Association of Ascariasis with Nutritional and Anemic Status in Early School-Age Students

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Abstract

Background: Ascariasis is one of the most frequent helminthias is that occurred in school-age children. Commonly, severe intensity of infection will seriously affect the nutritional and anemic status of the students. The aim of this study was to determine the association of ascariasis with nutritional and anemic status in early school-age students.

Methods: An analytical cross-sectional study was conducted based on the secondary data from Jatinangor Cohort. The secondary data of 74 students who met the criteria were included in this study. Data collection was conducted in the Department of Epidemiology and Biostatistics from August to September 2014. The data obtained was analyzed based on the characteristics of the students regarding gender, age, class, parents' education, ascariasis, nutritional and anemic status. Then, the data were further analyzed to determine the association of ascariasis with nutritional and anemic status of the students using the chi square test or Fisher test if the requirement was not fulfilled.

Results: Sixteen (22%) students were having Ascaris lumbricoides infection, six (8.1%) students were thin and seventeen (23%) students were anemic. There was no statistically significant association found of Ascaris lumbricoides infection with nutritional and anemic status in early school-age students (P value <0.05) in this study.

Conclusions: There is no statistically significant association of Ascaris lumbricoides infection with nutritional and anemic status of the early school-age students. **[AMJ.2016;3(1):93–8]**

Keywords: Anemia, ascariasis, nutritional status, early school-age students

Introduction

Helminthiasis is a disease that is usually neglected by the community whereby it will not affect people when light intensity infection occurs. However, when the infection becomes more severe, it will give out a range of health symptoms.[1] Children are the most unprotected people from helminthiasis which usually comes from a poor sanitation area that lacks hygiene, clean water supplement and access to health care. It can become worse with a low family status with low educational level.[2] Among the types of helminthiasis, infection of Ascaris lumbricoides is recorded the highest with 819.0 million people worldwide when compared to Trichuris trichiura and hookworms in 2010.[3]

Fulfilling all the risk factors of ascariasis such as high air humidity, poor sanitation and hygiene plus located in a tropical area with the community's bad habits, has caused Indonesia becomes one of the endemic countries with ascariasis. Ascaris lumbricoides grows, feeds and breeds inside the human body. As the worm population increase exceeds 500, it covers most of the intestine of the child and may disturb the nutrient's digestion and absorption. Then, this will lead to protein-energy malnutrition, vitamin A deficiency and anemia.[4] Seemingly, the condition of the surroundings fulfilled the requirement for the ascariasis life cycle thus, this study was conducted to know the association of ascariasis with nutritional and anemic status in early school-age students.

Methods

An analytical cross-sectional study was

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conducted based on the secondary data from Jatinangor Cohort that was carried out from July to August 2013. The secondary data collection was from a larger study conducted at the Department of Epidemiology and Biostatistics Faculty of Medicine Universitas Padjadjaran from August to September 2014.

The population of this study was students aged 5 to 9 years who were in Class I to Class III from 2 elementary schools in Jatinangor. The selected subjects were all early school-age students particularly from Class 1 to Class 3 (aged 5-9 years) by using the total sampling technique. The subjects who had performed the fecal examination to identify presence of Ascaris lumbricoides eggs with complete data about the nutritional (body mass index) and anemic (hemoglobin level) status were included in this study. However, in accordance with the part of knowledge, attitude and practices in the questionnaire of the study, the students who got other infections and incomplete data were excluded from this study. The minimal sample in this study was 105 students. Besides, the secondary data of 74 students who met the criteria were also included in this study.

The secondary data were analyzed based on the student's characteristics of gender, age, class, parents' education, ascariasis, nutritional and anemic status. Further analysis was performed to determine the association of ascariasis with nutritional and anemic status of the student. The analysis of association was carried out by using the SPSS 15.0 software. The independent variable was ascariasis and the dependent variables were nutritional and anemic status of the students whereby both independent and dependent variables were classified based on the nominal classification. Consequently, the data obtained were analyzed by using the Chi-square test with p value<0.05. However, Fisher's exact test was the alternative way if the requirement of the Chi-square test was not fulfilled.

Results

More than half of the students in this study were female when compared to male students. The number of students involved according to age varied between 7-9 years old. It seemed that the higher class, the number of students also increased. The educational level of parents was mostly from senior high school followed by the second highest was from junior high school. This could indicate the educational level of the parents in this study was moderate (Table 1).

Table 1 Characteristic of Students

Characteristic	Frequency (n)	%
Gender		
Male	34	46
Female	40	54
Age		
7 years	21	28
8 years	25	34
9 years	28	38
Class		
Class I	19	26
Class II	25	34
Class III	30	40
Parents' Education		
Elementary School	19	26
Junior High School	20	27
Senior High School	32	43
College	3	4

Table 2 Prevalence of Ascariasis in Each Class

| Class | Ascariasis | | | |
| | Positive | | Negative | |
	Frequency,n	Percentage,%	Frequency,n	Percentage,%
I	9	12	10	13
II	5	7	20	27
III	2	3	28	38
Total	16	22	58	78

Table 3 Prevalence of Nutritional and Anemic Status among Students

Characteristic	Frequency (n)	%
Nutritional status		
Thin	6	8
Normal	68	92
Anemic status		
Anemia	17	23
Normal	57	77

It showed that the most number of students infected by ascariasis was in Class I, whereby the number of students in Class I was the lowest among the 3 classes. However, the least infected with ascarisis were students from Class III, whereby the number of students in Class III was the highest (Table 2).

Most of the students in this study had normal nutritional and anemic status. However, the number of students who were thin was less than the student who was anemic (Table 3).

There were no significant association of infection with Ascaris lumbricoides and nutritional status based on the Fisher's exact test statistics with P-value was above α value=0.05 (Table 4).

There were no significant association of infection with Ascaris lumbricoides and anemic status based on the Fisher's exact test statistics with P-value was above α value=0.05

(Table 5).

Discussion

It was found that the number of students infected with ascariasis showed a decrease as the class increased. This was supported by a study conducted in Edo state, Nigeria[5] which stated that as the age of children increased, the prevalence of the child to get infected wih Ascaris lumbricoides would decrease. However, there was one study conducted in Osun State, Southwest of Nigeria by Adefioye OA et al.[6] who stated that the prevalence of ascariasis that occurred in students at Osun[5] was as much as 36.2%. The percentage was considered higher than the prevalence of Ascaris lumbricoides infection in school-age students of this study. This could be influenced

Table 4 Distribution of Students Based on Ascariasis and Nutritional Status

| Infection | Nutritional Status | | | | Total (%) | P-value |
| | Thin | | Normal | | | |
	Frequency	Percentage	Frequency	Percentage		
Positive	1	2	15	20	16(22)	0.614
Negative	5	7	53	71	58(78)	

Table 5 Distribution of Students Based on Ascariasis and Anemic Status

Infection	Anemia		Non-anemia		Total (%)	P-value
	Frequency	Percentage	Frequency	Percentage		
Positive	3	4	13	18	16(22)	0.467
Negative	14	19	44	59	58(78)	

by several factors such as the timing of the fecal collection, surrounding conditions and other geographical factors that lead to the difference in the prevalence of Ascariasis.[6]

In addition, it showed that the majority of students had a normal nutritional status. This number was nearly lower when compared to the statistics in 'Indonesia Basic Health Research 2013' by the Ministry of Health Indonesia which showed that there was 11.2% of children aged 5 to 12 years who were having thin nutritional status.[7] This could indicate that the nutritional status of the students in this study was good because of the balance between the nutrients intake and requirements of the body. This could be influenced by several factors such as the parent's education level and the volume of food intakes. Most of the parents in this study had a moderate educational level since most of them were from senior high school (Sekolah Menengah Atas, SMA) or junior high school (Sekolah Menengah Pertama, SMP). This was be supported by a previous study conducted by Srivastava et al.[8] in India who stated that mothers who had an educational level ≤6th standard were significant risk factor of malnutrition in their children. There was also another study conducted in Banda Aceh, Indonesia[9] which showed that the students who have healthy weight with mother who have middle and high educational level have higher prevalence than those who have mother with lower educational level. However, the percentage of the thin students in this study had not reached the standard of prevalence of the World Health Organization (WHO).[10] The WHO has stated that the standard of prevalence of the underweight child in a population must be ≤5%.[10]

Anemia is a pathological condition where the hemoglobin level is low. It was found that more than half of the students had normal hemoglobin level which means the students have no anemia. This condition might be considered good since most of the students had enough nutrition according to the statistical analysis above about nutritional status in this study that led to the avoidance of occurrence of anemia. However, the number of students who had anemia was lower than that in the 'Indonesia Basic Health Research' where it showed 29% of children aged 5 to 12 years have anemia.[7] This may indicate the numbers of early school-age students who are anemic have decreased. This was supported by the study conducted in Mexico by Torres et al.[11] who stated that the children with low body mass index have the highest prevalence of anemia. As in this study, the number of students who were thin was lower than students who were anemic. This can be influenced by the increased risk for the co-occurrence of anemia and obesity that is associated with gender and age of the children.[11] Based on the research conducted in Mexico, the children who are aged 5 to 9 years are easier to have the condition of anemia and obesity that occurred at the same time.[11]

It showed that there was no significant association of ascariasis with nutritional status in this study. This can be supported by the study carried out in Ethiopia[12] which reported that ascariasis and malnutrition have no association significantly. In contrast, Shang et al.[13] have conducted a study in China reported that one of the risk factor to cause stunting is the moderate-to-heavy intensity infection of soil-transmitted helminth. When compared with this study, the method to identify the infection is different with which they had used to find the intensity of infection by using the Kato-Katz technique.[13] However, in this study, the bigger research just used the saline wet mount technique to identify whether the eggs of Ascaris lumbricoides was present or not. The Kato-Katz technique could not be performed in this study due to the stool sample given by the students was in little portion. To be more specific, a study conducted in Nigeria[14] proved that Ascaris lumbricoides infection had associated with anthropometric measurement among 418 children who lived in both rural and urban area that meant the infection could

cause worse effect of nutritional status.

In addition, there was also no significant association between ascariasis and anemic status in this study. Based on the study conducted in Malaysia by Ngui et al.[15], it reported that there was no significant correlation between Ascaris lumbricoides eggs and hemoglobin level of the children. Besides, they also used the serum ferritin level in order to identify the anemia that is caused by Ascaris lumbricoides infection which is the iron deficiency anemia.[15] This was due to the sensitivity of the test which was higher when compared with the hemoglobin level in order to detect anemia in children.[5] However, the study conducted in Edo state, Nigeria[5] showed a significant association between Ascariasis and anemia that used hemoglobin levels as the parameter. This was caused by the technique used to identify the Ascaris lumbricoides infection. The study which was conducted in Nigeria[5] used the same technique as in this study. The difference between these two studies was that in the study conducted in Nigeria[5], a recheck was performed for the negative infection by using a formal ether concentration method. Besides, the number of students in the study conducted in Nigeria was higher than in this study.[5] This was due to most of the data from the larger study was incompletely based on each variable in this study which led to more samples were excluded.

As conclusion, this study finds that there is no significant association of ascariasis with nutritional and anemic status in early school-age students. This is due to several limitations in the study such as the number of sample did not reach the minimal sample because of the incomplete data and the method used by the larger study to identify the Ascaris lumbricoides eggs was not specific.

There are several recommendations from this study. Firstly, more samples are needed in order to find a very significant association of ascariasis with nutritional and anemic status. In addition, the technique used to identify the Ascaris lumbricoides infection needs to be more specific either use the Kato-Katz technique to find the intensity of the infection or use a more concentrated method as suggested in the WHO. Lastly, increase awareness of parents about the importance of the examination should be performed to the students in order to identify the types and the impact of the infection to nutritional and anemic status of the students and the filling out of data from the larger study should be completed according to actions or examinations performed to the students.

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