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Education on the Prevention of Intestinal Worm Infections through the Practice of Personal Hygiene among Students at SD Negeri 4 Teluk Kijing

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Abstract

Soil-transmitted helminth infections remain common among primary school children and are closely related to personal hygiene, such as handwashing, nail hygiene, and wearing footwear. This community service activity aimed to improve primary school students' knowledge and skills in preventing intestinal worm infections through personal hygiene practices. The activity was held on 23 January 2025 at SD Negeri 4 Teluk Kijing and involved 45 fourth- and fifth-grade students. It included counseling with pictures and animated video, educational games, practice of six-step handwashing with soap, and nail trimming and inspection. Knowledge was measured with a 10-item pictorial questionnaire before and after education, and handwashing skill was assessed with an 8-step observation checklist. Before the activity, only 46.7% of students had short, clean nails and 42.2% habitually washed their hands with soap before eating. The mean knowledge score increased from 49.8 ± 16.4 to 82.7 ± 12.1 ($p < 0.001$), with a mean N-gain of 0.64 (moderate). The proportion of students performing all handwashing steps correctly rose from 6.7% to 68.9% ($p < 0.001$). One week after the activity, 82.2% of students had short, clean nails. Education combined with hands-on practice effectively improves students' knowledge and personal hygiene skills for preventing intestinal worm infections.
Keywords: *handwashing; health education; intestinal worms; personal hygiene; primary school students*

INTRODUCTION

Soil-transmitted helminth (STH) infections—most notably those caused by *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworms—are among the most prevalent infections globally. These infections primarily affect populations with limited access to clean water, sanitation, and hygiene. According to the World Health Organization (WHO, 2023), more than 600 million school-aged children live in areas with high STH transmission, necessitating both

treatment and preventive measures. Such helminth infections can lead to anemia, nutritional deficiencies, and impaired growth, as well as reduced concentration and poorer academic performance in children.

Worm eggs enter the body through hands contaminated with soil, long and dirty fingernails, or unclean food, while hookworm larvae can penetrate the skin of bare feet. Consequently, controlling soil-transmitted helminths (STH) requires more than just periodic deworming medication; it also necessitates health education to prevent reinfection (WHO, 2023). A meta-analysis of primary school students in Indonesia indicates that failing to wash hands, not wearing footwear, and neglecting nail hygiene increase the risk of helminth infections (Krismahardi & Metriana, 2023). Research conducted at SD Negeri Kejambon 7 Tegal further underscores the importance of students' knowledge and personal hygiene in preventing such infections (Arinda & Buana, 2023), and it has been shown that personal hygiene education programs in primary schools can effectively improve students' understanding (Dwijastuti et al., 2025).

SD Negeri 4 Teluk Kijing is located in Teluk Kijing Village (in the respective sub-district and regency). Most of the students play in the schoolyard or around their homes, where the ground is often damp. Initial observations, conducted in collaboration with teachers, revealed that many students have long, dirty fingernails, frequently eat snacks without washing their hands, and play barefoot. Furthermore, the school lacks a regular handwashing-with-soap program. Consequently, a team from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa implemented an educational initiative on preventing intestinal worm infections through the practice of personal hygiene. This activity aims to: (1) increase students' knowledge about intestinal worms and how to prevent them; (2) improve students' skills in washing their hands properly with soap; and (3) encourage students to maintain clean fingernails and wear footwear.

METHOD

Time, location, and target participants. The activity took place on Thursday, January 23, 2025, at SD Negeri 4 Teluk Kijing, Lais District, Musi Banyuasin Regency. The target participants were fourth and fifth-grade students who were present on the day of the event and had received permission from the school. A total of 45 students participated in the entire series of activities.

Implementation team and partners. The activities were carried out by lecturers from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa, with the assistance of students, and in collaboration with the school principal, homeroom teachers, and the teacher in charge of the school health unit (UKS) at SD Negeri 4 Teluk Kijing.

Stages of the activity.

1. Preparation. The team coordinated with the school and prepared visual aids, including an animated video titled "Let's Get Rid of Worms!", posters illustrating the six-step handwashing technique, soap, access to running water, nail clippers, and a questionnaire featuring images.
2. Initial observation and pre-test. The team assessed the cleanliness of the students' fingernails and inquired about their habits regarding handwashing, the use of footwear, and the consumption of deworming medication. Students then completed a 10-item knowledge questionnaire (using images), which was read aloud by the team. Afterward, students were asked to wash their hands as they normally would, while the team observed and recorded their technique using an 8-step observation checklist.
3. Education. A session lasting approximately 45 minutes was conducted using simple language to cover topics such as types of intestinal worms; modes of transmission (via hands, fingernails, food, or walking barefoot); the impact of worm infections on health and academic performance; and methods for prevention. The session incorporated an animated video, a picture-guessing game, and a Q&A segment with prizes.
4. Practical application. In small groups, students practiced the six-step handwashing technique using soap and running water. Their performance was then re-evaluated using the observation checklist. The team also assisted in trimming the students' long fingernails.
5. Evaluation and follow-up. Students completed a post-test. One week later, the class teacher re-examined the cleanliness of the students' fingernails. The school was also provided with handwashing posters to be displayed near handwashing stations.

Data analysis. Data are presented as frequencies and percentages. Knowledge scores (0–100) were categorized as good (≥76), fair (56–75), or poor (<56). As the score differences were not

normally distributed (Shapiro–Wilk p = 0.033), the Wilcoxon signed-rank test was applied. The effectiveness of the educational intervention was assessed using the N-gain score. Changes in the proportion of students who performed all handwashing steps correctly and who had short, clean fingernails were tested using the exact McNemar test. Statistical significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Implementation of activities

The activity lasted for about 3 hours and involved 45 students. The students were very enthusiastic, especially while watching an animated video, playing a picture-guessing game, and practicing handwashing. Many students were surprised to learn that worm eggs can hide under fingernails and remain invisible to the naked eye.



Figure 1. Documentation of Educational Activities

Students' personal hygiene characteristics and habits

Table 1. Characteristics and personal hygiene habits of students prior to the activity (n = 45)

Variable	Category	n	%
Gender	Man	23	51,1
	Woman	22	48,9
Class	IV	24	53,3
	V	21	46,7
Age	9–10 years old	26	57,8
	11–12 years old	19	42,2
Short and clean nails (observation)	Yes	21	46,7
Wearing footwear when playing outside	Yes	28	62,2
Wash your hands with soap before eating	Yes	19	42,2

Variable	Category	n	%
Wash your hands with soap after using the toilet	Yes	25	55,6
Took deworming medication within the last 6 months	Yes	17	37,8

Prior to the activity, more than half of the students had long or dirty fingernails, and less than half were in the habit of washing their hands with soap before eating. Only 37.8% of the students recalled taking deworming medication within the last six months. These habits are risk factors for helminth infections (worm infestations), as demonstrated in a meta-analysis involving elementary school students in Indonesia (Krismahardi & Metriana, 2023).

Changes in students' knowledge

Table 2. Knowledge scores and categories before and after education (n = 45)

Parameter	*Pre-test*	*Post-test*
Rerata ± SD	49,8 ± 16,4	82,7 ± 12,1
Median (min–max)	50,0 (10,0–80,0)	80,0 (50,0–100)
Good, n (%)	2 (4,4)	33 (73,3)
Sufficient, n (%)	16 (35,6)	11 (24,4)
Insufficient, n (%)	27 (60,0)	1 (2,2)
Mean difference (95% CI)	32,9 (28,0–37,8)	
Wilcoxon Test	p < 0,001	
Average N-gain	0.64 (moderate)	
Score increased/remained the same/decreased	43/2/0	

The mean knowledge score increased by 32.9 points following the educational intervention ($p < 0.001$), and the proportion of students with a good level of knowledge rose from 4.4% to 73.3%. Prior to the intervention, many students were unaware that worms could enter the body through the skin of unshod feet or via dirty fingernails. The use of images, animated videos, and games helped primary school-aged students grasp the material more easily.

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Handwashing skills and nail hygiene

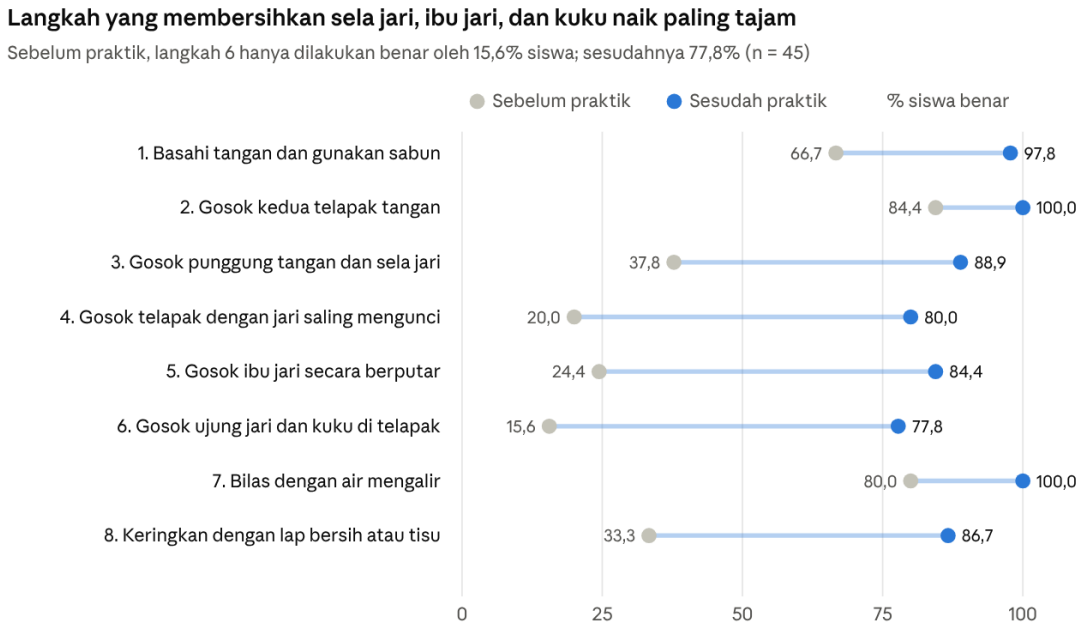


Figure 2. Percentage of students who performed each step of handwashing correctly before and after the practice session.

Table 3. Changes in handwashing skills and nail hygiene (n = 45)

Indicator	Before, n (%)	After, n (%)	p (McNemar)
Perform all 8 steps of handwashing correctly	3 (6,7)	31 (68,9)	< 0,001
Short and clean fingernails (one week after the activity)	21 (46,7)	37 (82,2)	< 0,001

Before the practical session, most students merely wetted their hands, rubbed their palms together, and rinsed. Steps such as cleaning the spaces between the fingers, the thumbs, and the fingertips and nails were the least frequently performed—even though these areas are the most prone to harboring dirt and helminth eggs. Following the session, the percentage of students who correctly performed these steps increased sharply (Figure 1), and the proportion of students who carried out all the steps correctly rose from 6.7% to 68.9%. One week after the activity, 82.2% of the students had short, clean fingernails, an improvement from 46.7% prior to the activity. These findings align with the work of Arinda and Buana (2023), who emphasized the importance of student knowledge and personal hygiene in preventing helminth infections, as well as with similar hygiene education initiatives conducted in other primary schools (Dwijastuti et al.,

2025). Health education of this nature complements mass deworming programs; while medication only eliminates existing worms, hygienic practices prevent reinfection (WHO, 2023).

Limitations

Data on personal hygiene habits were obtained partly through student self-reporting, which may be influenced by recall bias or a desire to provide socially desirable answers. The assessment of fingernail cleanliness was conducted only once—one week after the activity—so the long-term sustainability of these behaviors remains unknown. Furthermore, this initiative did not include stool examinations; therefore, its impact on the prevalence of helminth infections (intestinal worms) could not be evaluated.

CONCLUSIONS AND SUGGESTIONS

Conclusion. Education on the prevention of intestinal worm infections through the practice of personal hygiene significantly improved the knowledge of students at SD Negeri 4 Teluk Kijing (increasing from 49.8 to 82.7; $p < 0.001$; N-gain 0.64). Hands-on practice increased the proportion of students who washed their hands using all the correct steps from 6.7% to 68.9%, while the proportion of students with short, clean fingernails rose from 46.7% to 82.2% one week after the activity.

Suggestion.

1. For schools: provide handwashing stations with running water and soap, implement group handwashing sessions before meal times, conduct weekly checks of students' fingernails, and collaborate with the local community health center (puskesmas) to administer deworming medication periodically.
2. For parents: encourage children to develop the habit of washing their hands with soap, trimming their fingernails once a week, and wearing footwear when playing outdoors.
3. For future activities: conduct stool examinations to determine the prevalence of helminth infections (worm infestations) and evaluate changes in students' behavior over the long term.

Thank-you note

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