

28. Physical environment of home affecting the infection

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Physical Environment of Home Affecting the Infection of Helminthiasis among Toddlers in Rural Areas

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ABSTRACT

Background: Helminthiasis in Indonesia are still public health problems because the prevalence is still very high between 45% -65%. Even in certain areas with poor sanitation, the prevalence can reach 80%. This study aims to determine the relationship between the variables of the physical environment of the house with the incidence of infection of worm eggs in toddlers.

Method: This type of research uses a cross-sectional design. The location of this study was in Sumbang District, Banyumas Regency, Central Java, Indonesia. The size of the research sample was 237 toddlers (age 12 months to <60 months). The process of data analysis uses univariate and bivariate analysis. Chi-Square test was employed to examine the relationship.

Results: The results of this study indicate that there is a correlation between several variables of the physical environment of the house with the incidence of worm infections in the toddler including the home yard cleanliness ($p = 0.003$), house floor type ($p = 0.017$), wastewater disposal ($p = 0.000$), ownership of healthy latrines ($p = 0.042$), and house density ($p = 0.000$).

Conclusion: People can experience improve environmental sanitation conditions where toddlers have daily activities including having healthy latrines and improving access to sanitary restrooms for each family.

Keywords-: Home, Physical environment, Helminthiasis, Infection, Toddler

INTRODUCTION

In the village of Indonesia, worming attacks more children because their activities are more related to the soil where there are a number of species that are transmitted through the soil including roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*) and hookworms (*Necator americanus* and *Uncinaria stenocephala*) that infect humans the most ⁽¹⁾. Indonesia is one of the endemic countries of Soil-Transmitted Helminths (STH) with the third largest number of children aged 1-14 years in the world after India and

Nigeria which is around 7% ⁽²⁾ as in certain areas with poor sanitation; worm prevalence can reach 80% ^(3,4). Given this, the approach to prevention of worm disease through the improvement of sound environmental quality and healthy behavior is needed, so that the health risks for humans to be infected with worms can be suppressed.

Research on helminthiasis in rural areas of Central Java Province showed high rates of morbidity due to worms intestine ^(5,6).

Though worm disease is widespread in all rural and urban areas with a high prevalence and has the impact mainly on the quality of human resources, this is still a small concern for the community. Thus, this study aims to determine the relationship between the variables of the physical environment of the house with the incidence of infection with worm eggs in toddlers.

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METHODOLOGY

This type of research was observational with a cross-sectional approach. The location of this study was carried out in Sumbang sub district randomly in one sub-district from five sub-districts under the coverage of Banyumas Regency, Central Java Province.

The population in this study were all to toddlers (aged 12 months to <60 months) in the Banyumas Regency with the number of 237 samples in Sumbang District.

The data collected was then tabulated and analyzed by univariate descriptively from each variable with a frequency distribution table, and bivariate analysis to see the relationship between variables with statistical tests of Chi-square.

RESULTS

The results of the univariate analysis of the house physical environment are summarized in the following table.

Table 1. Frequency Distribution of the House Physical Environment

No	Variables	Category	Total	%
1	Yard	Partially and wholly available	191	80.6
		No yard	46	19.4
		Total	237	100
2	Yard cleanliness	Dirty	125	52.7
		Clean	112	47.3
		Total	237	100
3	Floor type	Partially and wholly covered	137	57.8
		No floor	100	42.2
		Total	237	100
4	Water sources	Vulnerable	145	61.2
		Safe	92	38.8
		Total	237	100
5	Water disposal	Yard/garden	88	37.1
		River/pond	149	62.9
		Total	237	100
6	Sanitary toilet possession	No	203	85.7
		Yes	34	14.3
		Total	237	100
7	House density	< 10 m ²	63	26.6
		> 10 m ²	174	73.4
		Total	237	100

Most houses have yards in the form of soil, rocky and sandy (80.6%) and the rest is yard made from cement as much as 19.4%. The cleanliness of the yard observed from the presence of puddles, garbage, and the absence of sunlight is as much as 52.7% indicating the clean home yard is only 47.3%. The household floor in this study was found as much as 57.8% still made of soil and 42.2% of the floor of the house was made of

water-resistant material. Clean water sources are used for everyday purposes in the category of risky as it is taken from river or pond (61.2%) while the one in the class of safe is the source of water taken from dug wells, hand-pumped wells, springs and running water company (38.8%). The study showed that 62.9% of waste water was discharged into rivers/ponds, and 37.1% discharged it in the yard/garden around the house. Ownership of

sanitary latrines is 14.3% while 85.7% do not have ones and to make it worse, still many families that do not have latrines. Average house density is 14.82 m² with the category of occupant density <10 m² is 26.6%, and house density > 10 m² is 73.4%.

Table 2. Cross Tabulation of Physical Environment of The House and Helminthiasis

No	Variables	Category	Helminthiasis in toddlers				Total	
			Positive		Negative			
			Total	%	Total	%	Total	%
1	Yard	Partially and wholly	117	61.26	74	38.74	191	100
		No yard	25	54.35	21	45.65	46	100
		P = 0.391		OR = 1.33; CI (95%) = 0.79-2.54				
2	Yard cleanliness	Dirty	86	68.8	39	31.2	125	100
		Clean	56	50	56	50	100	100
		P = 0.003		OR = 2.205 ; CI (95%) = 1.298-3.744				
3	Floor type	Partially and wholly	91	66.42	46	33.58	137	100
		No floor	51	51	49	49	100	100
		P = 0.017		OR = 1.90 ; CI (95%) = 1.12-3.335				
4	Water sources	Vulnerable	86	59.31	59	40.69	145	100
		Safe	56	60.87	36	39.13	92	100
		P = 0.811		OR = 0.940 ; CI (95%) = 0.55-1.60				
5	Water disposal	Yard/ garden	78	88.64	10	11.36	88	100
		River/ pond	64	42.95	85	57.05	149	100
		P = 0.000		OR = 10.359 ; CI (95%) = 4.973-21.581				
6	Sanitary toilet possession	No	127	62.56	76	37.44	203	100
		Yes	15	44.12	19	55.88	34	100
		P = 0.042		OR = 2.117 ; CI (95%) = 1.016-4.411				
7	House density	< 10 m ²	48	76.19	15	23.81	63	100
		> 10 m ²	94	54.02	80	45.98	174	100
		P = 0.002		OR = 2.723 ; CI (95%) = 1.419-5.227				

The statistical test results for yard type obtained $p = 0.391$ indicating there is no difference in the proportion of toddler positively infected by worm eggs between houses that are partially or wholly having a yard or no yard. The results of statistical tests for yard cleanliness obtained $p = 0.003$ denoting there is a difference in the proportion of incidence toddler positive of worm egg infection between homes that do not clean the yard and a house with a clean yard. Oddity Value Ratio (OR) = 2.205 means that the dirty house has a chance of 2.205 times for toddlers to be infected by worm's eggs

compared to the home with a clean yard. Similarly, a positive relationship is found between floor types of the house with the incidence of infection of worm's eggs in the toddler with the OR = 1.90. The same trends also found in waste water disposal with OR = 10.359, sanitary latrine ownership with OR = 2.117, and house density with OR = 2.723. However, statistical test results for the water source obtained $p = 0.811$ meaning that there is no difference between the proportion of homes that have vulnerable water sources to the homes that have safe water sources.

DISCUSSIONS

Based on statistical tests on the variables of the physical environment of the house, seven variables allegedly related to the incidence of infection of the eggs flatulent there were five variables that were statistically significant, namely the cleanliness of the yard, type of floor of the house, ownership of sanitary latrines, disposal of liquid waste and density of homes. This is possible because the family's habit of defecating (toddler and family) is not in the toilet and has an impact on the presence of worm eggs on the ground, as a result of not having sanitary latrines as well as house density.

In planning to make latrines, attention must be paid to efforts to prevent breeding. The nature of positive phototropic flies, which are attracted to light and avoid darkness and dark surfaces, can be used for prevention efforts. The best latrine is a toilet where the fist immediately flushes into a hole or underground tank. Besides, all parts that are open to feces, including seating or squatting, must be kept clean and closed if not used⁽⁷⁾.

The existence of worm eggs on the ground is more optimal if the atmosphere of the surrounding environment is conducive to support. This happens as the yard is poorly maintained and the disposal of liquid waste is still to the yard/garden. Wastewater disposal facilities must meet the requirements of not contaminating drinking water sources, not contaminating surface water, not infecting disease-causing insects, closed, odorless and having disposal at the end of the channel⁽⁸⁾. Water can be a significant factor in various diseases such as *typhus*, *dysentery*, diarrhea, cholera, and worms⁽⁹⁾.

While the type of floor houses are still made from the soil extending worm breeding ground, thus increasing the contact of toddlers with contaminated soil worm eggs. Floor requirements of a clean house have a type of floor that is not dusty in the dry season and not wet in the rainy season. The kind of floor of the house that meets the requirements, namely: (1) plastered, tile, ceramic, board, or stilt house, (2) not dusty, and (3) kept clean. The type of floor of the house from the soil can cause worm disease because the ground is a factor in the spread of the disease⁽¹⁰⁾.

Several supporting studies^(11, 12) show that the condition of home sanitation (water source, water quality, the place to wash hands and cutlery, bowel movements, house floor, and house density) are related

to the incidence of helminthiasis. Also, poor sanitation conditions can worsen the prevalence of worm egg infection.

House density allows facilitating pollution and decreasing the ratio between the number of occupants and home sanitation facilities so that it supports the possibility of infection with worm eggs. Further, other environmental variables exacerbate soil pollution conditions making worm eggs will be more optimal in the soil which then provides an excellent opportunity for the infection of worm eggs in a toddler which is also supported by habits that are not good from the toddler and mother. Efforts need to be made to improve the physical environment of the house in general and to counsel on the prevention of worm disease.

CONCLUSION

For the community, it is expected to maintain the cleanliness of the surrounding house yard that is used to play toddlers and repair the floor of the house by using waterproof flooring material to reduce the risk of infection with worm eggs in a toddler in the home. Also, the community must make a means of storing wastewater that is closed and safe for the environment and does not pollute the environment. And the most important thing is for every family to have and be able to access a sanitary latrine to secure their dirt so as not to pollute the environment and not cause infection with worm eggs.

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Conflict of Interest: Nil.

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