

# Prevalence And Intensity Of *Ascaris lumbricoides* Infection In Children Of Oemasi Village, Kupang District, East Nusa Tenggara Province, Indonesia

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## ARTICLE INFO

### Article history:

Received Sep 1, 2022

Revised Sep 20, 2022

Accepted Oct 5, 2022

### Keywords:

*Ascaris lumbricoides*

Intensity Infection

Children

Kupang District

## ABSTRACT

Worm infection is one of the health problems in all tropical, countries including Indonesia. The most frequent helminthiasis is the infection caused by the *Soil Transmitted Helminth*. Primary school-age children are an age group that is susceptible to helminthiasis. Worm infections can cause a serious impact if left untreated with no clean and healthy lifestyle. This study was conducted to determine the prevalence and intensity of *Ascaris lumbricoides* in children of Oemasi village, Nekamese Subdistrict, Kupang District, East Nusa Tenggara Province, followed by the characterization of subjects. The descriptive design with the cross-sectional study applied to this research. Research subjects were 112 children age 6-12 years old. The infection was diagnosed microscopically by the Katokatz method. *Ascaris lumbricoides* were the only species found infecting a total of 7 children (6.25%). The distribution of ascariasis was higher in females (4 or 57.1%) than in males (3 or 42.9%) with the intensity of *Ascaris lumbricoides* infection was categorized as mild.

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## INTRODUCTION

*Ascaris lumbricoides* is one of the *Soil Transmitted Helminths* (STH). STH are intestinal nematoda worms that infect humans who ingest their eggs via the oral-fecal route. This worm consists of *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus* and *Ancylostoma duodenale*, *Strongyloides stercoralis* (Bethony et al., 2006). Around 40 to 60% of the Indonesian population suffers from disability and World Health Organization (WHO) data states that more than one billion of the world's population also suffers from disability (World Health Organization, 2016). Most of the sufferers of disability live in slums and sufferers among school children are still quite high (Kementerian Kesehatan RI, 2017).

More than 1.5 billion people or about 24% of the world's population experience *Soil Transmitted Helminthes* infection. Where more than 250 million by *Ascaris lumbricoides*, 46 million by *Trichuris trichiura* and 151 million by hookworms (World Health Organization, 2016) (Veridiana et al., 2014).

Indonesia is one of the countries that requires special handling of disability and is in third place, after India and Nigeria in the ranking of disability. The prevalence of helminthiasis in Indonesia varies between 2.5% to 65% (World Health Organization, 2016). This number increases when the prevalence of disability is calculated in school-age children, to 80% (Kementerian Kesehatan RI, 2017).

Helminthiasis has a negative impact on sufferers. This disease can result in a decrease in the health condition, nutrition, intelligence and productivity of the sufferer so that economically it causes a lot of losses, because it causes loss of carbohydrates and proteins and blood loss (anemia) (Kementerian Kesehatan RI, 2012). The countermeasures against helminthiasis are directed at breaking the chain of transmission, namely age group of toddlers and children of primary school age with mass administration of deworming prevention drugs of vulnerable groups to stop the spread of helminth eggs from the sufferer to the surrounding environment, improved sanitary hygiene, and cultivation of clean living behaviors and healthy through health promotion (Taisir et al., 2019) (Kementerian Kesehatan RI, 2017).

*Ascaris lumbricoides* is the largest nematoda of the gastrointestinal tract of humans. This nematoda is cosmopolitan in distribution, where the typical habitat of the adult worm is the jejunum. The infection is acquired by the ingestion of the embryonated eggs, and the larvae pass through a pulmonary migration phase for maturation. The transmission of *Ascaris lumbricoides* infection can be through water, mud, and fertilizer. Soil and water are important transmission media, the habit of disposing of feces in the soil, make fertilizer from feces, as well as the lack of family latrines that will cause pollution in the yard of the house (Subahar et al., 2017). This study aims to find out the prevalence and intensity of *Ascaris lumbricoides* worm infection in primary school-age children in the refugee area of Oemasi Village, Nekamese Subdistrict, Kupang District, East Nusa Tenggara Province, Indonesia.

## RESEARCH METHOD

The descriptive design with the cross-sectional study was applied to this research. Samples collection were done during February-June 2022. Stool samples were collected using stool pots which distributed on a day before sample collection followed by explanation on how to collect stool samples and the subjects who agree to give the sample were asked to sign the inform concern. The parents of the children ethically represented to sign the inform concerns. The sampling must meet inclusion criteria that the subjects who have signed the inform concern and gave their stool samples, the children who did not take the anthelmintic medication within the last 6 months when the sampling was ongoing, and the samples which contained STH on microscopy examination. The exclusion criteria were the children who did not give the samples during the data collection, and who have taken anthelmintic medication within the last 6 months when the sampling was ongoing. Stool pots contained stool samples were then labeled with identity of the subjects. The collected samples were then transported to the Laboratory of Parasitology, Study Program on Medical Technology, Institute of Polytechnic of Ministry of Health, Kupang District prior to microscopy examination.

Kato Katz method was done based on the method explained by WHO in (WHO, 2019) modified based on the materials available in the Laboratory of Parasitology in the Study Program on Medical Technology in the institute of Polytechnic of Ministry of Health, Kupang District. A gram of fecal sample was placed on filter paper and then a wire mesh was put on the feces. A piece of cardboard was prepared, a hole was made on it then the cardboard was placed on a slide glass. The wire mesh was placed on fecal sample examination top of the feces; then, the cardboard holes were filled with feces, and cardboard was removed. Feces on object glass was then covered with cellophane that has been soaked in the Kato solution. Cellophane tape was pressed with other glass objects to flatten the stool, and it was left for 20-30 minutes at room temperature. Objects glass was then examined under a light microscope using a 10x objective lens to identify the species of STH.

The eggs per gram of feces were counted and calculate to determine the intensity of infection based on WHO (WHO, 1994)

The intensity of helminth infection was divided into three, namely mild (1-4,999), moderate (5,000-49,999), and severe (> 50,000). Can be seen in Table 1.

**Table 1.** Intensity Of *Ascaris Lumbricoides* Infection Based On EPG (World Health Organization, 2017)

Worm Species	Low	Medium	High
<i>Ascaris lumbricoides</i>	1 - 4.999	5000 - 49.999	> 50.000

## RESULTS AND DISCUSSIONS

Research subjects were 112 children aged 6-12 years old, consisted of 60 females and 52 males. Based on the results of microscopic examination, in 112 samples were found worm eggs from the species *Ascaris lumbricoides* with a positive number of 7 (6.25%). On macroscopic examination of feces, no adult worms were found. Table 2 shows what was found when feces from all of the children were looked at under a microscope. The results were presented in Table 2.

**Table 2.** Prevalence of *Ascaris lumbricoides* Infection in Elementary School Children in Oemasi Village

Worm Infection	Number of the sample	Percentase (%)
<i>Ascarias lumbricoides</i>	7	6,25%
Negative	105	93,75%
Total	112	100%

The prevalence of *Ascaris lumbricoides* infection was highest in children aged 6-8 years, with 4 children (57.1%), and lowest in children aged 9-12 years, with 3 children (42.9%). As can be seen in Table 3, the characteristics of research subjects based on gender are dominated by the female sex, which consists of 4 females and 3 males.

**Table 3.** Prevalence Of *Ascaris lumbricoides* Infection based on the characteristic of subjects and their parents

Variable	Number of the sample (%)		Total
	Positive	Negative	
Age (years)			
6-8	4 ( 57.1 )	35 (33.4)	39 (34.8)
9-12	3 ( 42.9 )	70 (66.6)	73 (65.2)
Gender			
Female	4 ( 57.1)	56 (45.7 )	60 (53.6)
Male	3 ( 42.9)	57 (54.3)	52 (46.4)

Worm infection intensity, or eggs per gram (EPG), is a laboratory test that determines the number of eggs per gram of feces in patients suspected of having a parasitological infection. The analysis of eggs per gram or other data such as larvae per gram of feces is one of the most important experiments carried out in a parasitology laboratory. A quantitative egg count is needed to determine the intensity of infection or the severity of the disease by knowing the number of eggs per gram of feces or eggs per gram (EPG).

Based on the EPG, the intensity of *Ascaris lumbricoides* infection is known to be of mild and moderate intensity(World Health Organization, 2017). At light intensity, the lowest EPG was 1,000 and the highest was 4,000, with a mean EPG of 1,300. A total of seven children infected with *Ascaris lumbricoides* showed a mild intensity of infection. Of the respondents, there were 2 males (25%) and 5 females (75%) showing mild infection intensity. Based on age, children aged 8 years were more infected, as many as 3 children (44%) out of a total of 7 children with mild intensity.

**Table 4.** Intensity of *Ascaris lumbricoides* infection based on the number of EPG of feces in children of Oemasi Village, Kupang District

Intensity of <i>Ascaris lumbricoides</i>	Mild	
	N	(%)
Gender		
Male	2	25
Female	5	75
Number of sample (%)	7	100
Number of EPG of feces	1,000-4,000	
Mean of EPG of feces	1,300	

Oemasi Village is one of the villages located in Nekamese District, Kupang Regency, with a population of 1,005 people. Elementary school-aged children were chosen because they do not understand the importance of clean and healthy living habits, playing habits, contact with the ground, and personal hygiene at this age. In studies that have been conducted, it is known that children infected with *Soil Transmitted Helminth* (STH) are mostly at the age of 2–12 years (Lamberton & Jourdan, 2015). Based on the results of the study, 38.4% of elementary school-aged children in Manusak Village, East Kupang District, were infected with *Ascaris lumbricoides* (Bria et al., 2021).

Stool examination using the Kato-Katz method was chosen because it is recommended to diagnose and determine the presence of infection and the intensity of worms in each sample (World Health Organization, 2016). Based on the results of the examination, the positive results of *Ascaris lumbricoides* in Oemasi Village, Nekamese District were 7 children, namely 3 males with a percentage of 42.9% and 4 females with a percentage of 57.1%. The research subjects were elementary school-aged children. In studies that have been carried out, it is stated that women are more infected with *Soil Transmitted Helminths* than men (Selomo & Ruslan, 2013). In contrast to other studies, (Uneke et al., 2007) found that *Soil Transmitted Helminths* are more common in boys than in girls. However, until now, there has been no theory which states that gender affects the incidence of *Soil Transmitted Helminth* infection. Several studies have shown that schoolchildren are the age group that most often suffers from helminthiasis (Irianto, 2013). Another study also showed that the highest prevalence of students who were positively infected with STH eggs was in grades I, II, and III. This is because children interact a lot with the ground while playing. Besides that, children's knowledge is still lacking about how to infection with helminthiasis is a basic factor that affects children's behavior in maintaining body hygiene (Kattula et al., 2014). Data from the Directorate General of PP and PL in 2009 showed that 31.8% of elementary school students suffered from helminthiasis. The prevalence of research results by P2B2 research and development workshops for seasoning soil in 2008-2009 conducted in elementary school children's grades (1-6) showed that the most infection was caused by *Ascaris lumbricoides*, as many as 192 children (42.5%).

In this study, the results showed that the intensity of *Ascaris lumbricoides* infection based on gender and age was categorized as mild in the seven samples. There were 3 males (42.9%) and 4 females (57.1%). The intensity of *Ascaris lumbricoides* infection based on gender and age was categorized as mild in the seven samples. In a study conducted in North Jakarta, it was also found that the intensity of *Ascaris lumbricoides* infection was categorized as mild and moderate. This indicates that the number of worms in the intestines of individuals is not so great that the clinical symptoms of these worm infections are not obvious. Most minor infections of *Ascaris lumbricoides* are asymptomatic or asymptomatic. Individuals with mild to moderate infection intensities, on the other hand, are a source of transmission of these worm infections in the community. Infection with *Ascaris lumbricoides* was found in Kalibaru, North Jakarta, in elementary school children. This shows that reinfection is very common in children. This is due to the fact that STH worms are easily reinfected, especially in areas with poor environmental sanitation (Subahar et al., 2017). As for the research that has been done, it was found that the highest proportion of students

experienced helminthiasis, namely *Ascaris lumbricoides*, followed by *Trichuris trichiura* and hookworm. The high egg production of the *Ascaris lumbricoides* worm is due to the fact that a female *Ascaris lumbricoides* worm can lay as many as 100,000–200,000 eggs per day (Paige et al., 2017). In addition, a female *Ascaris lumbricoides* worm can produce 26 million eggs during her lifetime, and transmission of this worm can be through several ways, namely the entry of infective eggs into the mouth with contaminated food or drink, or ingested through dirty hands, for example in children. Children, or infected eggs, are inhaled with airborne dust (Speich et al., 2016).

## CONCLUSION

Based on the research that has been done, it can be concluded that the prevalence of *Ascaris lumbricoides* infection in elementary school-aged children in Oemasi Village, Nekamese District, was found to be 7 children (6.25%). The intensity of *Ascaris lumbricoides* infection in elementary school-aged children in Oemasi Village, Nekamese District, is categorized as a mild infection.

## ACKNOWLEDGEMENTS

The researchers like to express their gratitude to the Poltekkes Kemenkes Kupang for providing research funding as well as to all other parties that contributed to the success of this study.

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