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THE RELATION OF PERSONAL HYGIENE WITH THE RISK OF OCCURRENCE OF SOIL-TRANSMITTED HELMINTH CO-INFECTION IN TB PATIENTS IN THE WORKING AREA OF THE JENGGAWAH HEALTH CENTER IN JEMBER REGENCY

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Table of Contents

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THE RELATION OF PERSONAL HYGIENE WITH THE RISK OF OCCURRENCE OF SOIL-TRANSMITTED HELMINTH CO-INFECTION IN TB PATIENTS IN THE WORKING AREA OF THE JENGGAWAH HEALTH CENTER IN JEMBER REGENCY

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ABSTRACT

Tuberculosis (TB) and soil-transmitted helminth (STH) infections are infectious diseases with a high prevalence in Indonesia. STH co-infection in TB patients can worsen the prognosis of TB disease due to the dysregulation of the immune response. The high prevalence of STH infections in Indonesia is caused by environmental factors such as poor personal hygiene habits. Jenggawah Subdistrict is an area with a high number of TB cases in Jember Regency and most of the area is in the form of agricultural fields and plantations that have a suitable humidity and temperature for the development of STH. The purpose of this study was to determine the relationship of personal hygiene risk factors with the risk of STH co-infection in TB patients in the work area of the Jenggawah Health Center in Jember Regency. This study used an observational analytic design with a cross sectional method and was conducted from September to December 2019. The research was conducted at the TB Polyclinic in Jenggawah Health Center in Jember Regency with a total sample of 26 respondents who were given a personal hygiene questionnaire. Stool examination was conducted at the Laboratory of Parasitology FK UNEJ using sedimentation and flotation methods. The results showed the incidence of STH co-infections was 15.3%, good personal hygiene was 57.7%, and bad personal hygiene was 42.3%. Fisher exact test results showed that there was no significant relationship between personal hygiene risk factors and the risk of the occurrence of STH co-infection in TB patients in the working area of the Jenggawah Health Center in Jember Regency (p = 1,000).

Keywords: personal hygiene, soil-transmitted helminth, tuberculosis (TB), Jember Regency

1. INTRODUCTION

Tuberculosis (TB) is a chronic infection caused by the bacterium *Mycobacterium tuberculosis*. Based on the WHO Global Tuberculosis Report, Indonesia ranks third as the largest contributor of TB sufferers in the world.[1] One of the districts in East Java Province that has a high TB incidence is Jember Regency.[2] During January to September 2019 reported the number of TB cases in the work area Jenggawah Health Center in Jember Regency with 103 cases.

Aside from being a country with a high TB incidence, Indonesia is also an endemic area for helminth infections, especially soil transmitted helminths (STH). Soil-transmitted helminth is an intestinal nematode that requires soil in its life cycle to become an infective stage. STH infections in Indonesia are mostly caused by *Ascaris lumbricoides* 60-90%, *Trichuris trichiura* 65-75%, and 30-50% *hookworms*.[3]

Previous studies have shown a strong relation between active pulmonary TB and soil-transmitted helminth infections.[4,5,6] TB infection accompanied by STH co-infection can worsen the prognosis of TB disease due to

dysregulation of the immune response. The parasitic STH antigen will induce a TH2 immune response characterized by the production of cytokines such as interleukins (IL-4, IL-5, IL-9, IL-13), increased levels of circulating IgE, and eosinophilia. Increased overactivity from the TH2 immune response tends to suppress the TH1 immune response by suppressing the expression of IL-12Rβ2 by IL-4, causing an immune response against *Mycobacterium tuberculosis* to be ineffective.[7] Earlier research in Tanzania said that worm infections by *hookworm* ranked the second highest after worm infections by *Strongyloides stercoralis* and from that study it was shown that the *hookworm* co-infection rate in TB patients was 0.7% higher compared to the control group who were not TB patients.[8]

The high incidence of STH infections in Indonesia is caused by tropical climate and environmental factors. Environmental factors that influence the development of STH are personal hygiene.[9] A person with bad personal hygiene is 6.12 times more at risk for STH infection compared to a good personal hygiene group.[10] Habits of washing hands, cutting nails, defecating, and using footwear are component of personal hygiene risk factors that are closely related to STH infection.[9] This study aims to determine the relation of personal hygiene risk factors with the risk of the occurrence of soil-transmitted helminth co-infection in TB sufferers in Jenggawah Health Center in Jember Regency.

2. METHOD

The design of this study was observational analytic with cross sectional method. The variables studied were personal hygiene risk factors and the incidence of STH co-infections in TB patients. The population in this study were all TB patients in the working area of the Jenggawah Public Health Center in Jember Regency who were undergoing treatment during the third quarter of 2019, amounting to 37 people. The sampling technique uses total sampling technique with the exclusion criteria, namely pregnant women, patients taking worm medication for the last 3 months before data collection, patients are seriously ill and unable to respond at interviews, patients with chronic immunosuppressive diseases, and subjects who do not collect complete data either feces specimens or questionnaire answers. The research was carried out at the TB Pol Clinic of Jenggawah Jember Health Center and Parasitology Laboratory FK UNEJ during September - October 2019. Primary data were obtained from questionnaires regarding personal hygiene and examination of stool samples by sedimentation and flotation methods, while secondary data were obtained from patient medical records. The data obtained were analyzed with the SPSS 26.0 program and tested using the fisher exact test.

3. RESULTS

This research was conducted in September - December 2019 and obtained a sample of 26 people. Stool collection and questionnaires were taken in the TB Polyclinic of Jenggawah Public Health Center, and then the stool samples were examined at the FK UNEJ Parasitology Laboratory. Table 1 shows data on the general characteristics of TB patients in the work area of Jenggawah Health Center.

Table 1. General characteristics of TB patients in the work area of the Jenggawah Health Center

General Characteristics	Co-infektion STH		Amount(%)
	Negative (%)	Positive(%)	
Sex			
Male	10 (38,5)	2 (7,7)	12 (46,2)
Female	12 (46,2)	2 (7,7)	14 (53,8)
Range age			
<15 y.o	1 (3,8)	0	1 (3,8)
15-24 y.o	4 (15,4)	1 (3,8)	5 (19,2)
25-34 y.o	6 (23,1)	1 (3,8)	7 (26,9)
35-44 y.o	4 (15,4)	1 (3,8)	5 (19,2)
45-54 y.o	4 (15,4)	0	4 (15,4)
>54 y.o	3 (11,5)	1 (3,8)	4 (15,4)
Education degree			
No school	3 (11,5)	0	3 (11,5)
SD	3 (11,5)	2 (7,7)	5 (19,2)
SMP	8 (30,8)	1 (3,8)	9 (34,6)
SMA	8 (30,8)	0	8 (30,8)
S1	0	1 (3,8)	1 (3,8)
Profession			
Not work	13 (50,0)	2 (7,7)	15 (57,7)
Farmer	1 (3,8)	1 (3,8)	2 (7,7)

Labor	1 (3,8)	1 (3,8)	2 (7,7)
Private sector worker	6 (23,1)	0	6 (23,1)
Civil servant	1 (3,8)	0	1 (3,8)
TB status			
New case	21 (80,8)	2 (7,7)	23 (88,5)
Case of relapse	1 (3,8)	1 (3,8)	2 (7,7)
MDR	0	1 (3,8)	1 (3,8)
Organ TB			
Lung	21 (80,8)	4 (15,4)	25 (96,2)
Extra-lung	1 (3,8)	0	1 (3,8)
Rejimen OAT			
KAT 1	21 (80,8)	3 (11,5)	24 (92,3)
KAT 2	1 (3,8)	0	1 (3,8)
MDR	0	1 (3,8)	1 (3,8)

The results of examination of stool samples by sedimentation and flotation methods obtained the incidence of STH co-infection by 15.3% (4 samples). The types of STH that infected TB patients in the Jenggawah Health Center were *hookworm* in 2 samples (7.7%), *Ascaris lumbricoides* in 1 sample (3.8%), and *Hymenolepis diminuta* in 1 sample (3.8%) as shown in Table 2.

Table 2. Types of STH infecting TB sufferers in the Jenggawah Health Center

Kind of STH	Amount(%)
Ascaris lumbricoides	1(3,8)
Hookworm	2(7,7)
Hymenolepis diminuta	1(3,8)
Amount	4(15,3)

Personal hygiene condition description in this study sample was obtained from questionnaire interviews which consisted of questions about hand washing habits, nail cutting habits, eating habits, bowel habits and toilet ownership, as well as the use of personal protective equipment. The state of personal hygiene and the results of the analysis test in this study are shown in Table 3.

Table 3. The state of personal hygiene in TB patients in the working area of the Jenggawah Health Center

Variable	Infection Status		Total (%)	*P*
	- (%)	+ (%)		
Personal hygiene				1,000
Bad	9 (34,6)	2 (7,7)	11 (42,3)	
Good	13 (50,0)	2 (7,7)	15 (57,7)	
Total	22	4	26	

The results of the analysis test between personal hygiene variables and STH co-infection occurrence variables in TB sufferers in the Jenggawah Health Center in Jember District showed a value of P = 1,000.

4. DISCUSSION

The results of this study indicate that STH co-infection in TB sufferers in the working area of Jenggawah Health Center in Jember Regency is 15.3% with a breakdown of 7.7% caused by *hookworm*, 3.8% caused by *Ascaris lumbricoides*, and 3.8% due by a non-STH species, *Hymenolepis diminuta*. The incidence of STH co-infection in this study is lower than the incidence of STH infection in Garahan Kidul Plantation in Jember Regency which was reported at 38.78% .[11] Although both of these studies were conducted in Jember District, the incidence of STH infections in both of them cannot be compared directly because the location and geographical location of the study are different, and the subjects in this study only consisted of TB patients who were undergoing treatment in the work area of the Jenggawah Public Health Center in Jember Regency. STH infections can be found in the Jenggawah region because most of the Jenggawah area is in the form of agricultural fields and plantations that have a suitable humidity and temperature for the development of STH to become an infective stage.

The results of data analysis in this study indicate that there is no significant relation between personal hygiene risk factors and the risk of occurrence of soil-transmitted helminth co-infection in TB patients in the work area of Jenggawah Health Center in Jember Regency (p = 1,000). This is consistent with research conducted by Permata Sari et al[12] which states that there is no significant relation between personal hygiene behavior or personal hygiene with worm infections in elementary students of Susukan Sumbang Regency. The personal hygiene condition of the respondents in this study were mostly included in the good category. This is indicated by the percentage of

good personal hygiene at 57.7% and poor personal hygiene at 42.3%. The state of personal hygiene in this study was assessed from the results of a questionnaire interview which contained several components of personal hygiene that were closely related to the incidence of STH co-infection in TB patients. From each component of personal hygiene, in this study showed the results of most respondents have good hand washing habits, good nail cutting habits, good eating habits, good bowel habits, and have used personal protective equipment.

STH co-infection in this study was found in respondents with good or bad personal hygiene habits with an equal number of events, namely 7.7%. The STH co-infection found in TB patients with good personal hygiene habits is due to the fact that personal hygiene habits have not been done in the right way, such as washing hands properly and always wearing PPE when in contact with the ground. Proper hand washing is done at the right time and in the right way. The right time to wash your hands is recommended when before eating, after defecating and urinating, after touching garbage, after working, and after touching animals.[13] WHO has recommended 11 steps to wash hands properly using soap and running water for 60 seconds.[14] Washing hands is needed to remove impurities and prevent colonization and contamination with infectious microorganisms such as STH. The use of PPE can prevent direct contact with limbs from soil contaminants that contain eggs or STH larvae. The minimum PPE that must be used during work or activities is footwear and gloves. Most respondents in this study wear PPE in the form of footwear but it is still rare for respondents to use gloves when engaging in activities that come into direct contact with soil. This allows worm larvae to penetrate into the host body through the skin and cause worm infections.

Each component of personal hygiene in this study was also tested by bivariate analysis and showed no significant relationship with the incidence of STH co-infection in TB patients. This does not mean that the personal hygiene component has no effect on the incidence of STH co-infection but the data obtained from the samples in this study did not prove this due to the small sample size. In addition, in this study the researchers did not dig up data and sought information about other risk factors that might be associated with STH co-infection events such as environmental sanitation, nutritional status, and economic status.

5. CONCLUSION

Based on the research that has been done, it can be concluded that there is no significant relation between personal hygiene risk factors and the risk of the occurrence of soil-transmitted helminth co-infection in TB patients in the Jenggawah Community Health Center in Jember Regency (p value = 1,000).

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