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Relationship Between Intestinal Worm Infection Soil Transmitted Helminth (STH) and Hand Washing Habits: Case Study from Second Grade Class of Children at SD Negeri 1 Sabaru Palangka Raya, Indonesia

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ABSTRACT
In this study, the aim was to analyse the relationship between Soil Transmitted Helminth (STH) infection and hand washing habits in grade 2 children at SD Negeri 1 Sabaru, Palangka Raya. Worm infestation is an infectious disease caused by parasites in the form of worms, especially in school-age children who are vulnerable because clean and healthy living behaviour still depends on parents.This study used an observational method with a cross-sectional design. The sample consisted of 52 grade 2 children of SD Negeri 1 Sabaru who were taken using total sampling technique based on inclusion and exclusion criteria. The examination was carried out at the Parasitology Laboratory of the Faculty of Medicine, Palangka Raya University using the Kato-Katz method. Data were analysed using the chi-square test.The results showed that the incidence of helminth infection was 15.4%. The chi-square test showed a significant relationship between hand washing habits and STH worm infections with a p value = 0.000.In conclusion, there is a relationship between Soil Transmitted Helminth (STH) intestinal worm infections and hand washing habits in grade 2 children at SD Negeri 1 Sabaru, Palangka Raya.

Keywords: Worm Infections, Hand Washing, Personal Hygiene, Sanitation, Elementary School Children.

I. Introduction

Indonesia, as a tropical country with high humidity, provides an ideal environment for the development of various types of parasites, including Soil-Transmitted Helminths (STH). According to data from the World Health Organization (WHO) in 2021, worm infections affected more than one billion people globally, with East Asia, China, and Sub-Saharan Africa noted as the regions with the highest transmission. Indonesia reported more than 73 million cases, placing it among countries with a high incidence of helminth

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infections. A study by Mohpul & Jabal (2020) in Rakumpit District, Central Kalimantan, revealed that the prevalence of helminth infection among elementary school children reached 71%. STH are a group of nematode worms whose life cycles involve soil as a medium for egg development into infective larvae. Common species infecting humans include *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), and hookworms *(Ancylostoma duodenale* and *Necator americanus)*. Transmission typically occurs through contact with soil contaminated by helminth eggs, particularly in areas with inadequate sanitation. Elementary school children are especially vulnerable due to frequent soil contact, lack of footwear use, and suboptimal hygiene practices. Handwashing with soap and running water is recognized as an effective preventive measure against helminth infections. Washing hands for 40–60 seconds can remove dirt and helminth eggs from the skin surface. However, a preliminary survey at SD Negeri 1 Sabaru, Palangka Raya, showed that sanitation facilities are limited; the school yard is unpaved, and handwashing stations do not provide soap, increasing the risk of infection. Previous studies support the correlation between handwashing habits and helminth infection. Research by Bagus et al. (2022) found that 83.3% of students who lacked proper handwashing habits were infected. Similarly, Lestari et al. (2022) reported a relationship between hand hygiene, nail cleanliness, and helminth infections in elementary students. Given these findings, this study aims to analyze the relationship between STH infection and handwashing habits in second-grade students at SD Negeri 1 Sabaru, Palangka Raya. The results are expected to contribute to public health knowledge, particularly in promoting clean and healthy living behaviors as a preventive strategy against helminthiasis.

II. Research Method

This study employed an analytical observational method with a cross-sectional design, selected to examine the relationship between the independent variable (hand washing habits) and the dependent variable (STH intestinal worm infection) at a specific point in time. The research was conducted at SD Negeri 1 Sabaru, Palangka Raya, during the period of July to September 2023. Sample examinations were carried out at the Parasitology Laboratory, Faculty of Medicine, University of Palangka Raya. The target population consisted of all 2nd-grade students at the school. A total sampling technique was used, involving 52 students who met the established inclusion and exclusion criteria. Inclusion criteria included students who were officially registered as 2nd-grade students at SD Negeri 1 Sabaru, had received parental consent to participate, and had not received antiparasitic treatment within the past three months. Exclusion criteria included students who were unable to provide fecal samples or had underlying health conditions that could affect study outcomes. Data collection was conducted using a validated questionnaire to obtain demographic data and assess hand washing habits. Fecal samples were collected from each participant following standard procedures and examined using the Kato-Katz method to identify the presence of STH worm eggs. All sample analyses were performed by qualified personnel at the Parasitology Laboratory. Data analysis was conducted using chi-square statistical testing to determine the relationship between hand washing habits and STH infections. The independent variable was hand washing habits; the dependent variable was the presence of STH worm infection. Possible confounding variables included environmental sanitation, use of footwear, and nail trimming habits. This study received ethical approval from the Ethics Committee of the Faculty of Medicine, University of Palangka Raya, and all research procedures adhered to ethical standards, including obtaining informed consent from participants' parents. Descriptive statistics were used to analyze demographic data, while the chi-square test ($p < 0.05$) was used to evaluate variable relationships.

III. Results and Discussion

3.1. Analysis Result

This study involved 52 students of grade 2 of SD Negeri 1 Sabaru, Palangka Raya. The research data included the frequency distribution of respondents based on age category, gender, hand washing habits,

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infection status, and type of infection. In addition, the study also highlighted the relationship between hand washing habits and the incidence of STH intestinal worm infections.

Table 1. Frequency distribution by age

Component	Frequency	Percentage (%)
Age		
6-10 years	50	96,2
>10 years	2	3,8
Total	52	100

Many respondents (96.2%) were students aged 6–10 years, while the rest (3.8%) were over 10 years old. This shows that the population studied was dominated by elementary school-aged children.

Table 2. Distribution by Gender

Component	Frequency	Percentage (%)
Age		
Female	25	48,1
Male	27	51,9
Total	52	100

Respondents consisted of 48.1% female and 51.9% male. This composition shows an almost balanced number of male and female students in this study.

Table 3. Frequency Distribution by Class

Component	Frequency	Percentage (%)
2A	19	36,5
2B	17	32,7
2C	16	30,8
Total	52	100

The distribution of respondents was quite even across the three classes, with 36.5% coming from class 2A, 32.7% from class 2B, and 30.8% from class 2C. This provides sufficient representation of all existing classes.

Table 4. Frequency Distribution Based on Hand Washing Habits

Component of Hand washing habits	Frequency	Percentage (%)
Good	39	75,0
Bad	13	25,0
Total	52	100

Most students (75%) have good handwashing habits, while 25% have bad habits. This finding indicates the importance of further education on hand hygiene for students.

Table 5. Distribution Based on Infection Status

Component of Infection Status	Frequency	Percentage (%)
Positive	8	15,4
Negative	44	84,6
Total	52	100

Most students (84.6%) were not infected with intestinal worms, but 15.4% tested positive. This indicates the prevalence of worm infections even though most students have good hand washing habits.

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Table 6. Frequency Distribution Based on Type of Intestinal Worm Infection

Component of Type of infection	Frequency	Percentage (%)
Ascaris lumbricoides	0	0
Trichuris trichiura	0	0
Hookworm	0	0
Hookworm eggs	1	12,5
Enterobius vermicularis	7	87,5
Total	52	100

The results showed that of the students who tested positive for intestinal worm infections, the majority (87.5%) were infected with *Enterobius vermicularis*, while 12.5% were found to have hookworm eggs. There were no cases of *Ascaris lumbricoides* or *Trichuris trichiura* infections. This confirms that Enterobius vermicularis is the most dominant type of worm infection in infected students.

Table 7. Relationship between Worm Infection and Hand Washing Habits

Infection Status	Hand washing habits				Total		P -value	PR
	Poor		Excellent					
	n	%	n	%	n	%		
Positive	7	13,5	1	1,9	8	15,4	0,000	44,333
negative	6	11,5	38	73,1	44	84,6		
total	13	25,0	39	75,0	52	100,0		

The results of the chi-square test showed a significant relationship between hand washing habits and STH intestinal worm infections in students. Respondents with good hand washing habits were not found to be infected with worms, while respondents with poor hand washing habits had a prevalence of infection of 15.4% (8 out of 52 students). Statistical analysis showed a p value = 0.000, which confirmed a significant relationship between the two variables.

3.2. Discussion

This study was conducted on second-grade students at SD Negeri 1 Sabaru, involving 52 stool samples. The results revealed that 15.4% of students were infected with intestinal worms, predominantly *Enterobius vermicularis*, which is strongly associated with poor handwashing habits. The data indicated that male students were more susceptible to infection compared to females. This finding aligns with previous studies (Saharman et al., 2013), which suggest that female students generally demonstrate better hand hygiene behavior than males (Al-Khatib et al., 2015). The chi-square test revealed a statistically significant relationship between handwashing habits and the incidence of worm infections ($p < 0.05$). Infections were more prevalent among students with poor handwashing habits (13.5%) compared to those with good habits (1.9%), which supports the findings by Saeni et al. (2017). *Enterobius vermicularis* is commonly found in children aged 5–14 and is known to negatively affect growth and productivity. Prevention efforts should emphasize personal hygiene education, especially practices like washing hands with soap before eating and after playing or defecating. These practices are an essential component of the Clean and Healthy Living Behavior (PHBS) program.

IV. Conclusion

The study concluded that the prevalence of intestinal worm infection among second-grade students at SD Negeri 1 Sabaru, Palangka Raya was 15.4% (8 students). Identification results indicated that 87.5% were infected with Enterobius vermicularis and 12.5% with hookworm eggs. Among the students, 75% had good handwashing habits, while 25% demonstrated poor handwashing behavior. A significant relationship was

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found between Soil Transmitted Helminth (STH) infection and handwashing habits (p = 0.000). Based on these findings, it is recommended that awareness campaigns on worm infections be conducted at the school level to increase students' understanding of the importance of proper hand hygiene. The active role of parents and local health centers is also crucial in both the treatment and prevention of worm infections. For future research, it is suggested to expand the study by including additional variables and reviewing more relevant literature to gain a deeper understanding of the factors influencing STH infection.

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