



Identification of *Soil-Transmitted Helminth* (STH) Eggs in Stool Samples of Children Aged 5–6 in Matekko Village, Gantarang Subdistrict, Bulukumba District

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Abstract. *Soil Transmitted Helminths (STH) infection remains a public health problem among young children due to their high risk of exposure to contaminated environments and inadequate hygiene practices. This study aimed to determine the presence and types of STH eggs in the feces of children aged 5–6 years in Matekko Village, Gantarang District, Bulukumba Regency. A cross-sectional study design was employed using purposive sampling. A total of 58 fecal samples were examined using native smear and sedimentation methods. The results showed that 22 samples (37.93%) were positive for STH infection. The identified helminth eggs were *Ascaris lumbricoides* and *Trichuris trichiura*. The sedimentation method detected 22 positive samples, while the native smear method detected 19 positive samples. In conclusion, STH infection was still found among children aged 5–6 years, with the sedimentation method demonstrating higher sensitivity than the native smear method. Early detection and routine screening of STH infections among young children directly contribute to Sustainable Development Goal (SDG) 3 by preventing parasite-induced morbidity and developmental impairment, while promoting hygiene and soil decontamination practices aligns with SDG 6.*

Keywords: STH; Children's Feces; Native Smear Method, Sedimentation Method, SDGs

1. Introduction

Helminthiasis remains a health problem found in various regions. The group of worms transmitted through contaminated soil is known as *Soil-Transmitted Helminths* (STH). Helminth infections can interfere with nutritional status due to reduced calorie and protein intake as well as blood loss. In addition, helminthiasis can impair children's physical and intellectual development and reduce their immune response (Idayani & Putri, 2022).

According to WHO (2012), more than 1.5 billion people, or approximately 24% of the world's population, are infected with STH. Children are among the groups that are particularly vulnerable to these infections. In Indonesia, helminth infections continue to occur, with relatively high prevalence reported in several regions. In South Sulawesi, data from the Health Office indicate that helminthiasis cases are still present, while in Bulukumba Regency, 153 cases were recorded in 2023, 78 cases in 2024, and 49 cases in 2025 (Bulukumba Health Office, 2025).

Children aged 5–6 years are particularly vulnerable to STH exposure because they engage in frequent play activities, including playing in soil. Soil contaminated with helminth eggs can serve as a source of transmission when children do not maintain proper hand and

nail hygiene. Personal hygiene and environmental sanitation factors are known to contribute to STH contamination in soil (Utami et al., 2023).

Based on data from Ponre Public Health Center in Matekko Village, 15 cases of helminthiasis were recorded in 2024. However, the relatively low number of recorded cases may not necessarily reflect the actual situation, as it may be influenced by parents' compliance in bringing their children for health examinations. Therefore, direct stool examination is necessary to obtain a more accurate picture of helminth infection in Matekko Village.

Laboratory examination plays an important role in identifying STH eggs. Methods that can be used include the direct wet mount (native) method and the sedimentation method. The native method is performed by mixing a small amount of stool with 2% eosin solution, followed by microscopic examination. Eosin helps enhance the visibility of helminth egg structures, making them easier to identify microscopically (Widyanti et al., 2024). Meanwhile, the sedimentation method is based on the principle of sedimentation, in which helminth eggs with a higher specific gravity become concentrated in the sediment and are subsequently examined microscopically (Yusri et al., 2025).

Widyanti et al. (2024) used the native method to examine children with indications of stunting and found 9 STH-positive samples, consisting of 7 *Ascaris lumbricoides* eggs and 2 *Trichuris trichiura* eggs. Nurfadillah et al. (2021), in a study involving 20 stool samples from children aged 7–10 years, found 2 samples (10%) positive for *Ascaris lumbricoides*. Meanwhile, Purba et al. (2023), in a study involving 49 stool samples from children aged 6–7 years, found 3 samples (6.1%) positive for *Trichuris trichiura* eggs.

Maintaining good hygiene practices is an important measure for preventing helminth infections. Prevention can be carried out through health education, stool examination for early detection, and the implementation of clean and healthy living behaviors (Ministry of Health, 2017).

Addressing STH infections directly aligns with the United Nations Sustainable Developments Goals (SDGs) agenda. Early laboratory screening and routine diagnostic monitoring among preschool children contribute to SDG 3 (Good Health and Well-being) by mitigating parasite-induced morbidity, malnutrition, and cognitive developmental delays. Concurrently, reducing soil-mediated parasitic transmission through enhanced personal hygiene, proper handwashing, and adequate environmental sanitation actively supports SDG 6 (Clean Water and Sanitation).

Based on the above considerations, this study was conducted to identify *Soil-Transmitted Helminths* (STH) eggs in stool samples from children aged 5–6 years in Matekko Village, Gantarang District, Bulukumba Regency, using the native and sedimentation methods.

2. Methods

This study was an observational study with a *cross-sectional* design. The study was conducted in Matekko Village, Gantarang District, Bulukumba Regency. Laboratory examinations were performed using the native and sedimentation methods.

The study samples consisted of 58 stool samples collected from children aged 5–6 years using a *purposive sampling* technique. The examination was conducted to identify the presence of *Soil-Transmitted Helminths* (STH) eggs. The native and sedimentation methods

were used as laboratory examination methods, as previously applied in related studies (Suraini & Sophia, 2020; Yusri et al., 2025).

For the native method, stool samples were examined directly using 2% eosin solution and observed under a microscope at 10× and 40× magnifications. For the sedimentation method, stool samples were processed through dilution, filtration, and sedimentation before the sediment was examined microscopically. The sedimentation method is based on the principle of concentrating helminth eggs in the sediment, making them easier to detect (Yusri et al., 2025).

The examination results were analyzed descriptively based on the types of helminth eggs identified and presented in tables and narrative form. The associations between handwashing habits, nail hygiene, footwear use, soil-playing activities, and STH infection were analyzed using the *chi-square* test.

3. Results and Discussion

3.1 STH Egg Examination

The study was conducted on 58 stool samples collected from children aged 5–6 years. The results showed that 22 samples (37.93%) were positive for STH eggs. The helminth species identified were *Ascaris lumbricoides* and *Trichuris trichiura*. These findings are consistent with the objective of the study, which was to identify the presence and types of STH eggs in children aged 5–6 years.

Table 1. Detection Performance of STH Eggs by Laboratory Method (N=58)

Examination Method	Positive (n)	Negative (n)	Total Samples (N)	Positive (%)	Negative (%)	Total (%)
Native Smear	19	39	58	32.75	67.25	100.00
Sedimentation	22	36	58	37.93	62.06	100.00

As shown in Table 1, the sedimentation method detected more positive samples than the native smear method. Of the 22 positive samples, the native smear method detected 19 samples, whereas the sedimentation method detected all 22 positive samples. Three samples showed negative results using the native smear method but positive results using the sedimentation method.

These findings indicate that the sedimentation method provided better detection results than the native method in this study. The native method does not involve a concentration process, which may make it more difficult to detect helminth eggs when present in small numbers. In contrast, the sedimentation process helps concentrate helminth eggs in the sediment, making them easier to detect microscopically.

3.2 Types of STH Eggs Identified

Based on the identification results, 12 samples were infected with *Ascaris lumbricoides*, 3 samples were infected with *Trichuris trichiura*, and 7 samples showed mixed infection with both helminth species. The distribution of identified species among positive specimens is summarized in Table 2.

Table 2. Distribution of STH Species Identified Among Positif Samples ($n=22$)

Type Of Infection	Number (n)	Percentage (%)
<i>Ascaris lumbricoides</i>	12	54,55
<i>Trichuris trichiura</i>	3	13,64
<i>Ascaris</i> + <i>Trichuris</i>	7	31,82
Total	22	100.00

Ascaris lumbricoides was the most dominant helminth species identified. This may be attributed to the thick-walled eggs of *Ascaris lumbricoides*, which enable them to survive longer under environmental conditions. Meanwhile, the presence of *Trichuris trichiura* may indicate exposure through hands or food contaminated with helminth eggs.

The findings of this study can also be compared with those of previous studies. Widyanti et al. (2024) identified 7 *Ascaris lumbricoides* eggs and 2 *Trichuris trichiura* eggs in stool examinations of children with indications of stunting. Nurfadillah et al. (2021) identified *Ascaris lumbricoides* in 2 out of 20 stool samples from children aged 7–10 years, whereas Purba et al. (2023) identified *Trichuris trichiura* in 3 out of 49 stool samples from children aged 6–7 years.

3.3 Association Between Handwashing Habits and STH Infection

The statistical analysis showed a significant association between handwashing habits and STH infection ($p = 0.018$). This finding indicates that handwashing habits serve as a major behavioral risk factor associated with the occurrence of STH infection. Hands serve as a primary vehicle for transferring helminth eggs from contaminated soil into the gastrointestinal tract. Children who play in the soil and subsequently eat without washing their hands are at high risk of ingesting helminth eggs.

3.4 Association Between Nail Hygiene and STH Infection

Nail hygiene was also significantly associated with STH infection ($p < 0.001$). Unclean fingernails accumulate soil debris and helminth eggs, particularly among young children who engage in ground play. Maintaining proper nail hygiene through regular trimming and hand hygiene is essential to prevent mechanical egg transmission.

3.5 Association Between Footwear Use and STH Infection

The statistical analysis showed no significant association between footwear use and STH infection ($p = 0.356$). The absence of a significant association is epidemiologically aligned with the helminth species identified in this study (*Ascaris lumbricoides* and *Trichuris trichiura*). Transmission of these species occurs via the oral ingestion of embryonated eggs rather than percutaneous larval penetration through bare feet.

3.6 Association Between Soil-Playing Activities and STH Infection

The results demonstrated that soil-playing activities were significantly associated with STH infection ($p = 0.003$). Soil contaminated with helminth eggs acts as a direct environmental exposure route. Children playing in contaminated soil with frequent hand-to-mouth movements face an elevated risk of infection.

Conclusions

Based on the results of this study, it can be concluded that among the 58 stool samples collected from children aged 5–6 years, 22 samples (37.93%) were positive for *Soil-Transmitted Helminths* (STH) eggs. The helminth species identified were *Ascaris lumbricoides* and *Trichuris trichiura*, with *Ascaris lumbricoides* being the most dominant species. The sedimentation method detected 22 positive samples, whereas the native method detected 19 positive samples. Therefore, in this study, the sedimentation method detected more positive samples than the native method. There was a significant association between handwashing habits, nail hygiene, and soil-playing activities and the occurrence of STH infection. Meanwhile, footwear use was not statistically significantly associated with STH infection.

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Conflicts of Interest

The authors declare no conflict of interest

References

- Idayani, I., & Putri, A. (2022). Impact of helminthiasis on nutritional status and physical development in early childhood. *Jurnal Kesehatan Masyarakat*, 10(2), 115–122.
- Bulukumba Health Office. (2025). *Health profile and epidemiological report of helminthiasis in Bulukumba Regency*. Health Office of Bulukumba Regency.
- Abrar, H. K., Sartika, S. D., & Tahlil, T. (2025). Risk factors for helminth infections among primary school students in Indonesia: A systematic review. *Bosowa Medical Journal*, 3(1), 7–12. <https://doi.org/10.56326/bmj.v3i1.2477>
- Jourdan, P. M., Lamberton, P. H. L., Fenwick, A., & Addiss, D. G. (2018). Soil-transmitted helminth infections. *The Lancet*, 391(10117), 252–265. [https://doi.org/10.1016/S0140-6736\(17\)31930-X](https://doi.org/10.1016/S0140-6736(17)31930-X)
- Ministry of Health of the Republic of Indonesia. (2017). *Guidelines for the prevention and control of helminthiasis*. Ministry of Health RI.
- Nurfadillah, N., Ridwan, A., & Arwie, D. (2021). Identification of Soil-Transmitted Helminths (STH) in children aged 7–10 years using native wet mount method. *TLM Blood Smear*, 2(2), 54–59.
- Okyere, J., Zegeye, B., Ahinkorah, B. O., & Yaya, S. (2021). Association between water, sanitation, and hygiene (WASH) practices and soil-transmitted helminthiasis among children in sub-Saharan Africa. *BMC Public Health*, 21(1), Article 1845. <https://doi.org/10.1186/s12889-021-11898-0>
- Purba, Y., Lestari, M., Rajagukguk, T., Erlan, A., & Girsang, V. I. (2023). Identification of Soil-Transmitted Helminths (STH) eggs in pediatric fecal specimens at Primary School 1 Ambarita, Samosir Regency. *Jurnal Teknologi, Kesehatan & Ilmu Sosial*, 5(1), 180–187.

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- Silver, Z. A., Kaliappan, S. P., Ajjampur, S. S. R., & Kang, G. (2020). The impact of soil-transmitted helminths on child growth and nutritional status in low- and middle-income countries. *Current Opinion in Infectious Diseases*, 33(5), 392–398. <https://doi.org/10.1097/QCO.0000000000000670>
- Subahar, R., Yasin, A., & Sitorus, C. (2022). Evaluation of direct smear and concentration techniques for detecting parasite eggs in stool specimens. *International Journal of Tropical Disease & Health*, 43(8), 12–19. <https://doi.org/10.9734/ijtdh/2022/v43i830612>
- Suraini, S., & Sophia, A. (2020). Evaluation and diagnostic agreement of Soil-Transmitted Helminth egg detection using direct, sedimentation, and flotation techniques. *Journal of Medical Laboratory Technology*, 3(2), 31–36.
- Triteeraprapab, S., & Lawpoolsri, S. (2021). Diagnostic sensitivity of formalin-ether sedimentation and direct smear techniques for intestinal parasite screening in rural communities. *Journal of Health Research*, 35(4), 310–319. <https://doi.org/10.1108/JHR-02-2020-0041>
- Utami, W. S., Rahmawati, E., & Indriani, D. (2023). Personal hygiene and environmental sanitation as predictors of STH contamination in rural soil environments. *Asian Pacific Journal of Tropical Medicine*, 16(3), 112–119.
- World Health Organization. (2020). *Ending the neglect to attain the Sustainable Development Goals: A road map for neglected tropical diseases 2021–2030*. World Health Organization.
- Widyanti, A., Suwandi, S., & Lestari, P. (2024). STH egg identification in stunted children using direct microscopic examination. *Journal of Tropical Parasitology*, 14(1), 45–51.
- Yusri, Y., Pratama, R., & Handayani, S. (2025). Comparative performance of native smear, sedimentation, and flotation methods for microscopic diagnosis of STH eggs. *International Journal of Parasitology Research*, 17(1), 88–95.
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