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INCIDENCE OF SOIL TRANSMITTED HELMINTHS INFECTION BASED ON PERSONAL HYGIENE AND DEFECATION CARE: CASE CONTROL STUDY IN ELEMENTARY SCHOOL CHILDREN

Running title: Incidence of Soil Transmitted Helminths Infection

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ABSTRACT

Background/Aims: One of the diseases whose incidence is still high is worm infection, namely intestinal worms that are transmitted through the soil (soil transmitted helminthiasis). This study to analyze the incidence of Soil Transmitted Helminths Infection Based on Personal Hygiene and Defecation Treatment in Elementary School Children.

Methods: The research design used is an observational study with a case control study approach. The population in this study were all children diagnosed with worms from January to June 2021 as many as 60 cases and as many as 60 children who were not dewormed in the working area of the Bontonompo I Health Center, Gowa Regency. The sampling technique used was total sampling with inclusion and exclusion criteria. The data obtained were analyzed using the Chi-square test statistical formula with a degree of significance (α = 0.05) and to see clarity about the dynamics of the relationship between risk factors and effects seen through the value of the odds ratio (OR).

Results: The results of the study showed that Chi-square analysis with Pearson chi-square test between personal hygiene variables and the incidence of intestinal worms obtained a value of 0.000 < 0.05 (OR= 11,000, 95%CI 4.5-99.1). The defecation treatment variable also showed a significant relationship with a p value of 0.001 < 0.05 (OR= 5,000, 95%CI 4.5-99.1), so the alternative hypothesis was accepted. So that personal hygiene and defecation care are risk factors for the effect because OR > 1.

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Conclusions: There is a relationship between personal hygiene and defecation care with the incidence of intestinal worms in children. Therefore, socialization about personal hygiene, treatment for defecation, and administration of deworming drugs is still carried out by the puskesmas in order to prevent an increase in the prevalence of worms in the future.

Key words: Infeksi *Soil Transmitted Helminths*, Personal Hygiene, Defecation Treatment, Risk

INTRODUCTION

In general, infectious diseases in Indonesia are still quite high. One of the diseases whose incidence is still high is worm infection, namely intestinal worms that are transmitted through the soil (soil transmitted helminthiasis). This happens considering that Indonesia is an agricultural country with low socioeconomic levels, knowledge, environmental sanitation and community hygiene and a tropical climate so that it is very possible for infection and transmission of worms to occur.[1]

The Agency for Health Research and Development (2012) stated that helminthiasis is spread and infects almost the entire population throughout the world, especially in Indonesia as a tropical region, with the prevalence of worms reaching 79-83 percent. Based on the survey results from the Center for Environmental Health Engineering & PPM of the Ministry of Health, the average number of Indonesian children suffering from helminthiasis is in the range of 30 percent.[2]

Based on the results of Mardiana's research regarding the prevalence of helminth infections in elementary school children grades I to VI in 2020 as much as 57%. The prevalence of types of worms that infect elementary school children grades I to VI is in single infections, namely Ascaris lumbricoides worms as much as 34% and in multiple infections, types of worms as much as 14% for Ascaris lumbricoides and Trichuris trichuria worms.[3]

Indonesia is currently actively developing in all fields. One of the development goals is to improve the quality of human resources. Humans are the key to the success of a development, so the success of a development depends on the quality of these human resources. School children are the main assets or capital for future development that need to be maintained, improved and protected for their health.[4,5]

Schools not only function as places of learning, but also as places of transmission of disease. In addition, the age of elementary school children is also by children, especially elementary school children, helminth infections. This is caused by the habit of playing in children who do not pay attention to personal and environmental hygiene. Likewise, the habit of consuming food sold in schools, without paying attention to hygiene and sanitation of food and the environment.[6]

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The prevalence of worm disease is the most health problem after malnutrition. The highest prevalence and intensity were found among elementary school children. In 2016, it was 32.6%, especially for the economically disadvantaged population. This weak economic group has a high risk of contracting helminthiasis because of the lack of ability to maintain hygiene and sanitation of the environment in which they live. And if the child has a high socio-economic level, the child will have a high nutritional status and will rarely get worms, because of controlled food intake, clean living behavior and a good environment.[7]

Indonesia, which has a tropical and humid climate, has a high potential to make children suffer from intestinal worms. This condition gets worse during the rainy season. This is because children often play in muddy places. If their hygiene is not supervised by their parents, they are more likely to get intestinal worms.[8]

Worms will then affect the intake (intake), digestion (digestive), absorption (absorption), and metabolism of food. Cumulatively, intestinal worm infections can cause nutritional deficiencies in the form of calories and protein, as well as blood loss which results in decreased body resistance and causes impaired child development. Especially for school-age children, this situation will adversely affect their ability to follow lessons at school.[9]

There are several things that are often ignored by parents, which actually causes the entry of worms into the child's body is personal hygiene in children which is considered unimportant, but often escapes their monitoring. For example, maintaining long nails, eating food everywhere, and not washing hands before eating.[10]

Nurjannah's research (2012) on Jatinagor State Elementary School students showed that 3.2 percent of respondents belonged to the hygiene category and 96.8 percent did not.[11] Meanwhile, research conducted by Fitri (2012) in South Tapanuli, showed that 60 percent of students were positively infected with helminthiasis. Where personal hygiene of students based on nail hygiene criteria as many as 43 percent of students are good and 57 percent of students are not good, the use of footwear as much as 42 percent of students is good and 58 percent of students is not good and the habit of washing hands of students is 37 percent of good students and 63 percent of students are not good. . So the personal hygiene of students based on the criteria for cleanliness of nails, use of footwear and hand washing habits of students is 28 percent of good students and 72 percent of students are not good. His research also shows that there is a significant relationship between nail hygiene, use of footwear and hand washing habits of students with the incidence of worm infections.[12]

Based on the district/city health office that the city of Makassar became the city with the highest cases of helminthiasis. The number of worm sufferers in the city of Makassar based on reports from the District/City Health Office has increased from 2020 (3,226 cases), 2019 (3,266 cases), 2018 (3,270 cases).[13]

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Factors that can cause the still high rate of helminthiasis are inadequate environmental sanitation conditions, poor personal hygiene, low levels of education and socio-economic conditions, knowledge, attitudes and behaviors of healthy living that have not been entrenched, as well as geographical conditions suitable for life and reproduction of worms.[14] Indonesia is a tropical country that can support the spread of earth-borne helminth infections, where the tropical climate and high humidity support the development of hookworm larvae and the maturation of roundworm and whipworm eggs.[15] Worm infections can be found in all age groups and genders but most often occurs in children this is because their direct involvement with the play environment is very high.[15] Various games for school-age children in general are almost always done outside the home or in direct contact with children. soil and soil is a good medium for the development of worms.[16]

Worm infections in children have an impact on inhibiting physical growth, development, activity and intelligence of children because generally worms will absorb nutrients and minerals that are needed by children at the age of growth. Humans.[7] Worm infection can cause loss of nutrients in the form of calories, protein and blood loss. Where, in moderate infections, blood loss can be detected in the stool, causing symptoms of anemia and iron deficiency.[6]

Based on data obtained from the Bontonompo I Health Center, Gowa Regency, it shows that the number of elementary school-aged children suffering from intestinal worms in 2019 reached 149 children, while in 2020 the number of people with worm infections was 195 children. From these data it can be seen that the number of children suffering from intestinal worms is increasing.

In this regard, this research needs to analyze the incidence of Soil Transmitted Helminths infection based on personal hygiene and defecation care in elementary school children.

METHODS

The research design used was case control, which is an analytical study (survey) in which the identification of subjects (cases) who have been affected by the disease (effect), then traced retrospectively to the presence or absence of risk factors that play a role.[17] The population in this study were all children. who were diagnosed with worms at the Bontonompo I Health Center from January to June 2021 as many as 60 cases and as many as 60 children who did not have worms in the working area of the Bontonompo I Health Center, Gowa Regency. The subjects of this study consisted of two groups, namely the case population and the control population. The samples in this study were 60 cases and 60 children as controls in the working area of the Bontonompo I Public Health Center, Gowa Regency. The sampling technique in this study was to use a total sampling of 120 children, with a case group of 60 children and a control group of 60 children.

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The data that has been obtained is then processed by presenting the data in the form of frequency distribution tables and percentages with table processing. The relationship between variables can be determined by using Chi Square statistical test (X2) with a significance limit (α) of 0.05 using the SPSS for Windows computerized system. Chi Square is a statistical technique used to test hypotheses and is used to determine whether there is an influence between the independent and dependent variables. To see clarity about the dynamics of the relationship between risk factors and effects, it is seen through the value of the odds ratio (OR). The basis for taking the research hypothesis is based on the significant level (value), that is, if the value of 0.05 means that the research hypothesis is accepted.[18]

RESULTS

This study is an observational study to determine the relationship between personal hygiene and defecation care with the incidence of intestinal worms in children with a case control approach. Data were collected from a sample of 120 respondents, of which 60 children were cases and 60 children were controls and met the inclusion criteria that had been set. Where the sampling technique is by total sampling which is a way of collecting samples in which all populations are used as samples or research objects.

The results of this study were obtained by going directly to the respondent's house and distributing questionnaires which were then filled out by the respondent. After all the data has been collected, the completeness check is carried out and then the data is processed and analyzed by univariate and bivariate. as for the results of this study are presented with a pattern of analysis that has been formulated, namely the characteristics of the respondents, univariate analysis and bivariate analysis. In the following, the researcher will present data analysis on each variable.

Most of the respondents in this study were male as many as 32 children or 53 percent and the largest respondents were in the case and control group, namely in the age group 9-12 years as many as 34 children or 57 percent and the education level of the respondents in this study were all respondents sitting in elementary school (SD) as many as 60 children or 100 percent of the case group and control group (Table 1).

The results showed that in the group of cases who had good personal hygiene in the last five months there were 12 children (20%). While in the control group who had good personal hygiene in the last five months as many as 31 children (51.6%). The results of statistical tests using Pearson chi-square between personal hygiene variables and the incidence of intestinal worms obtained a value of 0.000 < 0.05 (OR = 11,000, 95%CI 4.5-99.1), then the alternative hypothesis is accepted. So that personal hygiene is a risk factor for the effect because OR > 1. The OR value is 11.0, this means that children who have poor personal hygiene

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are 11 times more likely to have intestinal worms than children who have good personal hygiene.

The results showed that in the case group there were 48 children (80%) who had bad hand washing habits. Meanwhile, in the control group, there were 30 children (50%) who had good hand washing habits. The results of statistical tests with Pearson chi-square obtained a value of 0.000 < 0.05 (OR = 9.000, 95% CI 4.0-89.6), this means that children who do not wash their hands before eating, after defecating and after playing on the ground have 9 times more likely to experience intestinal worms compared to children who wash their hands.

The results showed that in the group of cases who had bad footwear habits in the last five months, there were 48 children (80%). While in the control group who have a habit of wearing good footwear as many as 32 children (53.3%). The results of statistical tests with Pearson chi-square obtained a value of 0.000 < 0.05 (OR = 13,222, 95% CI 4.92-109.67), this means that children who do not wear footwear have a 13.2 times greater probability of more likely to have intestinal worms compared to children who wear footwear.

The results showed that the case group with poor nail hygiene was 41 children (68.3). Meanwhile, in the control group who had good nail hygiene were 39 children (65%). The results of statistical tests with Pearson chi-square obtained a value of 0.000 <0.05 (OR = 9.081, 95%CI 3.3-25.1), this means that children with dirty nails have a 9.1 times greater probability have worms compared to children who have clean nails.

From the results of the study showed that in the case group that had unclean snacks, 49 children (81.7%). Meanwhile, in the control group, there were 30 children (50%) who had the cleanliness of their snacks. The results of statistical tests using Pearson chi-square obtained a value of 0.000 < 0.05 (OR= 29.000, 95% CI 3.3-25.1), this means that children who have unclean snacks are 29 times more likely to have intestinal worms. compared to children who have clean snacks.

The results showed that there were 45 children (75%). Meanwhile, in the control group who had good defecation habits, there were 29 children (48.3%). The results of statistical tests with Pearson chi-square obtained value of 0.001. Because the value of <0.05 is 0.001 (OR= 6.333, 95%CI 2.1-19.1), this means that children with poor bowel habits have a 6.3 times greater chance of having intestinal worms than children with who have a good habit of defecation/defecation.

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DISCUSSION

a. The relationship between personal hygiene and the incidence of intestinal worms

The results showed that children who had poor personal hygiene were 21 times more likely to have intestinal worms than children who had good personal hygiene. This finding is in accordance with previous research that there is a significant relationship between students' personal hygiene behavior and the incidence of helminthiasis at the Elementary School, East Angkola District, South Tapanuli Regency with an OR value of 6,000 (95% CI: 3,580-10,057). This is because the spread of intestinal worms is most commonly found in areas with high humidity, namely in groups with poor personal hygiene.[15,19]

This is in accordance with the theory that explains that good personal hygiene will minimize the entrance (portal of entry) of microorganisms that are everywhere and ultimately prevent someone from getting sick. Where personal hygiene is not good, it will make it easier for the body to be attacked by various diseases such as infectious diseases (such as intestinal worms), skin diseases and digestive tract diseases.[20]

Educating children about good hygiene is the best way to prevent the spread of infection not only for the development of childhood but into adulthood. The principles of personal hygiene should have become part of everyday life and providing examples of good personal hygiene practices is the best way for parents to teach their children.[21]

This study also showed that in the case group there were 2 children (5%) who had good personal hygiene but had intestinal worms and 19 children (47.5%) in the control group had poor personal hygiene. This can happen because intestinal worms are not only caused by personal hygiene alone but by several other factors such as poor environmental sanitation and a person's poverty level. The more severe the poverty level of the community, the more likely it is to experience helminth infections. Deworming disease usually occurs in slum environments, especially in urban areas or suburbs.[22] The prevalence of Ascarislumbricoides is mostly found in urban areas. The highest prevalence rates are found in suburban or rural areas where most people still live in poverty.[22]

Researchers argue that personal hygiene can be achieved when someone knows the importance of maintaining personal health and hygiene, because basically personal hygiene is developing good habits to maintain personal health.

b. The relationship between the habit of washing hands with the incidence of intestinal worms

The results showed that from 40 respondents in the case group there were 38 children (95%) who did not wash their hands before eating, after defecating and after playing on the ground with running water using soap, while in the control group there were 20 children (50%) who washed their hands. Through the results

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of data analysis using the chi-square statistical test that there is a relationship between the habit of washing hands with the incidence of intestinal worms. The OR value of 19.0 means that children who do not wash their hands before eating, after defecating and after playing on the ground are 19 times more likely to have intestinal worms than children who wash their hands.

This finding is in accordance with that found by Andaruni, Budi (2012) who found a relationship between hand washing habits and intestinal worm infections in children or elementary school students (ρ<0.05).[9] This is in accordance with the theory which also explains that children most often infected with intestinal worms because they usually put their fingers in their mouths or eat rice without washing their hands where dirty or contaminated hands can transfer germs into the body.[23]

Roundworm eggs come out with feces in a humid place and are not exposed to sunlight, the eggs grow to be infective. Roundworm infection occurs when the infective eggs enter through the mouth with food or drink and can also be passed through dirty hands (contaminated with soil with worm eggs). properly eating raw vegetables is important especially in countries where feces are used as fertilizer.[24]

c. The relationship between the habit of wearing footwear with the incidence of intestinal worms

The results showed that in the case group who had a habit of not wearing footwear were 38 children (95%) while in the control group who wore footwear as many as 22 children (55%). Through the results of data analysis using the chi-square statistical test, it was found that there was a relationship between the habit of wearing footwear and the incidence of intestinal worms. Children who do not wear shoes are 23.2 times more likely to have intestinal worms than children who wear shoes.

The results of this study are in accordance with previous studies which showed a relationship between nail hygiene and the incidence of worms in elementary school students at the Indonesian Dinamika Foundation Bantar Gate Bekasi, West Java and elementary school students in Angkola Timur District, South Tapanuli Regency with a value of value = 0.000 and an OR value of 5.524. (95% CI : 2.840-10.743).[15]

This is in accordance with the theory that explains that the skin is a place where germs enter the body. Loose soil (sand, humus) is a good soil for the growth of worm larvae. If a person sets his feet on the ground without using footwear and if hygiene and foot care are not observed, then he can become a target for the entry of disease germs into the body, including worm larvae.[24]

Infection is common in all tropical and subtropical countries where the soil is extensively contaminated with human feces and people often walk barefoot.[25] Eggs and larvae of helminths are abundant in soil. The more frequent contact with the soil, the greater the risk of infection with worms.[26]

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d. The relationship between nail hygiene and the incidence of intestinal worms

The results of the analysis of the relationship between nail hygiene and the incidence of worms were obtained as many as 31 children (77.5%) in the case group who had worms had dirty nails while in the control group there were 29 children (72.5%) who had clean nails. The results of the chi-square statistical test obtained value <0.05 (ρ = 0.000), which means that there is a relationship between nail hygiene and the incidence of intestinal worms. Children with dirty nails are 9.1 times more likely to have intestinal worms than children who have clean nails.

The results of this study are in accordance with research that shows a relationship between nail hygiene and the incidence of intestinal worms in elementary school students.[16,27]

Worm eggs are often stuck in dirty nails. This condition often occurs in children who often play on the ground as well as in adults who work in gardens or rice fields.28 Transmission of helminthic infections can be through long fingernails which may contain worm eggs and can later be swallowed when eating.[29]

e. The relationship between the cleanliness of snacks and the incidence of intestinal worms

The results showed that from 40 cases of intestinal worms in children there were 39 children (97.5%) who had unclean snacks, while in the control group there were 20 children (50%) who had clean snacks. Through the results of the chi-square statistical test, it was found that there was a relationship between the cleanliness of snacks and the incidence of intestinal worms. Children who have unclean snacks are 39 times more likely to experience intestinal worms than children who have clean snacks.

The results of this study are in accordance with research conducted by Juanda (2005) which showed a relationship between snacking habits and the incidence of worms in elementary school children in the Muara Ciujung Elementary School Complex, Rangka Sibitung District, Lebak Regency.[30]

This is in accordance with what Endriani (2012) stated that the behavior of children snacking in any place whose cleanliness cannot be controlled by parents, is not protected and can be polluted by dust and dirt containing worm eggs can be a source of transmission of worm infection in children.[31]

Diseases suffered by elementary school children related to unhealthy snack behavior, one of which is intestinal worms, which reaches 40-60 percent. As a result of this unhealthy behavior, it can also cause more serious problems such as the threat of infectious diseases to school-age children.[32]

f. The relationship between the habit of defecation/defecation with the incidence of intestinal worms

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The results showed that children with poor bowel habits were 6.3 times more likely to have intestinal worms than children with good bowel habits. This finding is in accordance with that found by Sumanto who stated that poor bowel habits have a 4.3 times chance of having intestinal worms compared to children who have good bowel habits with an OR value of 4.3 at 95% CI: 2, 1-8,9.[33]

This is in accordance with what was explained by Maryanti (2006) that the behavior of defecation (defecation) that is not good and in any place is suspected to be a risk factor in worm infection. Theoretically, worm eggs require soil media for their development. The presence of worm eggs in the feces of patients who carry out defecation activities in open ground increases the chance of transmitting worm larvae to the surrounding community.[34]

The role of feces in the spread of disease is very large. Besides being able to directly contaminate food, drinks, vegetables, water, soil, insects (flies, cockroaches, etc.), and body parts can be contaminated by the feces. Objects that have been contaminated by feces from a person who has suffered from a certain disease are the cause of disease for others. Lack of attention to fecal management coupled with rapid population growth, will accelerate the spread of fecal-borne diseases. Diseases that can be spread by human feces include: typhoid, dysentery, cholera, various worms (roundworms, pinworms, hookworms), schistosomiasis, and so on. Therefore, defecation and urination must be in the latrine, not in the river or in any place because it can cause various diseases.[35]

From this study also obtained as many as 5 children (12.5%) in the case group had good bowel habits but had intestinal worms and in the control group there were 21 children who had bad bowel habits. This can occur due to environmental sanitation factors epidemiologically there are several factors that influence the incidence of worms, namely, environmental sanitation factors and human factors. In the control of worms, supervision of water and food sanitation is very important, because transmission of worms occurs through contaminated water and food. Environmental sanitation is an important thing that must be considered. To achieve the ability to live in the community, it must pay attention to the provision of clean water, management of latrines and bathrooms, and waste management.[20]

The researcher assumes that even though children defecate in the toilet, if after defecation / defecation does not wash their hands with soap, then it is very likely to experience worms because germs or worm eggs are still attached to their hands. This is in accordance with the theory which states that efforts to prevent intestinal worms are always washing hands with soap after using the bathroom/WC, always washing hands with soap after playing, before handling food, hookworm infection can be avoided by always wearing footwear, using daily disinfectant in bathing and defecating areas.[36]

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Conclusion

This study showed that there was a significant relationship between personal hygiene and defecation care and the incidence of helminthiasis in elementary school students. Children with poor personal hygiene are 11 times more likely to have intestinal worms than children who have good personal hygiene. Children with poor bowel habits have a 6.3 times greater likelihood of having intestinal worms compared to children who have good bowel habits. These findings suggest that health workers need to provide intensive counseling once a month to residents, especially elementary school-aged children about the importance of personal hygiene and defecation care to prevent helminthiasis.

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Conflict Of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contributions

All Authors conceived of the presented idea in this manuscript. Tutik Agustini has devised the project, the main conceptual ideas, proof outline, prepared and revised the manuscript. Yusriani, Muhammad Khidri Alwi, Andi Asrina was involved in the design of the study and the data analysis. All authors read and approved the final manuscript.

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Table 1. Frequency Distribution of Respondents Based on Characteristics

Characteristics	Worms Incident			
	Worms (Case)		Not Worms (Control)	
	N=60	%=100	N=60	%=100
Gender				
Man	32	53,3	32	53,3
Woman	28	46,7	28	46,7
Age				
5-8 years	26	43,3	26	43,3
9-12 years	34	56,7	34	56,7

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Table 2. Frequency Distribution of Respondents Based on Personal Hygiene and Defecation Care

Characteristics	Worms Incident				Nilai p	Nilai OR
	Worms (Case)		Not Worms (Control)			
	N=60	%=100	N=60	%=100		
Personal Hygiene						
Good	12	20,0	31	51,7	0.000	11,000
Poor	48	80,0	29	48,3		
Hand Washing Habits						
Good	12	20,0	30	50,0	0,000	9,000
Poor	48	80,0	30	50,0		
Habit of Wearing Footwear						
Good	12	20,0	32	53,3	0,000	13,222
Poor	48	80,0	28	46,7		
Nail Hygiene						
Good	19	31,7	39	65,0	0,000	9.081
Poor	41	68,3	21	35,0		
Snack Cleanliness						
Good	11	18,3	30	50,0	0,000	29,000
Poor	49	81,7	30	50,0		
Defecation Treatment						
Good	15	25,0	29	48,3	0,000	6,333
Poor	45	75,0	31	51,7		

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