The prevalence of parasitic gastrointestinal infection and hygiene knowledge in elementary school children in Boyolali district

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ABSTRACT

Introduction: Currently, the integrated data regarding the prevalence of gastrointestinal parasitic infections in Central Java is still lacking particularly, the Simo district which considered to have the second lowest percentage of clean and healthy living habits (60.25%) in Boyolali Regency. Therefore, an estimation of the prevalence of intestinal protozoan and helminth infections are crucial in order to formulate a proper community intervention especially in elementary school children in Boyolali.

Methods: A cross-sectional study was conducted using total sampling method and involving first to sixth-grade elementary schoolchildren. Stool specimens were examined using direct, modified Ziehl-Neelsen and Kato staining methods. All of the data were compiled and analyzed using chi square test.

Results: Among 127 participants, 17 students (13.58%) were infected with intestinal protozoans and 13 students (10.24%) were infected with helminth. The age ranged from 6 to 14 years old. The most frequent protozoan parasite detected was Blastocystis hominis (11.80%) while the most frequent helminth detected was A. lumbricoides (5.51%).

Conclusion: In conclusion, there was a considerable helminth and protozoa infection among students in Simo region. Further and wider studies are needed to confirm these findings.

Keywords: gastrointestinal parasites, elementary school children, helminth, hygiene, protozoa.

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INTRODUCTION

It is estimated that more than one third of the world’s population is infected with gastrointestinal tract parasites. Among them, 450 million are symptomatic. Symptoms ranged from diarrhea, fever, abdominal pain, to dehydration. These symptoms can have long-term effects in children including decreased cognitive abilities, growth retardation, and poor nutritional status, which if not handled properly will affect the quality of life in adulthood. The prevalence rate of parasitic gastrointestinal infections in Indonesia varies greatly in each province. For ascariasis, the prevalence rate ranges from as low as 2.5% to 62%. The cases of ascariasis were dominated by ascariasis and trichuriasis (> 90 million cases) and hookworms (average at 60 million cases).

The prevalence rate of intestinal protozoan infection in Indonesia is also quite high. In rural areas, the incidence of protozoan infection could reach 17.9% for Entamoeba histolytica, 4.5% for Giardia lamblia, and 34.4% for Blastocystis hominis. These figures are derived from separate studies that have not been integrated by the Government of Indonesia. As a result, many areas do not have clear data regarding the number of gastrointestinal parasitic infections.

Central Java Province is one of the provinces that still does not have much information regarding gastrointestinal parasitic infections. In the Central Java Provincial Report for Basic Health Research 2018, there were no integrated data showing the prevalence of gastrointestinal parasitic infections. Apart from not being integrated, research related to gastrointestinal parasitic infections has not been carried out in many areas in Central Java. One such area is Boyolali Regency.

Research on the epidemiology of gastrointestinal parasitic infections is not frequently conducted. Simo District, an area in Boyolali which considered to have the second lowest percentage of clean and healthy behavior (60.25%), still did not have adequate gastrointestinal parasitic infection data. Therefore, this study was aimed to assess the epidemiology of gastrointestinal parasitic infections in this district, especially focusing on school-age children.

METHODS

This research was conducted in three public elementary schools in Simo District, Boyolali Regency, Central Java, namely SDN Wates, SDN Talakbroto 1, and SDN Kedunglengkong 1. These schools were selected due to their poor environmental condition such as untiled floor, dirt yard, and most of the parents work as waste
The community is considered to have poor hygiene and healthy living habits mainly because of difficulty in accessing clean water and suboptimal education from the local health centers.

The study used total sampling technique and included all students (grades 1-6) in the educational year 2019/2020 from those three elementary schools. An informed consent was delivered to the parents and those who agreed to participate was included. Stool samples were collected from all subjects and assessed for parasites by using direct microscopic techniques, staining and the Katokatz method at the Parasitology Laboratory of the Faculty of Medicine, Universitas Sebelas Maret. Meanwhile, hygiene knowledge was assessed using a pre-test questionnaire.

All of the data were compiled and the descriptive statistics were used to analyze data distribution. Chi-square statistical test was used to process bivariate analysis. P-value < 0.05 was considered significant.

RESULTS

From three elementary schools, 195 students were asked to participate but 68 students did not collect feces sample, which left 127 students that were enrolled in this study. The distribution of the students from the three schools is presented in Table 1.

Of the 127 children, 39 children were from SDN Talakbroto 1, 49 children from SDN Kedunglengkong 1, and 39 children from SDN Wates. The age of the research respondents ranged from 6 and 14 years. There were 52 (40.9%) children who were less than 10 years old and 75 children (59.1%) who were 10 years old or older. Of the 127 children, female comprised most of the subjects (69 children, 54.3%). Regarding the hygiene knowledge, 51 subjects (40.2%) had poor knowledge while 76 (59.8%) of them had good or sufficient knowledge.

Table 2 shows the prevalence of intestinal protozoa obtained from stool samples. The most common pathogenic intestinal protozoa identified was Blastocystis hominis (11.80%). Meanwhile, only 1 subject had E. coli (0.79%) which is considered as non-pathogenic intestinal protozoa. Intestinal protozoan infection at SDN Kedunglengkong 1 was lower than those in SDN Talakbroto 1 and SDN Wates.

Table 3 shows the prevalence of worm infections among research subjects. The most common infection was A. lumbricoides (5.51%) and T. trichiura (3.15%). However, there are one subjects who had both A. lumbricoides and T. trichiura infections (0.79%) and one other was infected with hookworm larvae (0.79%). Again, the infection rate in SD
Intestinal parasitic infection is still one of the most prevalent health problems worldwide and children are one of the most vulnerable populations. The infection could result in growth disorder and potentially affect the adulthood. Therefore, a proper community policy and health intervention are needed to prevent a widespread infection in the community. For this, an integrated data is needed which is not present in most of the provinces in Indonesia, particularly in Boyolali district, Central Java.

From this research, it appeared that the infection rate was quite high among elementary school children in Simo district, Boyolali. The total protozoan infection rate was 13.38% while helminth infection rate was 10.24%. Additionally, almost half of the subjects had poor hygiene knowledge which put them at higher risk of infection. These problems were augmented with the environmental condition and poor economic power of most of the families.

Regarding protozoan infection, the prevalence rate of intestinal protozoal infection in Indonesia was also quite high. In rural areas, the incidence of protozoan infection could reach 17.9% for *Entamoeba histolytica*, 4.5% for *Giardia lamblia*, and 34.4% for *Blastocystis hominis* comprised of 5 main islands (Java, Kalimantan, Sumatra, Sulawesi, and Papua). In this study, it was found that the prevalence of *B. hominis* infection was 11.80%. This infection was lower than the *B. hominis* infection that occurred in SD 2 Dukuh, Bali and lower than the infection in the island of Sumba. The results of this study were also lower than the research conducted in Saraburi Thailand. *B. hominis* infection needs to be treated because this infection is often manifests as diarrhea, bloating, weight loss, vomiting, nausea, and constipation. *B. hominis* infection has also been associated with ulcerous colitis, terminal ileitis, and enteritis. If untreated, the infected children will also be a source of infection in the community.

The results of this study also showed that 0.79% of children were infected with *E.histolytica*. This infection is lower than the results of the study for *E. histolytica* infection conducted by Rojas et al (2016). If left untreated, it will cause abdominal pain, diarrhea, fever, decreased appetite, and weight loss. Chronic disease often associated with amebic ulcerous colitis and those children will be act as a source of infection. The prevalence of *E. coli* is very low with only 0.79% which is lower than the number of *E. coli* infections in elementary school children in South Dagon and Hlaing TharYar district, Myanmar.

Regarding the helminth infection, *A. lumbricoides* and *T. trichiura* were found in almost all of infection cases. Untreated *T. trichiura* infection will cause anemia, diarrhea, dysentery, anal pain and protrusion from the anus. *A. lumbricoides* infection will cause symptoms depending on the organ affected. *A. lumbricoides* infection in the lungs often manifests as coughing, shortness of breath, blood-tinged mucous, chest discomfort, and fever. When it colonizes the intestines, *A. lumbricoides* infection causes nausea, vomiting, diarrhea, stomach discomfort, weight loss, decreased appetite, intestinal obstruction, and severe vomiting occurs. On the other hand, untreated hookworm infection will cause abdominal pain, colic, nausea, fever, bloody bowel movements, decreased appetite, and itching. Like other fecal-oral-transmitted infections, untreated *T.trichiura* and hookworm infections can be a source of transmission.

The results showed that the highest number of cases of protozoa infection was found at SDN Wates. The results of this study obtained *T.trichiura* infection was 3.15% and hookworm infection was 0.79%. This result is lower than worm infection in a study conducted by Hardiyanti and Umniyati (2017). The influencing factor in this case is thought to because the hygiene knowledge in SDN Kedunglengkong 1 which was better. This is in accordance with the theory where PHBS is the final stage after someone is able to increase knowledge both formally and informally through observation, then it will form attitudes and statements which then be implemented as a behavior.

Intestinal protozoan and helminth infections were more common in male (53.3%) than in female. This was in line with Green’s theory that demographic factors (gender) influence health behavior. The results of this study are consistent with the research conducted by (Callixte et al. 2019). This study has several limitations such as limited scope in one district and did not conduct an in-depth interview with local officials or health care personnel. Wider scope will enable us to draw a more conclusive results and eliminate any demographic biases. Meanwhile, information from the officials will also give a wider perspective in the community health problem which also be the source of bias.

**CONCLUSION**

Overall, there were a considerable rate of intestinal helminth and protozoal infection among school children in Simo region. There was a higher rate of protozoal infection compared to helminth and the most probable factor of infection was the poor hygiene knowledge. However, further study is needed to confirm these findings with wider scope and using the combination of qualitative and quantitative study.

**AUTHOR CONTRIBUTION**

Siti Ma’rufah: processed the ethical clearance, prepared materials in this research, and doing the statistical test; Yulia Sari and Endang Lis S : performing the research’ procedures; Lilik Wijayanti: performing statistical analysis and preparing the manuscript; Sri Haryati: finalization of the manuscript.

**CONFLICT OF INTEREST**

The author declared that there is no conflict of interest regarding all aspects of the study.

**ETHICS APPROVAL**

This study has been approved by the Health Research Ethics Committee, Dr. Moewardi General Hospital/ Faculty of Medicine, Universitas Sebelas Maret, Surakarta, with letter number 218 / II / HREC / 2020
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