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THE RELATIONSHIP BETWEEN THE HABITS OF USING PERSONAL PROTECTIVE EQUIPMENT AND PERSONAL HYGIENE AND THE INCIDENCE OF INTESTINE PARASITE INFECTIONS

Maria M.M Sitanggang[1]*, Steven Tandean[2], M. Oky Prabudi [2], Lambok Siahaan [2], Adelina Haryani Sinambela [2], Yoan Carolina Panggabean [2]

[1]*Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia.*
[2]*Department of Parasitology, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia.*
*Corresponding Author: mailto:mariamorado@students.usu.ac.id

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ABSTRACT

Background: Intestinal parasitic infections are quite a big problem and are still often found in society. Personal Protective Equipment (PPE) and good personal hygiene have an important role in reducing the transmission of parasites from soil to humans, both through eggs, larvae, and adult parasites, especially for waste workers who have direct contact with infectious environments. The purpose of this study is to determine the relationship between the habit of using PPE and personal hygiene with the incidence of intestinal parasite infections in waste workers at TPA Terjun Medan.
Methods: This research used a *cross-sectional* approach, in the landfill of *Tempat Pembuangan Akhir Sampah* (TPA) Terjun in the city of Medan. The research instrument used in this research was a questionnaire. The questionnaire consists of 15 questions that the representative of personal hygiene and the individual's habit of using the self-protection tools.
Result: This study included 121 subjects, there was no correlation between the use of gloves, masks, protective clothing, and protective shoes on the incidence of intestinal infections in waste workers, and also between personal hygiene and the incidence of intestinal parasite infections in waste workers.
Conclusion: There is no significant relationship between the use of protective equipment, and protective shoes on the incidence of intestinal infections in waste workers. There is no significant relationship between personal hygiene and the incidence of intestinal parasite infections in waste workers

Keywords: Intestinal infection, parasites, Personal hygiene, PPE

ABSTRAK

Latar Belakang*: Infeksi parasit usus merupakan masalah yang cukup besar dan masih sering ditemukan di masyarakat. Alat Pelindung Diri (APD) dan kebersihan diri yang baik memiliki peran penting dalam mengurangi penularan parasit dari tanah ke manusia, baik melalui telur, larva, maupun parasit dewasa, terutama bagi pekerja limbah yang memiliki kontak langsung dengan lingkungan yang menular. Tujuan dari penelitian ini adalah untuk mengetahui hubungan antara kebiasaan menggunakan APD dan kebersihan diri dengan kejadian infeksi parasit usus pada pekerja sampah di TPA Terjun Medan.*
Metode: *Penelitian ini menggunakan pendekatan cross sectional, di TPA Tempat Pembuangan Akhir Sampah (TPA) Terjun di kota Medan. Instrumen penelitian yang digunakan adalah angket kuesioner. Kuesioner terdiri dari 15 pertanyaan yang mewakili kebersihan pribadi dan kebiasaan individu menggunakan alat perlindungan diri.*
Hasil: *Penelitian ini melibatkan 121 subjek, tidak ada korelasi antara penggunaan sarung tangan, masker, pakaian pelindung, dan sepatu pelindung*

terhadap kejadian infeksi usus pada pekerja limbah, dan juga antara kebersihan diri dengan kejadian infeksi parasit usus pada pekerja limbah.
Kesimpulan: *Tidak ada hubungan yang signifikan antara penggunaan alat pelindung, dan sepatu pelindung terhadap kejadian infeksi usus pada pekerja limbah. Tidak ada hubungan yang signifikan antara kebersihan pribadi dan kejadian infeksi parasit usus pada pekerja limbah*

Kata kunci*: Infeksi usus, parasite, Kebersihan pribadi, APD*

1. Introduction

Parasitic infections are one of the most frequent causes of infections that attack the intestines. Intestinal parasitic infections can be caused by protozoa or nematodes. Global prevalence shows that around 438.9 million people have Hookworm infection, 819.0 million people are infected with Ascaris lumbricoides, and 464.6 million people are infected with Trichuris trichiura [1]. Based on data released by the World Health Organization (WHO) in 2013, the prevalence of intestinal parasitic infections in the world is still very high. Infection occurs mainly in developing countries. WHO estimates that around 3.5 billion people or almost half of the world's population are infected with intestinal protozoa. This infection most often occurs on the continents of Asia, Africa, and Latin America [2]

The Ministry of Health of the Republic of Indonesia reports that several provinces in Indonesia have a prevalence of intestinal infections ranging between 40-60%. The most common cause of intestinal infections in Indonesia is Blastocystis hominis and Giardia lamblia while STH infections are caused by several species such as Ascaris lumbricoides, Necator americanus, Ancylostoma duodenale, Strongyloides stercoralis, and Trichuris trichiura. Several factors, including Indonesia's geography, climate, and excessive humidity, contribute to its prevalence. Over 20% of Indonesian people had parasitic diseases in their intestines in 2012 [3]. Intestinal parasite infections can cause various complications, such as decreased nutrition, anemia, and increase the risk of secondary parasite infections [4]. This infection can be influenced by several risk factors, such as poor environmental cleanliness and sanitation due to low socio-economic status, lack of sanitation facilities, and poor waste management [5]. Hence, the occurrence of intestinal parasite diseases can be mitigated via the practice of personal hygiene and the maintenance of a clean and sanitary environment.

Garbage workers are one of the groups at high risk of experiencing intestinal parasite infections. Waste recipients are often in dirty environments and have direct contact with various types of waste, making them more susceptible to infection with diseases that spread through the soil [6]. Landfill or TPA is one of the places that pose a risk of transmitting intestinal parasites to staff [7]. Personal Protective Equipment (PPE) plays an important role in reducing the transmission of parasite infections to humans from the environment. Using PPE appropriately and maintaining proper personal hygiene can reduce a person's risk of being infected with intestinal parasites. Using PPE can reduce the risk of intestinal parasite infection by 5.2 times greater than without using PPE [8]. One of the largest landfills in Medan City is TPA Terjun. However, based on the results of the initial survey, it was found that the waste officers at TPA Terjun did not use PPE properly and correctly, so it appeared that the officers did not pay enough attention to personal hygiene at work.

Therefore, based on this background, it is necessary to carry out research related to this matter. This study aims to determine the relationship between the habit of using PPE and personal hygiene with the incidence of intestinal parasite infections in waste workers at TPA Terjun Medan.

2. Methods

This study was conducted using a cross-sectional design during July-October 2023 at TPA Terjun, Medan, and the Parasitology Laboratory, Faculty of Medicine, Universitas Sumatera Utara. This research involved 121 respondents from waste officers at TPA Terjun Medan who were calculated based on the Slovin formula [9]. TPA Terjun receives waste from various areas in the city of Medan. Workers are at high risk of being infected by intestinal parasites that spread through the soil. The research instrument used in this research was a questionnaire. The questionnaire was used to assess the habitual use of personal protective equipment and personal hygiene with the incidence of intestinal parasite infections among waste workers. The questionnaire consists of 15 questions that the representative of personal hygiene and the individual's habit of using the self-protection tools. The scale used in this research is the Guttman scale with answer categories of "yes" or "no" [10]. Apart from that, stool samples were also taken from officers which were collected in pots and examined microscopically using formol ether examination. Stools are evaluated using a microscope. To determine the relationship between variables, the chi-square test is used. The ethical clearance of this study has been accepted by Komisi Etik Penelitian Kesehatan USU with the number 835/KEPK/USU/2023.

Statistical Analysis

This research was analyzed using the Statistical Package for the Social Sciences (SPSS) ver. 26. Univariate and bivariate analyses were carried out in this study. The value of $p<0.05$ was considered the hypothesis was accepted.

3. Results

Based on table 1, from 121 respondents shows the characteristics of respondents based on age and gender, the average age of respondents in this study was 20-44 years with a total of 56 people (4.3%). Meanwhile, the smallest age group is 20-44 years with a total of 56 people (4.3%). Meanwhile, the smallest age group was <19 years with a total of 7 people (5.8%). This study also showed that there were more female respondents with 69 people (56.6%) than male respondents with 69 people (56.6%).

Table 1 Respondent characteristics based on age and gender

Parameter	Frequency	Percentage (%)
Age (years)		
< 19	7	5.8
20-44	56	46.3
45-59	48	39.7
>60	10	8.3
Total	121	100
Gender		
Male	53	43.4
Female	69	56.6
Total	121	100

Based on Table 2, there are 4 types of personal protective equipment used by respondents when working, such as gloves, masks, aprons, and protective shoes. Protective shoes were the PPE most frequently used by respondents with 115 people (95.0%) and the least used were masks with 21 people (17.4%). The level of personal hygiene of respondents before and after work found that the majority of respondents had good personal hygiene with 84 people (69.4%) and the fewest had poor personal hygiene with 4 people (3.3%). Data on the distribution of intestinal parasite infections among respondents where the majority of patients were negative for intestinal parasite infections with a total of 103 responses (83.7%). The distribution of types of intestinal parasitic infections among respondents where the majority of patients were infected with intestinal parasites in the form of A. lumbricoides egg infections, which was the most common type of intestinal parasite, namely 11 people (9.1%).

Table 2 Distribution of personal hygiene, and types of intestinal parasite infections

Parameter	Frequency	Percentage (%)
Personal Hygiene		
Less	4	3.3
Enough	33	27.3
Good	84	69.4
Total	121	100
Parasites		
Positive	103	85.1
Negative	18	14.9
Total	121	100
Helminth		
A. lumbricoides eggs	11	9.1
Hymenolepis nana eggs	1	0.8
Hookworms eggs	2	1.7
Trichuris trichura eggs	1	0.8
Protozoa		
Giardia lamblia	1	0.8
Mixed		
A. lumbricoides and Hookworms eggs	2	1.7

Figure 1 shows the parasites found in stool samples. This study found some egg parasites type, such as A. lumbricoides corticated, Trichuris trichura, Hymenolepis nana, Hookworms, and Giardia lambia.

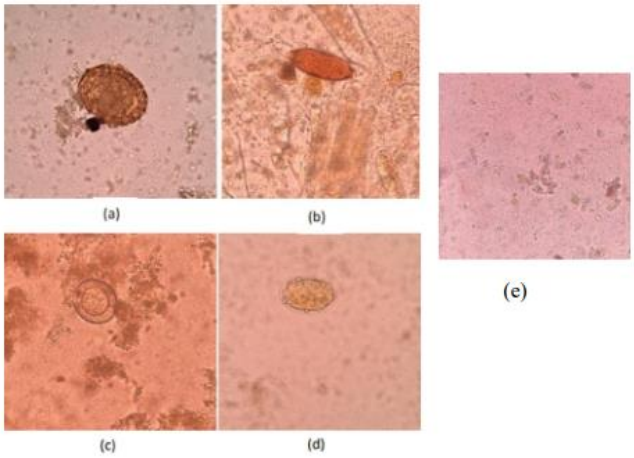

Figure 1. Parasites eggs in stools sample examination using formol-ether concentration technique with normal saline preparation under x 400 magnification: (a) A. lumbricoides corticated, (b) Trichuris trichura, (c) Hymenolepis nana, (d) Hookworms, (e) Giardia lamblia.

Based on Table 3, Bivariate analysis was carried out to assess the relationship between the use of PPE and personal hygiene and the incidence of intestinal parasite infections in respondents. The use of gloves, masks, protective clothing, and protective shoes has (p=0.196, p=0.152, p=0.947, and p=0.294 respectively) which means protective shoes did not have a significant relationship with the incidence of intestinal infections in respondents. After conducting a chi-square, it was found that there was no significant relationship between personal hygiene and the incidence of intestinal parasite infections in respondents (p-value = 0.834).

Table 3 The relationship between the use of personal protective equipment and the incidence of intestinal parasitic infections in respondents

	PPE		
PPE	Negative	Positive	p
Gloves			
Used	73 (60.3%)	10 (8.3%)	0.196
Not used	30 (24.8%)	8 (6.6%)	
Mas.			
Used	20 (16.5%)	1(0.8%)	0.152
Not used	83 (68.3%)	17(14%)	
Apron			
Used	91 (75.2%)	16 (13.2%)	0.947
Not used	12 (9.9%)	2 (1.7%)	
Shoes Protective			
Used	97 (80.2%)	18 (14.9%)	0.294
Not used	6 (5%)	0 (0%)	
Personal hygiene			
Less	3(2.5%)	1 (0.8%)	
Enough	38 (23.1%)	5 (4.1%)	0.840
Good	72 (59.5%)	12 (9.9%)	

4. Discussion

This research shows that there is no significant relationship between the use of PPE including masks (p=0.196), gloves (p=0.152), protective clothing (p=0.947), and protective shoes (p=0.294) and the incidence of intestinal disease. Parasitic infections in waste workers at TPA Terjun. This is in line with previous research in Makassar

where there was no significant relationship between completeness of PPE and the incidence of worms in waste workers [11]. However, another opinion was expressed in research conducted in Kaliputih, where the use of protective shoes (p=0.024), gloves (p=0.012), long-sleeved shirts and long trousers (p=0.006) had a significant relationship with the incidence of intestinal parasitic infections [12]. The results of this study were not significant, possibly caused by respondents who filled out the questionnaire incorrectly so that waste workers were still at risk of contracting diseases, one of which was worms. Incomplete use and availability of PPE as well as inappropriate use of PPE can allow the entry of infectious eggs or larvae through various body organs such as the hands, feet, and mouth [13]. There may be no significant relationship between the use of PPE and intestinal parasite infections in this study. This could occur because of the level of education, awareness, and knowledge possessed by waste officers regarding the importance of using PPE in their work [14].

The results of the study showed that there was no significant relationship between personal hygiene and the incidence of intestinal parasite infections in waste workers at TPA Terjun. This is different from other research conducted in Karo, North Sumatra, where there was a significant relationship between personal hygiene and the incidence of worm infections (p=0.00). Personal hygiene is very important in efforts to control risk factors for infection, one of which is intestinal parasite infection. Poor personal hygiene such as not washing hands before and after work, after defecating, not washing hands with soap, and not using PPE can increase the incidence of intestinal parasite infections [15].

In this research, it was found that the majority of respondents had a negative attitude. Suffering from intestinal parasitic infections, namely 103 responses (83.7%). The type of intestinal parasite that is most often found in A. lumbricoides eggs, which is the type of intestinal parasite that is most often found with 13 responses (65%), A. lumbricoides eggs themselves have a strong protective layer so they can survive for a long period. Environment, resistant to external conditions, and able to survive in a dormant state in the soil for quite a long period [16]. Apart from that, another thing that was found was that a person could experience more than one type of intestinal parasite infection at one time. This is the same as previous research, where A.lumbricoides worm infection is the type of parasite that most often infects the intestines of waste transport workers, namely 75% of all types of infections. Soil-transmitted worm infections (STH) are endemic diseases in Indonesia. Transmission of A. lumbricoides is via the fecal-oral route, meaning that transmission occurs due to the consumption of infective eggs through contaminated food and eating utensils. The practice of washing hands properly and not biting your nails can prevent this transmission [17]. Apart from that, garbage workers are also at risk of experiencing worm infections due to poor workplace conditions, especially in urban or suburban areas where there are lots of flies, smells, and humid conditions with temperatures of 280 C - 360 C. The distribution of A. lumbricoides and Trichuris trichiura is found in areas tropical because the humidity level is sufficiently high [13].

Those who routinely cleaned their hands at crucial times had a 68 percent lower chance of intestinal parasite infection than children who did not, according to the research. This result is similar to research done in many regions of Ethiopia.[18,19]. This may be the case because children who come into contact with contaminated objects spread germs that raise the risk of illness. Thus, the best strategy to stop an infection from spreading is to wash your hands [20,21]. This may be the case because touching contaminated objects exposes kids to germs, which raises the risk of illness. Therefore, the most effective technique to stop the spread of infection is to wash your hands [22]. The increased risk of contracting hookworm infection is one reason for the possible association between the habit of wearing shoes and increased parasitic infection. It is well known that wearing bare feet increases the risk of contracting hookworms [18].

The limitation of this study is the respondents who filled out the questionnaire possibly incorrect because the questionnaire is a subjective instrument and the results depend on individual perception and awareness. The strength of this study is the novelty of the population and the place of study which was conducted in TPATerjun Medan. So this study can be an evidence-based reference about the worker's hygiene and self-protection on TPA terjun Medan.

5. Conclusion

Based on this research, it can be concluded that protective shoes are the PPE most frequently used and the least used are masks. The majority of respondents had good personal hygiene with 84 people (69.4%) and the fewest had poor personal hygiene with 4 people (3.3%). A. lumbricoides eggs were the most common type of intestinal parasite. There were 2 people (1.7%) who had more than one type of intestinal parasite at one time. There is no significant relationship between the use of gloves, masks, protective clothing, and protective shoes on the incidence of intestinal infections in waste workers. There is no significant relationship between personal hygiene and the incidence of intestinal parasite infections in waste.

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Conflict of Interest
The authors declare no conflict of interest.

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