Soil Transmitted Helminths (STH) Infection Related Body Mass Index in Elementary School Students, Sukawinatan Landfill, Palembang

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Abstract

Background
The age of Primary School Children are the group most often affected by worm infections with a prevalence of more than 60%. Worm infection can cause a decrease in health conditions, Body Mass Index (BMI), intelligence and productivity of sufferers so that economically causes a lot of losses and decreases in the quality of human resources. The purpose of this study was to determine the relationship of infection with Soil Transmitted Helminths (STH) with the Body Mass Index (BMI) in the children of Elementary School (SDN 188), Sukawinatan Landfill, Sukarame District, Palembang City.

Methods
This research is an analytic observational study with a cross-sectional approach. The population consisted of all children of SDN 188 Sukarame Subdistrict, Palembang City, 109 people who were selected by consecutive sampling. Examination of helminthiasis infection was obtained by taking faecal samples on the subject and then examined by laboratory with Kato-Katz method and Body Mass Index (BMI) through anthropometric measurements of height and weight. The analysis carried out was univariate descriptively and bivariately by Chi-square test.

Results
There were found 27 (24.8%) children who were positive for helminthiasis and from the results of the bivariate test there was no correlation between STH infection and BMI (p> 0.05).

Conclusion
there was no significant relationship between infection with Soil Transmitted Helminths (STH) and the Body Mass Index (BMI) of primary school age children around the Sukawinatan landfill in Palembang.

Keywords: STH Infection, Body Mass Indeks, Landfill Area

Background

Soil Transmitted Helminths (STH) is a group of nematode parasites that cause infection in humans through contact with parasitic eggs or larvae that develop in warm and
moist soil and the most common types are *Ascaris lumbricoides* (roundworms), *Trichuris trichiura* (whipworms), *Necator americanus* and *Ancylostoma duodenale* (hookworms).1

STH infection is found in tropical and subtropical regions, especially in areas with poor sanitation and hygiene. 2STH infection occurs mainly in preschool children and school age (less than 15 years). 3*Hookworm* infection is much about the age of 10-14 years and its prevalence increases with age.4 In 2013, the number of children in the world who needed treatment for STH infection reached more than 800 million children.3

In Indonesia the prevalence of helminthiasis in 2012 showed a figure above 20% with the highest prevalence reaching 76.67%, especially at the age of primary school children with more than 600 million children.5 Worm disease in South Sumatra is still quite high, according to Novariza research in Talang Bungin District of Talang Kelapa in Banyuasin District in 2010 found the prevalence of STH was 41.6%.6 The spread of deworming can be through contaminated soil with stool containing eggs STH.7 Moist soil, unclean environmental sanitation, high population density and living habits which is not good makes people, especially children, easily infected with worms.8

Worms affect intake, digestion, absorption, and eating metabolism. Overall worm infection can cause nutritional deficiencies in the form of calories and protein which can be seen from the body mass index that is lacking and blood loss and cause disruption of child development which can reduce the body's resistance so that it is susceptible to other diseases and affect cognitive ability and learning achievement children in school.8 The impact of this worm has exacerbated public health, especially primary school students who are human resources in the future.9 Several studies of worm infections have shown that school-age children are often affected by worm infections because they are often associated with soil.10 Worm infection can cause nutritional losses in the form of calories and protein and blood loss. Besides being able to inhibit physical development, intelligence and work productivity, it can also reduce the body's resilience so that it is susceptible to other diseases.11

Nutritional needs are very important needs to helping the process of growth and development of baby and children, remember of the nutritional is importance in the body can help the process of growth and development of children, and prevent the occurrence of various diseases due to nutrition in the body. Poor nutritional status results in anemia,
impaired growth and decreased levels of children's intelligence. Research conducted at SD Negeri 29 Purus Padang showed that children infected with the *Soil Trasmitted Helminths* worm had less nutritional status compared to children who were not infected with worms.

The high incidence of intestinal worms in school-age children is caused by their activities that often play or come into contact with the soil, this research was conducted at SDN 118 in Palembang, which is located in the vicinity of Sukawinatan Final Disposal Site (TPA) Sukajaya Village, Sukarami District, Palembang City which is the final processing site garbage in Palembang City, supported by the conditions of the lowlands and most of the swamps and this is most likely a good medium for the growth and development of *Soil Transmitted Helminths (STH)*. In a survey that had been conducted before, the behavior of clean and healthy living was still considered lacking in children around the Sukawinatan landfill in Palembang. This can be seen from the habits of children who do not wear footwear while playing so as to facilitate the investment of worms into the human body. Living in a slum environment around a garbage collection site certainly has a higher risk of various diseases than those who do not live in similar places. This is certainly increasingly alarming for children who have lower endurance than adults.

Based on the description above and the still high prevalence of STH, a study was conducted on the relationship of infection *Soil Transmitted Helminths* with Body Mass Index (BMI) in children aged Elementary School (SDN 188), Sukawinatan Landfill, Palembang.

**Methods**

This research is an analytic and observational study with *Cross Sectional* study design. The population that became the target of the study were all children aged 5–15 years as many as 110 samples were selected by *consecutive sampling*. The location of the study was conducted at SD 188 which was located around Sukawinatan Final Disposal Site (TPA) located in Sukajaya Village, Sukarami District, Palembang City and in the Laboratory of Parasitology, Faculty of Medicine, The University of Muhammadiyah The study was conducted from July to August 2018. The sample of the study was 109 children in grade I–VI who met the inclusion criteria. Samples were taken using *simple random sampling* technique.
The research data was obtained by collecting primary data in the form of stool samples examined by the *Kato-Katz method*, as well as anthropometric measurements of height and weight. Data analysis was carried out in two stages: univariate analysis and bivariate analysis with *Chi-Square test*.

**Results**

**Table 1. Distribution of Soil Transmitted Helminths (STH) Infections**

<table>
<thead>
<tr>
<th>STH Infection</th>
<th>n (Population)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27</td>
<td>24,8</td>
</tr>
<tr>
<td>No.</td>
<td>82</td>
<td>75,2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The infection of Soil Transmitted Helminths (STH) was more infected in girls, 17 childrens than in boys, 10 children. Distribution of STH infection based on type of worm eggs, 24 childrens were infected with roundworms (*Ascaris lumbricoides*), 2 childrens were infected with whipworm (*Trichuris trichiura*), and 1 child was infected with hookworm (*Ancylostoma duodenale or Necator americanus*).

**Table 2. Distribution of Body Mass Index (BMI)**

<table>
<thead>
<tr>
<th>BMI</th>
<th>n (Population)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>2</td>
<td>1,8</td>
</tr>
<tr>
<td>Fat</td>
<td>2</td>
<td>1,8</td>
</tr>
<tr>
<td>Normal</td>
<td>74</td>
<td>67,9</td>
</tr>
<tr>
<td>Thin</td>
<td>26</td>
<td>23,9</td>
</tr>
<tr>
<td>Very Thin</td>
<td>5</td>
<td>4,6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>109</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The result of the Body Mass Index (BMI) in Children-infected STH (27 childrens) in SDN 188 showed that no children had obesity and obese Body Mass Index (BMI), 16 childrens were normal body mass index, 6 childrens were thin, and 5 childrens were very thin body mass index.
Table 3. Relationship Between STH Infection and Body Mass Index (BMI)

<table>
<thead>
<tr>
<th>BMI</th>
<th>STH Infection</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Normal</td>
<td>16</td>
<td>20,5</td>
</tr>
<tr>
<td>Thin</td>
<td>11</td>
<td>35,5</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>24,8</td>
</tr>
</tbody>
</table>

There is no significant relationship between Soil Transmitted Helminths infection and Body Mass Index (BMI) in Children of Elementary School (SDN 188), Sukawinatan Landfill, Palembang.

Discussion

There were 27 childrens (24.8%) were infected with Soil Transmitted Helminths (STH). This disease can be caused by several risk factors related to the environment, individual hygiene, natural conditions and geography. The Geographic Location of SDN 188 is located around the Sukawinatan landfill which is the place for processing the final waste in the city of Palembang supported by poor personal hygiene behavior, where there are still many children who do not wear footwear when playing. Environmental conditions of SDN 188 Sukarame Sub district Palembang City is a humid area where plantations and swamps are suitable for the development of worms. Soil Transmitted Helminths (STH) Worm infection attacks many people whose activities are often in contact with the soil, where most worm infections attack children preschool age and school age.

The most common worm egg is roundworm (Ascaris lumbricoides), which is 24 children (22%). This can be affected by soil conditions and rainfall and the optimal temperature of the breeding of this worm. Ascaris lumbricoides worms have very high frequency ranging from 20-90%. These infective eggs can live long and are resistant to adverse influences so that their prevalence is high.
Trichuris trichiura worm eggs were found in 2 children (1.8%) and hookworm infection in this study was only found in 1 child (0.9%), this is because of the life cycle of the worm requires a long time and the soil moist and shady so that the eggs are ripe.\textsuperscript{18}

The results of this study were in line with Reskha Renanti's (2014) research in Padang and the research of Tasbih, et al (2015) in Makassar. The absence of a relationship between STH infection and the Body Mass Index (BMI) can be caused by acute infections. Chronic worm infection will cause a lack of appetite and absorption of food that causes the child's nutritional intake is not fulfilled so that there will be a condition of malnutrition which is characterized by BMI results below normal.\textsuperscript{19-21}

The effects of worms infection will affect the intake, digestion, absorption, and food metabolism. Worm infection can cause a deficiency of nutrients such as calories and protein, which can be seen from nutritional status, blood loss, disruption of child development and decreasing body's resistance from other diseases. It will affect the decline in cognitive abilities and learning achievement of children in school.\textsuperscript{22}

Conclusion

There is no relationship between STH infection and Body Mass Index (BMI) in Elementary School Students (SDN 188), Sukawinatan Landfiil, Palembang.
References


