

The Relationship Between Helminthiasis and Nutritional Status in Children

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ABSTRACT/ ABSTRAK

ABSTRACT. Helminthiasis remains a prevalent public health problem in Indonesia, particularly among elementary school-aged children who are vulnerable to infection due to poor environmental sanitation and inadequate hygiene practices. This study aims to analyze the relationship between helminthic infection and nutritional status among students at SDN Polenga Jaya, located in the working area of the Poli-Polia Public Health Center. This research employed a quantitative analytic method with a cross-sectional design and involved 32 respondents selected through total sampling. Data were collected through interviews, stool examinations to detect helminth eggs, and nutritional status assessment using the Body Mass Index-for-Age (BMI-for-age) index. Bivariate analysis using the Chi-square test indicated a significant association between helminthic infection and nutritional status ($p = 0.012$; $\alpha = 0.05$). Conclusion: Children infected with helminths tend to have lower nutritional status compared to those who are not infected. Therefore, interventions through education, promotion of clean and healthy living behaviors, and regular health screenings are necessary to prevent helminthic infections and maintain optimal nutritional status in children.

ABSTRAK. Cacingan merupakan masalah kesehatan masyarakat yang masih banyak dijumpai di Indonesia, terutama pada anak usia sekolah dasar yang rentan terinfeksi akibat rendahnya sanitasi lingkungan dan perilaku hidup bersih. Penelitian ini bertujuan untuk menganalisis hubungan antara infeksi cacingan dengan status gizi pada siswa SDN Polenga Jaya di wilayah kerja Puskesmas Poli-Polia. Penelitian ini menggunakan metode kuantitatif analitik dengan desain *cross-sectional* dan melibatkan 32 responden melalui teknik total sampling. Data dikumpulkan melalui wawancara, pemeriksaan feses untuk mendeteksi telur cacing, serta pengukuran status gizi menggunakan indeks IMT menurut umur. Hasil analisis bivariat dengan uji Chi-square menunjukkan adanya hubungan yang signifikan antara infeksi cacingan dan status gizi ($p = 0,012$; $\alpha = 0,05$). Kesimpulan: anak yang terinfeksi cacingan cenderung memiliki status gizi yang lebih rendah dibandingkan anak yang tidak terinfeksi. Oleh karena itu, diperlukan intervensi melalui edukasi dan pembiasaan perilaku hidup bersih dan sehat, serta pemeriksaan kesehatan secara berkala untuk mencegah infeksi cacingan dan menjaga status gizi anak secara optimal.

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INTRODUCTION

Helminthiasis is a widespread health problem in tropical and subtropical regions. It is classified as a disease that can impact the quality of human resources due to its effects on nutrition, cognitive ability, and individual productivity. More than one billion people worldwide are infected with Soil-Transmitted Helminths (STH) (Freeman et al., 2015). According to the World Health Organization (2015), approximately 1.5 billion people, or 24% of the global population, are infected with soil-transmitted helminths, particularly in Sub-Saharan Africa, the Americas, China, and East Asia.

As a developing country, Indonesia continues to face numerous public health issues, including helminthiasis. This disease not only contributes to the decline in individual health but also adversely affects nutritional status, intelligence, and productivity. The economic burden it imposes is also substantial (Ditjen PP dan PL, 2012). Although the government has made various efforts, such as mass deworming programs and sanitation campaigns, the prevalence of helminthic infections remains high, especially among children (Beritasatu, 2015). A 2010 survey showed that the highest prevalence rates were found in West Nusa Tenggara (83.6%), West Sumatra (82.3%), and North Sumatra (60.4%) (Kusmi, 2014).

Helminthiasis significantly contributes to malnutrition, anemia, and impaired growth and development in children. Elementary school-aged children are particularly vulnerable due to their frequent contact with soil and limited understanding of personal hygiene (Ali in Idris & Fusvita, 2018). Mild helminthic infections may be asymptomatic, but severe cases can cause diarrhea, abdominal pain, fatigue, and both cognitive and physical impairments (World Health Organization, 2013). A study in Kenya found that 59% of elementary school children were undernourished due to helminthic infections, while in SDN 03 Pringapus, Semarang Regency, helminthiasis was identified as a risk factor for poor academic performance (JHECDs, 2018).

Risk factors for helminthic infection include poor sanitation, unhygienic behaviors such as not washing hands before meals or after defecation, and playing barefoot on contaminated soil (Rahayu, 2013; Alelign et al., 2015). Parasitic worms such as *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms typically develop in the human intestine and absorb nutrients that are meant for the host. Low socioeconomic status, limited education, and living in slum areas also increase the risk of infection (Kattula, 2014; Chadijah, 2014). Therefore, helminthiasis control must be comprehensive, including educational, social, and cultural approaches (Anwar, 2014; Eryani, 2015).

A study by Wantini (2011) reported a 47.4% prevalence of helminthiasis at SDN II Keteguhan, with open defecation in rivers identified as a key risk factor. A lack of knowledge about clean and healthy living behavior, poor nail hygiene, uncontrolled snacking habits, and limited access to clean water were major contributors to the high infection rate. These findings emphasize the importance of health promotion targeting school-aged children. Another study by Syahfitri Yolanda et al. (2017) found that good nutritional status was more prevalent among children whose nutrient intake matched their nutritional needs (Harjatmo, 2018). In other words, helminthic infection can potentially disrupt this balance, especially in children undergoing rapid growth.

Preliminary data from the Southeast Sulawesi Provincial Health Office in 2019 recorded 125 cases of helminthiasis, most of which occurred in children aged 7–14 years

(SP2P, 2019). In the working area of the Poli-Polia Public Health Center, SDN Polenga Jaya has 32 students as its population. However, empirical data specifically examining the relationship between helminthic infection and nutritional status among elementary school children in this area remain scarce. Therefore, this study was conducted to determine the relationship between helminthiasis and nutritional status among elementary school children at SDN Polenga Jaya in the working area of the Poli-Polia Public Health Center.

RESEARCH METHOD

This study employed a quantitative approach aiming to examine the relationship between helminthiasis and nutritional status among elementary school children. The method was used to establish generalizable facts regarding the relationship between the two variables through a survey and observational approach that produced numerical data. The study was analytical in nature, using a cross-sectional design that allowed the researcher to analyze the relationship between variables at a single point in time. The study was conducted at SDN Polenga Jaya, located within the working area of the Poli-Polia Public Health Center, East Kolaka Regency, Southeast Sulawesi. The research was carried out throughout the year 2024, following the predetermined activity plan. The location was selected based on preliminary data from the Health Office, which showed a relatively high incidence of helminthiasis among school-aged children in the area. The population consisted of all 32 students enrolled at SDN Polenga Jaya. Due to the relatively small population size, a total sampling technique was applied, in which all members of the population were included as research participants. This technique was chosen to avoid bias and ensure comprehensive data coverage from all respondents.

The data used in this study comprised both primary and secondary sources. Primary data were collected through direct interviews with respondents using an observation instrument tailored to the research objectives. Stool examinations were conducted to detect the presence of helminth eggs as an indicator of helminthic infection. Secondary data were obtained from reports and documentation at the Poli-Polia Health Center, particularly those related to children's nutritional status and health records. The main instrument used was a stool examination form to detect helminth eggs in elementary school children. The examination was conducted in collaboration with healthcare facilities to ensure accuracy and validity of the results. Children's nutritional status was assessed using the Body Mass Index-for-Age (BMI-for-age) index, calculated based on height and weight according to WHO standards. Data analysis was carried out in two stages: univariate and bivariate analysis. Univariate analysis was used to describe the characteristics of each variable, such as nutritional status and helminthic infection, presented in the form of frequency distributions and percentages. Meanwhile, bivariate analysis was used to examine the relationship between helminthiasis and nutritional status in elementary school children. The statistical test applied was the Chi-square (χ^2) test with a significance level of 0.05. The hypothesis was accepted if the p-value was less than 0.05, indicating a significant relationship between the independent and dependent variables.

Research ethics were strictly applied to protect the rights and privacy of the respondents. The researcher first provided an explanation of the study's purpose and objectives, then obtained written consent through an informed consent form. Respondents' identities were kept confidential by not recording names on the research instruments but

using codes instead. In addition, the principle of justice was upheld by treating all respondents equally without discrimination.

RESULTS

Univariate Analysis

Helminthiasis

Table 1. Frequency Distribution of Helminthic Infection Among Students at SDN Polenga Jaya

Helminthic Infection	Frequency	Percentage
Positive	2	6.25%
Negative	30	93.75%
Total	32	100%

Source: Primary Data, 2024

Based on Table 1, out of the total 32 children at SDN Polenga Jaya, 2 children (6.25%) were identified as positive for helminthic infection, while 30 children (93.75%) were classified as negative.

Nutritional Status

Table 2. Frequency Distribution of Nutritional Status Among Students at SDN Polenga Jaya

Nutritional Status	Frequency	Percentage
Poor	4	12.5%
Good	28	87.5%
Total	32	100%

Source: Primary Data, 2024

Based on Table 2, of the 32 children, 4 (12.5%) had poor nutritional status, while the majority, 28 children (87.5%), had good nutritional status.

Bivariate Analysis

Table 3. Relationship Between Helminthic Infection and Nutritional Status Among Students at SDN Polenga Jaya, Poli-Polia Public Health Center Work Area

Nutritional Status		Helminthic Infection				Total		<i>p-value</i>
		Positive		Negative				
		F	%	F	%	f	%	
Poor		2	6.25	2	6.25	4	12.5	0,012
Good		0	0	28	87.5	28	87.5	
Total		2	6.25	30	93.75	32	100	

Source: Primary Data, 2024

As shown in Table 3, all 2 children who tested positive for helminthic infection (100%) had poor nutritional status. Meanwhile, of the 30 children who tested negative, 28 (87.5%) had good nutritional status and 2 (6.25%) had poor nutritional status.

The Chi-square statistical test yielded a p-value of 0.012, which is lower than the significance level ($\alpha = 0.05$). These results indicate a statistically significant relationship between helminthic infection and nutritional status among students at SDN Polenga Jaya in the working area of the Poli-Polia Public Health Center.

DISCUSSION

The results of this study show that out of 32 student respondents at SDN Polenga Jaya, 2 children (6.25%) were found to be positive for helminthiasis, and all of them had poor nutritional status. Meanwhile, among the 30 children (93.75%) who tested negative for helminthic infection, 2 children (6.25%) also had poor nutritional status, while 28 children (87.5%) were in the good nutritional status category. Based on bivariate analysis using the Chi-square test, the p-value was found to be 0.012, which is lower than the significance level $\alpha = 0.05$. These findings indicate a significant relationship between helminthic infection and nutritional status among students at SDN Polenga Jaya in the working area of the Poli-Polia Public Health Center.

This finding is consistent with the study by Dewi Astuti et al. (2019), which found a significant association between helminthic infection and the nutritional status of children at Muhammadiyah Jampu Elementary School, Lanrisang Subdistrict, Pinrang Regency. As parasites, helminths inhabit the host's body and absorb essential nutrients that should be utilized by the human body. Helminthic infection in children can lead to growth disorders and reduced immunity. Transmission commonly occurs through soil contaminated with helminth eggs. Children who are not yet aware of the importance of personal hygiene and who frequently play in dirty environments such as ditches or sand are at higher risk of infection (Lestari Handayani, 2014).

Elementary school-aged children are considered a vulnerable group when it comes to nutritional disorders, making the measurement of nutritional status in this age group an important indicator of general public health. Helminthiasis is one of the factors that can affect nutritional status, as parasitic worms absorb nutrients such as carbohydrates, proteins, and iron from the host's body (Dewi Astuti et al., 2019). Accumulated infections can lead to the loss of vital nutrients and blood, decreasing children's productivity and immunity, and ultimately impacting their quality of life both physically and academically.

Mechanistically, helminth eggs can enter the human body through skin penetration upon direct contact with contaminated soil or water (Lapat et al., 2024). Eggs excreted in human feces can pollute the environment if waste is not managed properly. These eggs can be carried by water, adhere to soil or dust, and transfer to hands or frequently touched surfaces, thereby increasing the risk of transmission (Dewi Astuti et al., 2019). Soil-Transmitted Helminth (STH) infection can also occur when hookworm larvae penetrate the skin, confirming that direct contact with contaminated soil is a primary route of transmission (Ugwu et al., 2024).

Once inside the body, the helminth larvae travel through the venous blood vessels to internal organs, especially the digestive tract. In the intestines, the worms reproduce and attach to the intestinal wall to absorb nutrients from the digested food. Vital nutrients such as carbohydrates, proteins, and other micronutrients are taken up by the parasites, leading to nutritional deficits, particularly in children during critical growth periods. This condition can also reduce hemoglobin (Hb) levels to below 12 g/dL, disrupting oxygen distribution to tissues, including the brain. As a result, children may experience reduced brain metabolism, weakened immunity, and in the long term, delayed physical, mental, and even sexual development (Dewi Astuti et al., 2019).

Helminthic infections also have significant systemic impacts. These parasites are known to disrupt metabolic balance and cause malnutrition and iron-deficiency anemia. Worms absorb essential nutrients, interfere with glucose metabolism, and increase the body's metabolic energy burden, which can clinically result in weight loss and muscle wasting (Singla et al., 2024). These conditions directly affect children's growth and cognitive development, increase vulnerability to other infectious diseases, raise the risk of stunting, and reduce intellectual function (Maqfirah et al., 2023).

When helminthic infection occurs in children, particularly those with limited nutrient intake, the risk of malnutrition increases significantly. A study by Ugwu et al. (2024) indicated that soil-transmitted helminth infection is a major cause of anemia and undernutrition in children. In this context, limited access to balanced nutrition becomes one of the main determinants of stunting (Andriany et al., 2025). Another study by Sunarpo et al. (2023) reported that Soil-Transmitted Helminth infection could increase the risk of stunting in children by up to 44.407 percent. The pathological mechanisms involved include chronic malnutrition, impaired digestive function, and reduced immunity and brain development.

Thus, the findings of this study reinforce the importance of promotive and preventive interventions in addressing helminthic infection in children. Health education on clean and healthy behavior, improvement of environmental sanitation, and regular screening and treatment in school settings are strategic measures that must be implemented sustainably. These efforts are essential for improving children's nutritional status and ensuring the quality of human resources from an early age.

CONCLUSION

Based on data analysis using the Chi-square test, a p-value of 0.012 was obtained, which is lower than the significance level $\alpha = 0.05$. This result indicates a significant relationship between helminthic infection and nutritional status among elementary school children at SDN Polenga Jaya. Children infected with helminths tend to have lower nutritional status compared to those who are not infected.

The government, particularly the Health Office and Public Health Centers, is expected to strengthen collaboration in conducting regular screenings for helminthic infections and monitoring the nutritional status of school-aged children. These efforts are essential to detect possible new infections or reinfections early and to anticipate any decline in nutritional status as soon as possible. Although the infection prevalence is relatively low, the potential for transmission remains and requires continuous attention.

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