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Connection personal hygiene with the incidence of worm infection children aged 6-9 years in pesarean pagerbarang village, Tegal, Central Java

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Abstract
Background: Ringworm disease is one of the diseases caused by infections with Soil Transmitted Helminths (STH) which usually attacks children because they are less able to maintain Personal Hygiene such as still liking to play in the soil,and not washing hands after playing. *Objectives*: The aim of this research is to determine the relationship between personal hygiene and the incidence of worms in children aged 6-9 years in Pesarean Pagerbarang Village, Tegal, Central Java. *Materials and Methods*: This study uses an Observational Analytical research type using a *cross-sectional approach*, with an Incidental Sampling technique. *Results*: Based on the results of the questionnaire interview, it was found that 17 children (48.57%) had good personal hygiene, and 18 children (51.43%) had poor personal hygiene. Laboratory examination showed that 21 children (60.00%) were infected with STH, including Ascaris Lumbricoides, 18 children (85.71%). Trichuris Trichiura 1 child (4.76%), Necator Americanus 2 children (9.52%). *Conclusions*: The results of the analysis using chi-square obtained a p-value = 0.000 for the relationship between personal hygiene and the incidence of worms and a p-value = 0.013 for the relationship between nail cleanliness and the incidence of worms. This shows that there is a significant relationship between the two because α<0.05.

Keywords
Incidence of worms; Personal hygiene; Infection

1. Introduction

Worm disease is one of the diseases caused by infection with *Soil Transmitted Helminths* (STH). STH infection causes the most worm disease in the world, especially by species of roundworms (*Ascaris lumbricoides*), hookworms (*Necator americanus* and *Ancylostoma duodenale*), and whipworms (*Trichuris trichiura*). This disease usually attacks children because children are less able to maintain *Personal Hygiene* such as still liking to play in the dirt, not washing their hands after playing, and lack of parental concern for their children's cleanliness (Idayani and Dwi

Putri, 2023).

Children are an age group that is susceptible to worm infections , this is due to their playing habits or direct contact with the ground and their lack of attention to environmental cleanliness. Apart from that, personal hygiene was found, such as cutting nails, washing hands with soap, before and after eating and playing and wearing footwear. (Annisa Rahmawati, Suhartini, 2022) .

Worms can cause malnutrition because all nutrients are absorbed by worms, thus disrupting the child's mental and physical development and making the child susceptible to illness due to decreased immune system, stunting or the child's physical condition becomes shorter and smaller than their peers , and decreased intelligence in children. (Devi Istiani et al., 2019). Worms in children can cause decreased levels of cognitive function due to reduced iron status, decreased macronutrient status, inhibiting physical growth, development and activity of children. This happens because the substances needed by children during growth will be absorbed by worms.

Diagnosing worm disease can be done using worm egg examination analysis with qualitative and quantitative methods. Quantitatively we can find out the number of worm eggs. Techniques that are often used in diagnosing worm infections are using the flotation method and the Native method. This method can decompose worm eggs from feces and good visibility, and can be used to diagnose mild or severe infections. (Angria and the Kaaba, 2023) .

In Indonesia, worm disease is widespread in both rural and urban areas. The results of a survey of worm infections in elementary schools (SD) in several provinces shows a prevalence of around 60% - 80%, while for all ages it ranges from 40% - 60%. The prevalence of worms in Central Java is 4.37%. Low levels of personal hygiene and transmission from school / playmates are contributing factors to the infection rate (Manuhutu, Purnamasari and Dardjito, 2017).

The prevalence of worms in children in the Tegal area based on data from the Tegal City Health Office was found to be 28.6% in East Tegal, 24.3% in West Tegal, 27.7% in South Tegal, 19.4% in Margadana and in Tegal Regency itself around 20-50%. In a study conducted in the Tegal City area in 2010, 12.3% of toddlers were infected with worms, while in another study in the Tegal Regency area in 2018 around 6.5% and in 2019 17.7% of school-age children were positive for worms.

Yuwono *et al.'s research* (2019) on elementary school students in Sorong, West Papua also stated that the highest prevalence of worms was in children aged 6-9 years. This is due to the habit of children playing with dirt and not wearing footwear. Worm eggs in the soil can stick to nails which can then enter the stomach through food due to not washing hands. Transmission between individuals can occur through direct contact, for example holding hands while playing and the habit of sharing food contaminated by worm eggs. Previous research conducted by M. Zubaidi, et al. (2017) at MI Nahdlatul Wathan Bimbi, Sakra Barat District, East Lombok Regency, showed that

the *Chi-square test results* obtained p = 0.024 which showed that there was a significant relationship between personal hygiene and worm disease in children in grades I-IV MI.

Pesarean Village is one of the villages in Pagerbarang District, Tegal Regency, which has a population of 5097 in 2023. Densely populated areas and poor sanitation are usually prone to infectious diseases such as worms. Worms more often attack school-age children because their play activities involve direct contact with the soil, and they still pay less attention to healthy and clean living behaviors, such as paying less attention to the cleanliness of their hands and nails and sometimes not wearing footwear when playing.

The selection of this village was based on the results of previous observations by observing the environmental conditions of residents' homes and the behavior of children aged 6-9 years in the village. Children aged 6-9 years in this village often play and touch the ground, do not wash their hands after playing and rarely cut their nails.

2. Materials and Methods

2.1. Type and Design of Research

This study uses an Observational Analytical research type using a *cross-sectional approach* . Observational Analytical Research is a study that examines the relationship between two or more variables and researchers only need to observe without intervening in the research subjects. The *cross-sectional approach* is a type of research that only measures observation data from research subjects once at one time. One time here does not mean that all research subjects are studied simultaneously at the same time, but each subject is only observed once and the measurement of the subject's variables is carried out at that time.

2.2. Population and Sample

The population in this study was all children aged 6-9 years in Pesarean Pagerbarang Village, Tegal, Central Java. Researchers use the Incidental Sampling technique . Incidental Sampling is the determination of samples based on coincidence, that is, anyone who happens to meet the researcher can be used as a sample, if it is considered that the person who happened to be met matches the criteria determined by the researcher.

2.3. Method of collecting data

The type of data in this study is primary data, consisting of: Personal hygiene data was obtained from the results of closed interviews and observations. Closed interviews were conducted by giving questions through a questionnaire sheet to respondents. The question sheet is in the appendix. Observations are carried out to obtain data on the results of nail hygiene examinations. Direct

examination of worm identification in the Laboratory. Examination Method for worm identification is by using the Native method. The native method is a method of examining feces directly and without coloring. This method is fast and effective for examination of severe infections. Fecal samples in the native method are only dissolved with distilled water to dissolve and separate large particles in the feces so that they are easy to process and observe.

2.4. Research Procedures

The tools used are Microscope, Glass objects and glass deck, *Lidi*, Feces, NaCl/Eoisn 2%, Questionnaire sheet, a Digital camera, Stationery. Ways of working : Prepare the tools and materials to be used. Drop 1-2 drops of 2% NaCl/eosin onto the glass object. Feces are taken with a stick. Mix the feces with 2% Nacl/eosin, cover with a glass deck, make sure there are no bubbles. Examined under a microscope with low magnification (10x10) and continued with medium magnification (10x40).

2.5. Data Analysis

The type of data analysis in this study is Univariate and Bivariate analysis. Univariate analysis is used to see the frequency and distribution of respondents infected with worms. Bivariate analysis using chi square statistics in the study is used to see the relationship between personal hygiene variables and the incidence of worms.

3. Results and Discussion

3.1. Results of Soil Transmitted Helminths Infection Examination

Worms are infections caused by parasitic worms that can be harmful to health. STH is a nematode worm that requires soil for the development of its infective structure. The types of STH worm eggs that are included are *Ascaris lumbricoides, Trichuris trichiura,* and Hookworms (*Necator americanus* and *Ancylostoma duodenale*). STH itself is still considered trivial by the public, because it is considered harmless or does not cause death. However, in fact, the effects of STH irritation can cause a decline in health, let alone death (Dianti, 2017) .

Table 1. Results of Soil Transmitted Helminths Infections

	Number of children	Percentage (%)
Positive	**21**	**60.00**
Negative	**14**	**40.00**
Amount	**35**	**100**

A total of 42 pots distributed to children aged 6-9 years only 35 returned containing feces. After

the feces were added with 0.9% NaCl, the results of worms or worm eggs in children aged 6-9 years in Pesarean Village were 21 children or (60.00%) , and negative for 14 children (40%).

The prevalence of worms in Indonesia is 60-80% and mostly affects children. Several studies on the incidence of worms state that school-age children are a group that is often infected with worms because they often play with soil, as well as lack of knowledge about the importance of maintaining personal hygiene. In general, in Pesarean Village, people have poor hygiene behavior such as not washing their hands with soap after playing on the ground, not washing their hands after defecating or not wearing footwear when playing outside, this can easily cause them to be infected with worms

3.2. Distribution of the number of Soil Transmitted Helminths Infections based on worm species

Soil Transmitted Helminths are a group of intestinal parasitic nematodes that infect, live and reproduce in the human intestine. STH species The most common cause of intestinal infections are roundworms (*Ascaris lumbricoides*) which infect more than 1.2 billion people, whipworms (*Trichuris trichiura*) which infect almost 800 million people, hookworms (*Necator americanus* and *Ancylostoma duodenale*) which infect almost 100 million people worldwide. STH transmitted *fecal-orally* through soil that has been contaminated with STH worm eggs previously.

Table 2. Results of Fecal Examination of Children Aged 6-9 Years

Types of Infection	Number of children	Percentage (%)
Ascaris Lumbricoides	**18**	**85.71**
Trichiura Trichiura	**1**	**4.76**
Necator americanus	**2**	**9.52**
Amount	**21**	**100**

Results species of worms that cause infection The most commonly found *STH* are worms *Ascaris lumbricoides* is 85.71% (people), compared to *T. trichiura* 4.76% and *Necator Americanus* 9.52% . Surveys conducted in several places in Indonesia show that the prevalence of *Ascaris Lubricoides* is still quite high, around 60-90% (Trasia, 2021) . *A. lumbricoides* is found throughout the world, including in tropical and subtropical areas that have high humidity. This humidity factor will trigger the growth of *A. lumbricoides eggs* to develop and cause worm infections.

Soil Transmitted Helminths are transmitted through soil contaminated by human feces that have been infected with STH. previously, then the eggs will go through a maturation process in humus, warm and humid soil, so that climate conditions greatly affect STH transmission. *Ascaris Lumbricoides eggs* require a temperature of 28-32℃ and for 2-4 weeks fresh fertilized eggs will

develop into infective eggs if they enter the *host's body*. *Trichuris Trichiura* eggs require an optimal temperature of 30-32℃ to mature, fresh eggs that will develop into mature eggs with 2 cells for 3 to 6 weeks . *Necator Americanus eggs* require an optimal temperature of 23-33℃, in 24-48 hours they will hatch. These three species enter the body *fecal-orally* , so *personal hygiene habits* and sanitation facility conditions greatly affect STH transmission.

This is in accordance with the Minister of Health Regulation (2017), which states that at a temperature of 25-30℃, *A. lumbricoides* eggs will mature in less than three weeks in soil with high humidity, sunlight and air can accelerate drying and then spread worm eggs in dust. Children are susceptible to infection with *A. lumbricoides worm eggs* than other worm eggs because *A. lumbricoides* lays more eggs than other types of worm eggs and children are susceptible to infection than adults because children more often do direct contact activities with the soil which can support a high risk of getting worm infections

3.3. Relationship between Personal Hygiene and Worm Infection

Personal Hygiene is a habit of living by always paying attention to personal hygiene such as washing hands before and after eating, wearing footwear, cutting nails and bathing habits. *Personal Hygiene* is an action to maintain a person's cleanliness and health, both physically and mentally (Rembet et al., 2018)

Table 3. Frequency Distribution of Personal Hygiene in Children Aged 6-9 Years, Pesarean Pagerbarang Village, Tegal,Central Java

	Personal Hygiene	
	Number of children	**Percentage (%)**
Good	**17**	**48.57**
Not good	**18**	**51.43**
Amount	**35**	**100**

Based on the results of observations through a questionnaire on 35 children regarding *Personal Hygiene* which includes hand washing habits, use of footwear, and defecation habits, it was found that 18 children (51.43%) had *Personal Hygiene* in the poor category , which means it is higher than children who have good *Personal Hygiene , namely 17 children (48.57%).* Research conducted by Zahratunnajhah et al. The prevalence of poor *personal hygiene was 13 people (61.9%). This result can be stated as still higher than the results obtained by researchers.*

Worm infections in children are caused by low awareness of personal hygiene and ignoring hygiene issues, including enjoying playing in the dirt, not washing hands after playing with dirt, not washing hands before and after eating, defecating carelessly, not washing hands after defecating, not

wearing shoes when leaving the house are factors that can be infected with worm eggs. Worm eggs in the soil can stick to clothes and nails. If children do activities that involve direct contact with the soil, it can support a high risk of getting worm infections (Rembet et al., 2018) .

Table 4. Results of Statistical Test of the Relationship between Personal Hygiene and Worm Infection

		Incident Worms		Total	Chi Squere	P-value
		Positive	Negative			
Personal Hygiene	Good	3	14	17	24.706 [a]	0.000
	Not Good	18	0	18		
Total		21	14	35		

From the table above, it can be seen that *STH infections* in children with good *Personal Hygiene* amounted to 3 children and children with poor *Personal Hygiene were infected with STH as many as 18 children*. Poor *Personal Hygiene experienced more infections than vice versa*. *Personal Hygiene* with good conditions but positive laboratory results occurred because the possibility of the child's infection was obtained from food that had been infected by worms. From the results of the Chi-square test, a *p-value* of 0.000 was obtained where the value was less than <0.05, it can be concluded that Ho was rejected, which can be interpreted as a relationship between *Personal Hygiene* and the Incidence of Worms in children aged 6-9 years in Pesarean Pagerbarang Village, Tegal, Central Java. This was also proven by Zahratunnajhah et al. (2022), where the results of the Statistical test of the incidence of STH worms with *Personal Hygiene* were obtained (p-value = 0.018), this proves that the test value is more significant or there is a meaningful relationship between *Personal Hygiene and* the Incidence of Worms.

3.4 Relationship between nail cleanliness and the incidence of worms

Table 5. Distribution of Nail Frequency in Children Aged 6-9 Years, Pesarean Pagerbarang Village, Tegal, Central Java

	Nail Hygiene	
	Number Of Children	Percentage (%)
Clean	16	45.71
Not Clean	19	54.29
Amount	35	100

Based on the table above, it can be seen the results of observations of nail cleanliness in children aged 6-9 years in Pesarean Village, out of 35 children, 16 children (45.71%) have clean nails, and 19 children (54.29%) have unclean nails characterized by long and dirty nails. Long and dirty fingernails cause dirt and germs to grow. Worm eggs in the soil can be moved between the fingers or caught in the nails, so that when eating food, worm eggs attached under long and dirty nails will be swallowed along with the food eaten.

Table 6. Statistical Test Results of the Relationship between Nail Cleanliness and Worm Infection in Children Aged 6-9 Years in Pesarean Pagerbarang Village, Tegal, Central Java

		Incident Positive	Worms Negative	Total	Chi Squere	P-value
Nail Hygiene	Clean	6	10	16		
	Not Clean	15	4	19	6,217 [a]	0,013
Total		21	14	35		

The results of the chi-square test showed that there was a significant relationship between nail cleanliness and the incidence of worms in children aged 6-9 years in Pesarean with a P-value = 0.0 13 (α<0.05). From the table above it can be seen that worm infections In children with good nail hygiene (clean) there were 6 people and children with poor nail hygiene (dirty) were infected with worms as many as 15 people. Poor nail hygiene experienced more infections than vice versa. In children with good nail hygiene (clean) but had positive laboratory test results for STH infection, it is possible that this occurred because the children only cleaned their nails the night before the observation, because they were worried that they would be forced to clean their nails by the researcher.

4. Conclusions

Based on the research that has been conducted, the results of the distribution of the frequency of worm infestation in children aged 6-9 years in Pesarean Village were 60.00%, the frequency *Personal Hygiene* in the bad category is 51.43%, The frequency of nail hygiene in the bad category is 54.29%, There is a significant relationship between *Personal Hygiene* and the incidence of worms. And there is a significant relationship between nail hygiene and the incidence of worms

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