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THE RELATIONSHIP BETWEEN PERSONAL HYGIENE AND THE INCIDENCE OF HELMINTHIASIS IN ELEMENTARY SCHOOL STUDENTS IN INDONESIA

Adnindya Krismahardi ✉, **Metriana**
Department of Environmental Health, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

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ABSTRACT

Helminthiasis is an infectious disease caused by parasites in the form of worms that are usually transmitted through contaminated soil. Several things can be risk factors for disability in children. Risk factors for helminthiasis include Not washing hands with soap before eating; Not wearing shoes when leaving the house; Washing hands without soap after defecation; Frequent nail-biting; Playing on the dirty ground; Paying less attention to the food consumed. The purpose of this study was to determine the relationship between personal hygiene which consists of hand washing behavior, using footwear, and the habit of cleaning nails to the incidence of worms in elementary school students in Indonesia. This study used a meta-analysis method with secondary data obtained on the Google Scholar online database portal. Research articles obtained from Google Scholar and have gone through a selection process with inclusion criteria will enter the meta-analysis stage using JASP software. Based on the meta-analysis results, the personal hygiene variable was identified as the biggest risk factor. namely handwashing behavior with a pooled PR value of 2,944 and 95% CI of 0.696-1,465, followed by variables of behavior using footwear with a pooled PR value of 2,351 and 95% CI of 0.326-1,384 and the smallest risk factor, namely nail cleaning behavior with a pooled PR value of 2,284 and 95% CI of 0.263-1,389. The sensitivity test findings vary when the pooled PR value increases from the fixed effect model to the random effect model, as does the Confident Interval value.. In this study, it can be concluded that the behavioral variables of washing hands, using footwear, and cleaning nails can increase the risk of helminthiasis. Prevention efforts need to be carried out by educating children and parents to improve the personal hygiene of the child. Supervision efforts from parents are also needed to minimize the risk factor of helminthiasis in children.

Kata Kunci:

Kecacingan;
mencuci tangan;
menggunakan alas kaki;
membersihkan kuku;
sekolah dasar;
meta-analisis

ABSTRAK

Kecacingan adalah penyakit yang biasanya diturarkan melalui tanah yang terkontaminasi dan disebabkan oleh parasit berupa cacing. Terdapat beberapa hal yang dapat menjadi faktor risiko kecacingan pada anak. Faktor risiko terjadinya kecacingan antara lain tidak mencuci tangan dengan sabun sebelum makan; tidak menggunakan alas kaki saat keluar rumah; mencuci tangan tanpa sabun setelah buang air besar; sering menggigit kuku; bermain di tanah yang kotor; kurang memperhatikan makanan yang dikonsumsi. Tujuan dari penelitian ini adalah untuk mengetahui besaran hubungan personal higiene yang terdiri dari perilaku mencuci tangan, menggunakan alas kaki dan kebiasaan membersihkan kuku terhadap Kejadian cacingan pada siswa sekolah dasar di Indonesia. Penelitian ini menggunakan metode meta-analisis dengan data sekunder yang didapatkan pada portal database online Google Scholar. Artikel penelitian yang didapatkan dari Google Scholar dan telah melalui proses seleksi dengan kriteria inklusi akan memasuki tahapan meta analisis menggunakan software JASP. Berdasarkan hasil meta-analisis diperoleh variable personal higiene yang menjadi faktor risiko tertinggi yaitu perilaku mencuci tangan dengan nilai pooled PR 2,944 dan 95% CI 0,696-1,465, diikuti oleh variable perilaku menggunakan alas kaki dengan nilai pooled PR 2,351 dan 95% CI 0,326-1,384 dan faktor risiko terkecil yaitu perilaku membersihkan kuku dengan nilai pooled PR 2,284 dan 95% CI 0,263-1,389. Hasil Uji sensitivitas terdapat variasi dengan peningkatan nilai pooled PR dari fixed effect model ke random effect model serta pelebaran nilai Confident Interval. Dalam penelitian ini dapat disimpulkan bahwa variabel perilaku mencuci tangan, menggunakan alas kaki dan membersihkan kuku dapat meningkatkan risiko kecacingan. Upaya pencegahan perlu dilakukan dengan melakukan edukasi terhadap anak dan orang tua untuk meningkatkan personal hygiene dari anak tersebut. Upaya pengawasan dari orang tua juga diperlukan untuk meminimalisir factor risiko terjadinya Kejadian kecacingan pada anak.

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✉ ***Corresponding Author:***
Adnindya Krismahardi
Email : adnindyakrismah@gmail.com

INTRODUCTION

Helminthiasis is an infectious disease caused by parasitic worms that spread through polluted soil (Agustina, 2022). Worms that commonly cause helminthiasis include Ascaris lumbricoides, Trichuri strichiura, and hookworms (*Ancylostoma duodenale* and *Necator americanus*) and *Strongyloides stercoralis*. Soil-borne helminthiasis infections are most common in warm, humid climates with inadequate sanitation and hygiene, including temperate zones during the warmer months. STH is classified as a neglected tropical disease (NTD) because it causes significant disability and suffering but is treatable or curable (Global Health, 2022).

Soil-borne helminthiasis is transmitted by eggs excreted through the feces of an infected person. Adult worms live in the intestines and lay thousands of eggs each day. These eggs poison the soil in regions where sanitation is lacking. Eggs that stick to vegetables are ingested if the vegetables are not carefully cooked, washed, or peeled; eggs consumed from contaminated water sources; and eggs swallowed by children playing in contaminated soil and then putting their hands in their mouths without washing them. Hookworm eggs hatch in the soil, releasing larvae that mature into a form capable of actively penetrating the skin. Hookworm infections are spread primarily through barefoot walking in polluted soil (World Health Organization, 2023).

Soil-borne helminthiasis impairs the nutritional status of an infected person in various ways. Helminthiasis feeds on host tissues, including blood, causing iron and protein loss.. Hookworms can induce anemia in addition to chronic intestinal blood loss, especially in adolescent girls and women of reproductive age. Helminthiasis causes nutritional malabsorption to increase. Furthermore, roundworms may compete with bacteria for vitamin A in the intestines. Some soil-borne worms can also cause a loss of appetite, which leads to a decrease in nutrient intake and physical fitness. T. trichiura, in particular, has the potential to cause diarrhea and dysentery.

The worldwide incidence of helminthiasis included in the criteria for pre-school and school-age children requiring preventive chemotherapy for helminthiasis according to WHO in 2021 was 914,322,901 people. This number decreased from 2020 data with the same category of 1,023,547,048 people. Meanwhile, there were 653,738,522 school-age children who needed preventive chemotherapy for worms in 2021. Decreased from 2020 with the number of cases amounting to 732,326,753. The distribution of the number of cases worldwide, the largest is in India with 259,057,335 cases followed by Indonesia, Bangladesh, Philippines and Nigeria (World Health Organization, 2022).

According to the Regulation of the Minister of Health of the Republic of Indonesia Number 15 of 2017 concerning helminthiasis Control, the incidence of helminthiasis in Indonesia is still very high with a prevalence of 2.5%-62%. This occurs mainly in underprivileged population groups with poor sanitation. Refer to data World Health Organization, 2022 The number of helminthiasis cases in Indonesia in 2021 with the age category of school children requiring prevensive chemotherapy for helminthiasis reached 48,500,638. This number increased from 2020 with 47,810,065 cases in the same category.

The majority of helminthiasis occur in children of age before school to elementary school age. There are several things that can be a risk factor for worms in children. Risk factors for worms include Not washing hands with soap before eating; Do not use footwear when leaving the house; Washing hands without soap after defecation; Frequent nail biting; Playing on dirty ground; Lack of attention to the food consumed (Tim Promkes RSST, 2022). Research conducted in rural Haryana region, India found that the behavior of washing dirty and uncut nails is a common determinant of helminthiasis incidence (Dhaha, 2019). Climate, temperature, soil moisture, rainfall, mass drug administration, lack of access to water, sanitation and hygiene (WASH), and not using footwear are considered as major factors associated with the prevalence of helminthiasis (Neto, 2023).

This study is a study that utilizes previous research related to environmental factors and the incidence of worms in various regions in Indonesia to find out the general picture of helminthiasis risk factors in Indonesia. The purpose of this study is to determine the magnitude of personal hygiene relationships consisting of hand washing behavior, using footwear and nail cleaning habits on the

incidence of worms in elementary school students through combining several studies conducted in certain regions to find out the general picture in Indonesia.

METHODS

Types of Research

This research is an analytical research using previously available research with meta-analysis methods. The meta-analysis method is one of the studies by combining several similar existing studies with the same variables (Emma Suganda, 2021).

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Location and Time of Research

Data from this study was obtained from an electronic database portal, namely Google Scholar with the publication year 2016-2022. The data collection and analysis process will be carried out in Januari 2023.

Population and Sample

The population of this study represents all publications related to helminthiasis available on the online database portal Google Scholar. The sample of this study is research available on the Google Scholar portal that has met the inclusion criteria set by the researcher. The inclusion criteria and number of samples from this study are available in figure 1.

Data Collection

This study assesses the suitability of research articles with inclusion and exclusion criteria. Journal articles and theses written in Indonesian that study related personal hygiene risk factors in relation to the prevalence of helminthic events in elementary school students. After a Google Scholar database search for articles published between 2016 and 2022. Keywords used in the secondary data search process include: "Risk factors for helminthias", "Environmental factors and helminthias", "Behavioral factors and helminthias", " The prevalence of helminthiasis among elementary school students" and several relevant keywords.

Abstracts and full texts are filtered. Articles that do not have a comprehensive abstract or body will be excluded. Furthermore, it was assessed whether the article was original research, using the cross sectional method, having independent variables of hand washing behavior, using footwear and cutting nails and research conducted in Indonesia. If the article meets these criteria, It will be used, and items that do not match these requirements will be rejected.

Data Processing and Analysis

Research articles obtained from Google Scholar and have gone through a selection process with inclusion criteria will enter the meta-analysis stage. Meta-analysis involves data acquisition, data analysis, publication bias assessment, and sensitivity testing (Santosa & Raharjo, 2022). Data collection or abstraction, information gathered from each research paper, and data obtained, namely year of publication, location, design, exposure, and study outcomes, are converted into a 2 x 2 table. The data is then saved in Comma Separated Values (CSV) format for conventional meta-analysis utilizing fixed effect or random effect models. Articles that have been tabulated into 2 x 2 tables are continued in JASP Version 0.9.2 to generate Forest Plot graphs illustrating the cumulative effect size values for each variable. Using Funnel Plots with Egger's Test to identify substantial bias in research. Sensitivity tests were included in the study results to check whether the meta-analysis results were stable.

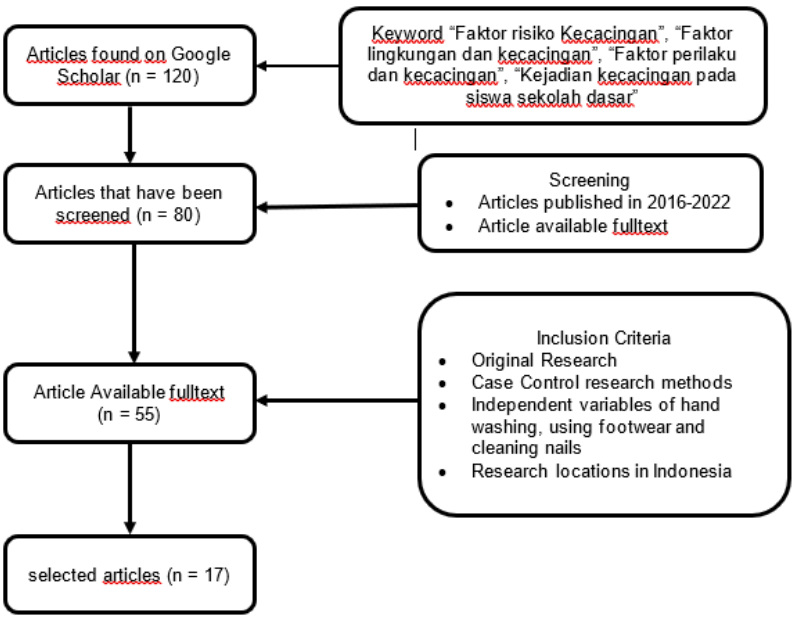


Figure 1. Prisma Flowchart of Personal Hygiene's Relationship with the Incidence of Helminthic in Elementary School Students in Indonesia

RESULTS

The Relationship of Handwashing Behavior with the Incidence of Helminthiasis

Articles obtained and have passed the screening process with variable independent handwashing behavior obtained 16 articles. The article that has passed is continued at the analysis stage with the Meta-Analysis method using JASP software. Figure 2 depicts the Meta-Analysis results.

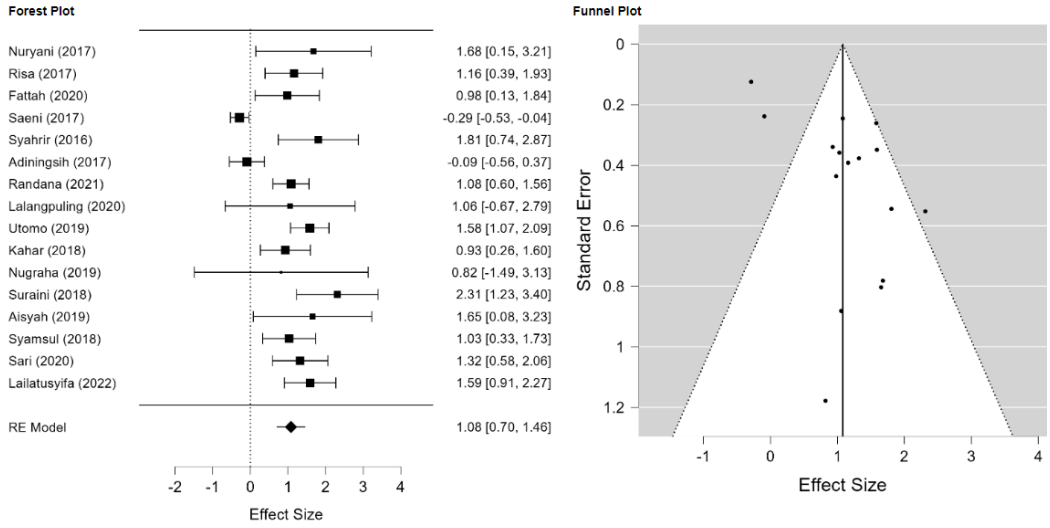
Table 1. Test of Heterogeneity of Handwashing Behavior with the Incidence of Helminthic in Elementary School Students in Indonesia

Fixed and Random Effects

	Q	df	P
Omnibus test of Model Coefficients	30,313	1	< ,001
Test of Residual Heterogeneity	112,412	15	< ,001

Note. *p* -values are approximate.
Note. The model was estimated using Restricted ML method.

The results of heterogeneity testing from 16 papers are shown in Table 1. with variables of handwashing behavior with worm incidence in elementary school students in Indonesia. The results of the heterogeneity test obtained a p value smaller than 0.05 (p = <0.001). Based on these results, it can be concluded that the data used in this variable is heterogeneous. Therefore, the Meta-Analysis test for the variable of hand washing behavior with worm incidence in elementary school students using the Random Effect Model.



A **B**

Figure 2. Plot of Meta-Analysis Results of the Relationship of Handwashing Behavior with the Incidence of Helminthic in Elementary School Students. A) Forest Plot; B) Funnel Plot

The Random Effect Model used in the Meta-Analysis Test yielded an estimated Prevalence Ratio (PR) value of 1,080 with a 95% CI of 0.696 - 1.465. Figure 2A depicts the findings of the forest plot that the pooled value of PR = $e^{1.080}$ = 2.944. It can be concluded that hand washing behavior has a 2,944 times greater risk of influencing the incidence of worms in elementary school students. The results of the funnel plot in figure 2B can be seen to be published bias in the variable of handwashing behavior of elementary school students. In figure 2B, it is known that the distribution of data on the handwashing behavior variable is not symmetrical. Therefore, it is necessary to do a regression test using Egger's Test.

Table 2. Egger's Test of Handwashing Behavior with Helminthic Incidence in Elementary School Students in Indonesia

Regression test for Funnel plot asymmetry ("Egger's test")		
	z	**p**
sei	2,021	0,043

Table 2 shows the findings of Egger's test, It is known that the p value is less than 0.05 (p = 0.043). In these results, it can be seen that there is a publication bias in the variable of handwashing behavior of kids from elementary school.

The Relationship of Behavior Using Footwear with the Incidence of Helminthiasis

Articles obtained and have passed the inclusion criteria on behavioral variables using footwear there are 11 articles. The selected articles are continued to be tested for meta-analysis using JASP software. The results of the meta-analysis are in figure 3.

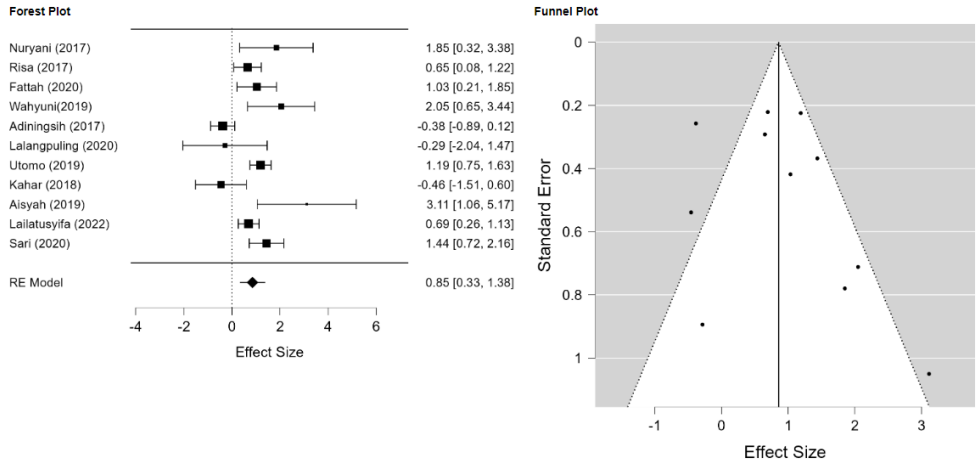
Table 3. Footwear Heterogeneity Test with Helminthiasis Incidence in Elementary School Students in Indonesia

Fixed and Random Effects

	Q	Df	p
Omnibus test of Model Coefficients	10,032	1	0,002
Test of Residual Heterogeneity	44,050	10	< ,001

Note. *p* -values are approximate.
Note. The model was estimated using Restricted ML method.

In table 3, it can be known the results of heterogeneity tests in 11 selected articles with behavioral variables using footwear on the incidence of worms in elementary school students. Based on the results of the heterogeneity test, it can be known that the p value is smaller than 0.05 (p = <0.001). Based on these results, it can be concluded that the data on this variable are heterogeneous and the meta-analysis test is continued using a random effect model.



A **B**

Figure 3. Plot Results of Meta-Analysis of the Relationship of Behavior Using Footwear with Helminthiasis incident in Elementary School Students. A) Forest Plot; B) Funnel Plot

In figure 3A, the results of a meta-analysis of behavioral variables using footwear can be known on the incidence of worms in elementary school students. The Random Effect model value represents the estimated Prevalence Ratio (PR), which has a 95% CI of 0.855 and a range of 0.326-1.384. Figure 3A depicts the findings of the forest plot can be seen that the combined value of PR = $e^{0.855}$ = 2.351. So it can be concluded that the behavior of using footwear can affect the incidence of helminthiasis 2.35 times greater. To determine the publication bias that occurs in behavioral variables using footwear, a funnel plot is used in figure 3B. The funnel plot shows that the data distribution on this variable is not symmetrical. So it is necessary to do a regression test using Egger's test to find out more about publication bias.

Table 4. Egger's Test of Footwear Behavior with the Incidence of Helminthic in Elementary School Students in Indonesia

Regression test for Funnel plot asymmetry ("Egger's test")

	z	p
sei	1,322	0,186

Based on the results of Egger's test in table 4, it can be seen that the p value is greater than 0.05 (p = 0.186). Based on these findings, it is possible to conclude that there is no publication bias in the behavioral variables involving footwear.

The Relationship of Nail Cleaning Behavior with the Incidence of Helminthiasis

In the variable of nail cleaning behavior, 14 articles were obtained that had passed the screening process and inclusion criteria. The selected articles are followed by a meta-analysis test using JASP software. The results of the meta-analysis can be seen in figure 4.

Table 5. Heterogeneity of Nail Cleaning Behavior and Helminthiasis Incidence in Indonesian Elementary School Students

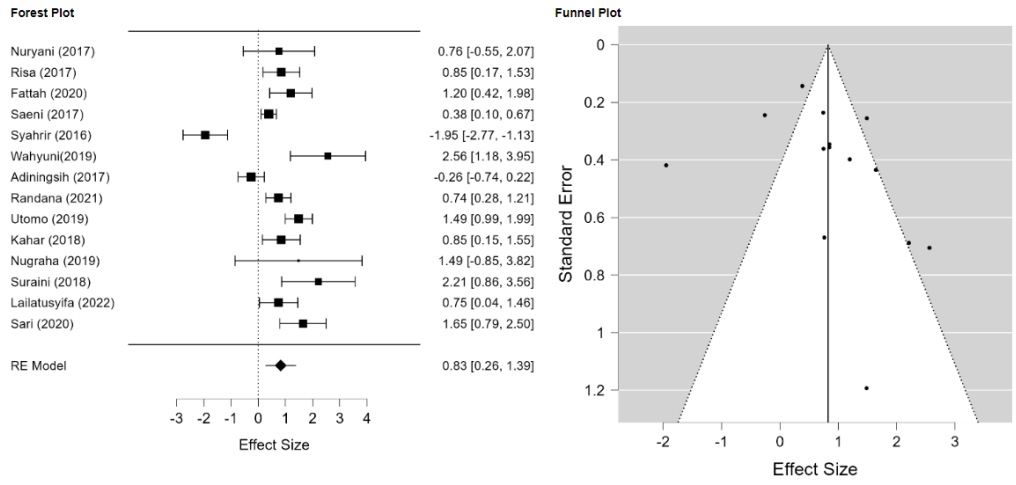
Fixed and Random Effects

	Q	df	P
Omnibus test of Model Coefficients	8,272	1	0,004
Test of Residual Heterogeneity	87,319	13	< ,001

Note. *p* -values are approximate.

Note. The model was estimated using Restricted ML method.

In table 5, it can be seen that the results of the heterogeneity test on the variable of nail cleaning behavior show a p value smaller than 0.05 (p = <0.001). With these results, it can be concluded that the data on the variables of nail cleaning behavior are heterogeneous. Therefore, the meta-analysis test used for the variable of nail cleaning behavior is a random effect model.



A **B**

Figure 4. Plot of Meta-Analysis Results of the Relationship of Nail Cleaning Behavior with the Incidence of Helminthic in Elementary School Students. A) Forest Plot; B) Funnel Plot

The estimated Prevalence Ratio (PR) value is represented by the random effect model value, which has a 95% CI value of 0.826 and a range of 0.263-1.389. Figure 4A shows the findings of the forest plot, which show that the value of pooled PR = $e^{0.826}$ = 2.284, so it can be concluded that poor nail cleaning behavior has a 1.284 times greater risk of helminthiasis in elementary school students. To determine the publication bias in nail cleaning behavior variables, a funnel plot is used as shown in figure 4B. The funnel plot results show that the data is not symmetrical.. Therefore, it is necessary to do a regression test using Egger's Test.

Table 6. Egger's Test of Nail Cleaning Behavior with the Incidence of Helminthic in Elementary School Students in Indonesia

Regression test for Funnel plot asymmetry ("Egger's test")		
	z	**p**
sei	1.405	0.160

The p value is greater than 0.05 (p = 0.160) based on the findings of Egger's test in table 6. Based on these findings, it is possible to conclude that there is no publication bias on the variable of nail cleaning habit and worm occurrence in elementary school pupils.

Table 7. Results of Personal Hygiene Meta-Analysis of the Incidence of Helminthic in Elementary School Students in Indonesia

No	Research Variables	N	*Heterogeneity (p-value)*	*Fixed / Random Effect Model*	
				PR	**95% CI**
1.	**Handwashing Behavior Variables**	**16**	**< 0.001**	**2,944**	**0,696-1,465**
2.	Behavioral Variables Using Footwear	11	< 0,001	2,351	0,326-1,384
3.	Nail Cleaning Behavior Variables	14	< 0,001	2,284	0,263-1,389

Based on the results of a meta-analysis on personal hygiene variables (handwashing behavior, using footwear, and cleaning nails) it was found that hand washing behavior was the largest risk factor with a Pooled PR value of 2,944, then footwear behavior with a PR of 2,351 and the lowest risk factor of nail cleaning behavior with a PR of 2,284.

Sensitivity Test

The sensitivity test is used to detect heterogenesis, understand the effect of research quality, and demonstrate that meta-analysis results are reasonably stable to change.. The sensitivity test that can be used is to compare fixed effect and random effect models. Sensitivity tests are carried out according to the number of meta-analysis studies.

Table 8. Sensitivity Test Polled Prevalence Ratio Fixed Effect Model and Random Effect Model Comparison

No	Research Variables	N	*Heterogeneity (p-value)*	*Fixed effect Models*		*Random Effect Model*	
				PR	**95% CI**	**PR**	**95% CI**
1.	**Handwashing Behavior Variables**	16	< 0.001	1,733	0,399-0,701	2,944	0,696-1,465
2.	Behavioral Variables Using Footwear	11	< 0,001	2,048	0,509-0,924	2,351	0,326-1,384
3.	Nail Cleaning Behavior Variables	14	< 0,001	1,818	0,436-0,759	2,284	0,263-1,389

Based on the thickness of 8, it is clear that the independent variable varies between studies, with an increase in the value of pooled PR from fixed effect models to random effects and a widening of the 95% Confident Interval.

DISCUSSION

The Relationship of Handwashing Behavior with Helminthiasis Incident

Based on the meta-analysis results, pooled PR data of 2,944 were obtained, implying that bad hand washing behavior affects helminthiasis work 2.9 times more than excellent hand washing behavior. Handwashing is a sanitary measure that involves washing fingers and all areas of the palm with soap and flowing water. Hand washing is vital because individuals in Indonesia continue to eat and touch things that could be a source of contamination with their bare hands in the absence of PPE and tools. These findings are consistent with Utomo, 2019 studies. The result P = 0.0001 means that there is a relationship between hand washing behavior and the incidence of helminthiasis in elementary school students. Similar research was also conducted by Nuryani & Yustitia, 2017 obtained a p value of 0.022 and an OR of 6.5, indicating a significant link between hand washing habit and helminthiasis cases. Handwashing behavior affected the incidence of helminthiasis by 6.5 times greater at the research site, namely in elementary schools in Pangkul Tengah Hamlet, North Lampung. Based on research results from Kahar, 2018 It is also known that the link between hand washing behavior and helminthiasis in SD Barombong Makassar City pupils has a value of p = 0.011, indicating a significant relationship.

Handwashing behavior needs to be done before and after doing activities such as eating, playing in the ground to defecate. Because hand washing behavior can affect helminthiasis infections in children. helminthiasis can be transmitted through hand media that are not washed using soap and have been contaminated by worm eggs then enter the body through the process of ingestion or swallowing (Risa et al., 2017). In the variable of handwashing behavior with the incidence of helminthiasis, there is a significant relationship that can be caused because elementary school students do not usually wash their hands well and do not use running water and soap. The behavior of students washing hands carried out by students is only putting their hands into a dipper filled with water. Despite the fact that washing hands with soap and running water can interrupt the cycle of disease transmission (Lailatusyifa et al., 2022). In its application at this time, hand washing using soap is the simplest health protocol and can provide many benefits for the health of the body. Hand washing can minimize exposure to Covid-19, prevent 1 in 3 diarrheal diseases and also 1 in 5 respiratory infections (UPK Kemenkes, 2022).

The Relationship of Behavior Using Footwear with the Incidence of Helminthiasis

In the meta-analysis test, it is known that the results of behavior using footwear with helminthiasis incident obtained Pooled PR results of 2.351, which means that students with poor footwear behavior (not using footwear) are at risk of contracting worms by 2.35 times greater than students who use footwear. This is consistent with Suraini et al., 2018 findings. There is a strong link between footwear and helminthiasis incidence (p = 0.0001). However, the results of this study are different from the research conducted by Lalangpuling, 2020 obtained value p = 0.748 and OR = 1.347 This suggests that there is no significant link between footwear use and the incidence of helminthiasis in primary school kids in the Ranomut Health Center Manado City operating area. Different results were also obtained by Fattah et al., 2020 in the variable wearing footwear value p = 0.052 which means there is no significant relationship between wearing footwear and the incidence of helminthiasis.

Footwear functions to maintain one's personal hygiene. The use of good footwear also serves to protect the soles of the feet from road conditions or surfaces that are rocky, watery, hot and cold so as to reduce the risk of injury and prevent the entry of infections into the body such as worms through the soles of the feet (Bestari et al., 2021). Helminthiasis worm larvae/eggs that are still infective can penetrate the outer skin of hair follicles, skin pores, and damaged skin. In most cases, the infection occurs on the dorsum of the foot or between the toes. If the soil is polluted with worm eggs, the infective form can infect people who are not wearing shoes (Adiningsih et al., 2017).

The Relationship Between Nail Cleaning Habits and Helminthiasis Incidence

The findings of a meta-analysis of variables associated with nail cleaning habit and helminthiasis work in elementary school pupils Pooled PR of 2.284, implying that poor nail cleaning habits affect the incidence of helminthiasis 2.28 times more than excellent nail cleaning habits. This is consistent with Aisyah et al., 2019 findings obtained results p = 0.002 means that there is a link between nail cleaning practice and the prevalence of helminthiasis. Similar research was also conducted by Randana et al., 2020 The link between nail hygiene and helminthiasis event was found to have a p value of 0.007, indicating that there is a significant relationship between nail hygiene and helminthiasis incident. However, different outcomes were achieved in Nugraha et al., 2019 research, which results in the relationship between nail hygiene and helminthiasis events with a value of p = 0.226 means that there is no relationship between nail hygiene and helminthiasis incident.

The growth of fingernails in one week averages 0.5-1.5 mm. Therefore, on the contrary, cutting nails is done at least once every 2 weeks to avoid long and dirty nails so that they look unkempt (Syahrir & Aswadi, 2016). The impact of good nail cleaning behavior is to avoid dirty and long nails. The condition of dirty and long nails can make a place for dirt and germs that cause disease and worm eggs. Good nail condition by cutting short and clean nails and diligently washing hands using soap to avoid worm infection from the nails (Sari & Hayati, 2020). Helminthiasis infections can be transmitted through dirty hands, dirty and long fingernails so that worm transmission can occur through the ingestion process When eating (Wahyuni & Muna, 2019).

CONCLUSION

Based on the results of the meta-analysis, personal hygiene variables were obtained which became the highest risk factors, namely hand washing behavior with pooled PR values of 2.944 and 95% CI 0.696-1.465, followed by behavioral variables using footwear with pooled PR values of 2.351 and 95% CI 0.326-1.384 and the smallest risk factor, namely nail cleaning behavior with pooled PR values of 2.284 and 95% CI 0.263-1.389. The sensitivity test findings differ as the pooled PR value shifts from the fixed effect model to the random effect model and the Confident Interval value expands.

In this study it can be concluded that behavioral variables of washing hands, using footwear and cleaning nails can increase the risk of helminthiasis. Prevention efforts need to be done by giving worms regularly every six months and when symptoms of worms appear and educating children and parents to improve personal hygiene of the child. Supervision efforts from parents are also needed to minimize risk factors for worms in children.

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