions, including MgSO₄ (1.2 g/l) which was used in this research. Meanwhile, *Ascaris lumbricoides* egg in unfertilized form (1,18 g/l) has almost the same number of specific gravity as most flotation solution. *Ascaris lumbricoides* egg in unfertilized form has no lipid membrane which makes it more difficult to float [9].

In front of the shed has most samples with positive outcome. Ten out of eighteen (55,56%) positive soil samples were obtained from in front of the shed. This result is in line with a study conducted by Mahartina *et al.*, 30 out of 60 (50%) positive soil samples were obtained from around the shed. Manggis village is sometimes flooded in rainy season due to the drain overflow. A drain that passes through every house in Manggis village is located in front of the sheep farm. Researcher supposed that the presence of Soil Transmitted Helminths in the soil of this sheep farm was due to the drain overflow that brought other houses' household waste to the sheep farm area which might contain Soil Transmitted Helminths. This statement is supported by the employees' stool examination. Stool examination was conducted to 8 employees and none of them were positive. A study conducted by Astuti *et al.*, found a correlation between Soil Transmitted Helminths egg finding in soil and flood ($p=0,015$) due to the poor environmental sanitation management [10].

5. Conclusion

Based on this research, it can be concluded that soil-transmitted helminths were found in the sheep farm in Manggis Village, Serbajadi District, Serdang Bedagai Regency. The types of soil-transmitted helminths found were *Ascaris lumbricoides* and hookworm. Hookworm were found in 14% of all soil samples, and *Ascaris lumbricoides* were found in 5% of all soil samples. Further study is needed to understand and compare whether soil-transmitted helminths are found in other houses' soil in Manggis Village. It is also important to know whether other residents of Manggis Village are infected by soil-transmitted helminths. In this research, all samples were only examined once. Examining all samples multiple times is necessary to obtain the best results.

6. Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author upon reasonable request.

7. Ethical Statement

This study was approved by the Research Ethics Committee of Universitas Sumatera Utara.

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

9. Funding

No funding.

10. Conflict of Interest

Authors declares no conflict of interest.

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