Original Article

Intestinal parasitic infection among school age students in Lakhok subdistrict, Pathumthani province, Thailand

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Abstract

Introduction: Intestinal parasites are mainly concern among children especially under age 13 who studying in primary school due to lack of appropriate protective procedures of themselves from those parasites. The parasitic infection in children may cause them serious effects in case of heavy infection if the proper prophylactic strategies are not applied. This study was conducted to survey the prevalence of intestinal parasites among the kindergarten and primary school students in Lakhok subdistrict, Pathumthani, Thailand which located closely to grimy canal (Premprachakorn canal) in the northern suburban area of surrounding Bangkok.

Method: The cross-sectional descriptive study was performed within July 2017. The 96 stool samples were collected from the students age 4 to 12 (51 girls and 46 boys). The evaluation of intestinal parasite was occupied by standard microscopic examination (simple direct smear) using 0.85% NaCl and Lugol's iodine and also by modified concentration method using Mini Parasep® SF (Apacor, England). The investigation of pinworm infection was performed by Scotch tape technique. The result was represented in percentage of infection.

Result: The prevalence among the students was 20.83% with 5.21% of pathogenic parasites and 15.62% of non-pathogenic parasites. The prevalence in the girl was higher than the boy in 25.49% and 15.56%, respectively. The highest prevalence was *Blastocystis* spp. (65% among identified parasites), and the others were *Endolimax nana, Giardia lamblia*, and *Entamoeba coli*, respectively. Only *Enterobius vermicularis* egg was found in the stool samples (5%). The prevalence of *E. vermicularis* by using Scotch tape technique was 5.41%. The sex of children was also statistically significant (7.50% in the boys and 2.94% in the girl).

Discussion and Conclusion: The prevalence of intestinal parasites in this current study is higher than the previous reports but the patterns are the same. Most of identified parasites are intestinal protozoa and non-pathogenic parasites are the highest incidence among them. Even though there are non-pathogenic parasites but it would be the index for personal hygiene and sanitary. This information could be used for taking further control strategies in the school and community all around.

Key words: Intestinal parasite, Primary school, Simple direct smear, Scotch tape technique

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Introduction

Intestinal parasite infection is one of the major public health problem in Thailand especially in children who lacking of ability to protect themselves from the parasites properly. The infection causes several complications affecting their daily life such as causing diarrhea, feverish, and disturbing their learning capability particularly in heavy infection. The Bureau of Epidemiology, Ministry of Public Health of Thailand has been reported for the prevalence of intestinal parasites among Thai population since 1981 to 2001 which illustrated the reduction of infection rate from 62.9 to 22.5%[1] according to the policy to eradicate these pathogens campaign during that period. However, the infection rates in primary school age were remaining high up to 60%.[2 - 4]

This investigated school is the primary school located in Lakhok subdistrict, Pathumthani province; the northern surrounding area of Bangkok. Most of the students in this school stay in the community close to the grimy area of Premprachakorn canal (connected between Chaopraya river from the north to the south). Due to that reason, the children have the better chance to obtain parasitic infection according to the accession of clean water for consumption is limited and insufficient knowledges to avoid themselves from infective parasites. Previous study in 2001, Lakhok subdistrict has been investigated for parasitic infection with 235 samples by the Ministry of Public Health of Thailand and the report was showed prevalence of 6.4% for overall parasitic infection with 4.7% Hookworm, 2.1% *Opisthorchis viverrini*, and 0.4% *Trichuris trichiura*, respectively.[1, 5] Even that report has been illustrated small percentage of the infection but the study from this school was opposite. The same school has also been studied in 2011 by Kitvatanachai, they have been reported for the intestinal parasitic infection among the students. The prevalence was 14.3% which higher than the previous report but the identified parasites were mostly protozoa and only one case of hookworm infection was found. In the meantime, they also investigated for the pinworm (*Enterobius vermicularis*) infection, the prevalence was 10.4% that was quite high when compared to the other schools in the same area.[6 - 7]

The objective of this study is to investigate the parasitic infection among the students in the primary school and monitor that situation in this school that was educated and introduced of some essential strategies for their teachers, parents, and also directly to the children previously.

Method

Study population and design

This study was conducted in the kindergarten (from 1 to 3; four to six-year) and the primary school ages (prathom 1 to 6; seven to twelve-year) students in the primary school, Lakhok subdistrict, Pathumthani province, Thailand. The school is located in suburban area of the northern surrounding Bangkok zone closely to the Premprachakorn canal which empty with water plants and rubbishes. The interesting point is that the children do have the high chance to get parasitic infection from improper hygienic behaviors of them and their parents. The descriptive cross-sectional study was designed to investigate the prevalence of intestinal parasites among them. The students under age 13 were included in the study and all of the participants were consented by their parents. From 178 consented children, only 96 stool samples were returned (51 girls and 45 boys) and 74 were evaluated for the pinworm infection (performed only in four to nine-year students). The participants were also asked for the general information that would be related to the parasitic infection such as source of fresh water, hand wash before meal, and other risky behaviors. This study was approved by ethical committee of the research institute of Rangsit university accession number RSEC 2/2560.

Assessment of intestinal parasites

The obtained stool samples were examined immediately for intestinal parasite within two hours by standard simple direct smear microscopy in 0.85% NaCl and Lugol's iodine in triplicate repeats. Simultaneously, the solvent-free fecal concentration method; Mini Parasep® SF (Apacor, England), was also used with no meaning for comparison but for enhancing the chance of parasitic evaluation. For the procedure in brief, the lid of the column filled tube was screwed and 10% formalin with one drop of Triron X-100 was added then scoop of fecal was introduced to the tube. The tube was screwed and sealed with conical tube then mixed thoroughly by shaking before centrifuged at 500xg for 2 min. The tube was then removed and the upper phase was discarded. The sediment was observed under the light microscope for investigating of the parasites. Negative samples were randomly re-investigated for attesting negative finding. The pinworm infection was investigated by using Scotch tape technique as previous described.[8] Before collection, the children parents were educated for the morning anal cleaning. The parasite adult and egg were observed under the light microscope as well.

Data analysis

The differences between groups in this study were evaluated by Pearson's chi-square test using SPSS version 17.

Result

From the total of 96 stool samples, 20.83% were positive with at least one intestinal parasite. The identified parasites were pathogen of 5.21% and non-pathogen of 15.62%. The highest prevalence among identified parasites in feces was *Blastocystis* spp. (65%) with 10% of >5 cells/OF which defined as pathogenic level follow by *Endolimax nana* (15%), *Giardia lamblia* (10%), *Entamoeba coli* (5%) and *Enterobius vermicularis* egg (5%). The diagnosed parasites with their prevalence are illustrated in Table 1. The other parameters that we have been investigated including sex, age, and their behaviors. The prevalence between sex of children was significantly different ($p = 0.044$) and the percentages in the girls was higher than the boys (25.49% and 15.56%, respectively) as illustrated in Table 2. The highest prevalence was found in the children of five-year (kindergarten 2) with 50% follow by nine-year (prathom 3) with 42.86%. The age under five-year and over nine-year were also reported high prevalence of 33.33% in ten-year (prathom 4) and four-year (kinderkarten 1), 30.77% in eleven-year and twelve-year students, respectively; but lowering in seven-year (prathom 1) with 9.09%. On the other hands, the parasite was not found in six-year (kindergarten 3) and eight-year (prathom 2) students. The percentages of parasitic infection among the age of the students were not indicated any conclusive aspects due to the number of samples were not equal and the trend analysis cannot be analyzed. The result as shown in Table 2.

Table 1 Prevalence of intestinal parasites identified from stool examination by simple direct smear and Mini Parasep® SF (Apacor, England)

Parasites	Prevalence (%)	Distributed Percentage (%)	Positive samples
Pathogenic parasites			
Blastocystis spp. (> 5 cells/HPF)	2.08	10	2
Giardia lamblia	2.08	10	2
Enterobius vermicularis egg	1.04	5	1
Non-pathogenic parasites			
Blastocystis spp. (< 5 cells/HPF)	11.44	55	11
Endolimax nana	3.13	15	3
Entamoeba coli	1.04	5	1
Total	**20.83**	**100**	**20**

Table 2 The distribution of intestinal parasites and pinworm among the students separated by age and sex of the them

	Prevalence of intestinal parasites (%)	Prevalence of pinworm (%)
Age of student		
4 (kinderkarten-1)	33.33	0.00
5 (kinderkarten-2)	50.00	0.00
6 (kinderkarten-3)	0.00	14.29
7 (prathom-1)	9.09	16.67
8 (prathom-2)	0.00	0.00
9 (prathom-3)	42.86	7.69
10 (prathom-4)	33.33	N/A
11 (prathom-5)	30.77	N/A
12 (prathom-6)	30.77	N/A
Average	20.83	5.41
Sex of student		
Male	15.56	7.50
Female	25.49	2.94
P-value	0.044	0.032

For the investigation of pinworm infection by Scotch tape technique, the infection rate was quite low in all ages. The overall prevalence was only 5.41% with 7.50% in the boys and 2.94% in the girls (as illustrated in Table 2) that was statistically different between sex (p = 0.032) but some of them were obtained heavy infection (>100 eggs/HPF) and adult parasites were also found stick on the Scotch tape. When compare the age of the students only three age-groups were infected, the highest prevalence was seven-year (prathom 1) in approximately of 16.67% follow by six-year (kindergarten 3) of 14.29%, and nine-year (prathom 3) of 7.69%, respectively. In contrast, the students age lower than six-year and eight-year were not infected with pinworm (Table 2).

The other parameters from the questionnaires such as hand washing before meal, and consumption behaviors were not statistically different between infected and uninfected participants (data not shown).

Discussion and Conclusion

Intestinal parasites are not only the disease causing agent but it also be used as the indication of personal and community sanitary. The intestinal protozoa and helminths contaminate to the food, consumptive water, and drinking water easily when the people are not take care themselves properly and the access of clean water are limited. The ingestion is the main route of infection both directly from contaminated food including water and accidentally by soil contamination.[9] As mentioned earlier that the intestinal parasitic infection rates were highly reported among Thai population in the past ten years but it was decreased in the most recent years. The parasitic eradication campaign from the Ministry of Public Health of Thailand was solemnly succeeded for overall of the country but in children seem to be unaccomplished. Our recent report demonstrated approximately 20.83% prevalence of intestinal parasites among the students who living in Bangkok suburban area which might be better sanitation than the children who living in the countryside. The infection was remaining high when compared to the previous report.

As comparison to the study from 2011 in the same area, the infection rate was increased by approximately 10% but the parasite strains were similar except hookworm which not found from our recent study. The highest prevalence was *Blastocystis* spp. in both studies and the other protozoa were still plentiful. These results were attested that the behaviors of the occupants around the school particularly children and their parents were not changed during the past period. The major risk factor that cannot be avoided is no other than the environments around the school which illustrate the polluted water in the Premprachakorn canal that empty with garbage and water plants. The people who live in the community along the canal remain use the water from the rain for drinking and from the canal especially for consumption only some households can be reached to the clean water according to their low incomes and awareness. The occupations and education of children's parents are also the important factors which can be related to the infection rate regarding to their ability to understand the procedure to protect themselves and their children from the parasites comprehensively.

For the pinworm (*Enterobius vermicularis*) infection, the infection rate was decreased when compared to previous study but it does not mean the problem is minimized. Even though the infection rate was lower but the adult parasites remain found. The studies of pinworm infection in several areas found that the infection rates were high in the children under six years.[10] In our recent study, the number of children who participated which under six years were smaller than the over age that might be the reason why the percentage was quite low.

The information obtained from the questionnaire were also not represented reality situations in their families and the control strategies that applied in the past were also not work considerably due to the infection was still high.

In conclusion, our finding indicates the steady high rate of intestinal parasitic infection in the students in this school. The eradication program would be vigorously needed to control the infection. The giving of education and action plan of the community's leader and primary health care unit could be help. The environmental responsible sector is also the one who could be action to get rid of the garbage and make canal and community cleaner.

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References

1. Department of Disease Control, Ministry of Public Health of Thailand. Assessment of helminth control strategies in the end of the eighth public health development plan. *Annual report*. 2001.
2. Saksirisampant W, Prownebon J, Kulkumthorn M, et al. The prevalence of intestinal parasitic infections among school children in the central region of Thailand. J Med Assoc Thai. 2006;89:1928-33.
3. Warunee N, Choomanee L, Sataporn P, et al. Intestinal parasitic infections among school children in Thailand. Trop Biomed. 2007;24:83-8.
4. Wongstitwilairoong B, Srijan A, Serichantalergs O, et al. Intestinal parasitic infections among pre-school children in Sangkhlaburi, Thailand. Am J Trop Med Hyg. 2007;76:345-50.
5. Saksirisampant W, Nuchprayoon S, Wiwanitkit V, et al. Intestinal parasitic infestations among children in an orphanage in Pathum Thani province. J Med Assoc Thai. 2003;86:263-70.
6. Kitvatanachai S, Rhongbutsri P. Intestinal parasitic infections in suburban government schools, Lak Hok subdistrict, Muang Pathum Thani, Thailand. Asian Pacific J Trop Med. 2013;699-702.
7. Kitvatanachai S, Rhongbutsri P. Pinworm infections in suburban government schools in Lak Hok Subdistrict, Muang Patumthani, Thailand. RJAS. 2014;4(2):117-22.
8. Petro M, Iavu K, Minocha A. Unusual endoscopic and microscopic view of Enterobius vermicularis: a case report with a review of the literature. South Med J. 2005;98(9):927-9.
9. Osman M, Safadi DE, Cian A, et al. Prevalence and risk factors for intestinal protozoan infections with Cryptosporidium, Giardia, Blastocystis and Dientamoeba among school children in Tripoli, Lebanon. Plos Negl Trop Dis. 2016;10(3):e0004496.
10. Lohiya GS, Tan-Figueroa L, Crinella FM, et al. Epidemiology and control of Enterobiasis in a developmental center. West J Med. 2000;172(5):305-8.

บทคัดย่อ

การศึกษาการติดเชื้อปรสิตในลำไส้ในนักเรียน ตำบลหลักหก อำเภอเมือง จังหวัดปทุมธานี

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บทนำ: เชื้อปรสิตในลำไส้เป็นปัญหาสุขภาพที่ควรเฝ้าระวังโดยเฉพาะอย่างยิ่งในเด็กอายุต่ำกว่า ๑๓ ปี เนื่องจากยังขาดการป้องกันตนเองที่ดีพอ ซึ่งอาจจะทำให้เกิดพยาธิสภาพที่รุนแรงกว่าในผู้ใหญ่ การศึกษาในครั้งนี้มีวัตถุประสงค์เพื่อสำรวจหาความชุกของการติดเชื้อปรสิตในลำไส้ทั้งโปรโตซัวและพยาธิชนิดต่างๆ ในเด็กนักเรียนทุกระดับชั้นของโรงเรียนประถมศึกษา ในตำบลหลักหก อำเภอเมือง จังหวัดปทุมธานี ซึ่งเด็กส่วนใหญ่อาศัยอยู่ในชุมชนริมคลองเปรมประชากรที่ไม่สะอาด เต็มไปด้วยขยะและน้ำเสีย ทำให้มีโอกาสเสี่ยงต่อการติดเชื้อปรสิตชนิดต่างๆ ได้ง่าย

วิธีการศึกษา: เป็นการศึกษาเชิงพรรณนา ณ จุดเวลาใดเวลาหนึ่ง โดยทำการเก็บตัวอย่างอุจจาระจากเด็กนักเรียนทุกระดับชั้นตั้งแต่อนุบาล ๑ จนถึงประถมศึกษาปีที่ ๖ อายุตั้งแต่ ๔ ถึง ๑๒ ปี จำนวน ๙๖ คน โดยเป็นนักเรียนหญิง ๕๑ คน และนักเรียนชาย ๔๕ คน ในช่วงเดือนกรกฎาคม พ.ศ. ๒๕๖๐ ทำการตรวจหาปรสิตลำไส้ในอุจจาระโดยใช้วิธีมาตรฐานคือ simple direct smear ในน้ำเกลือ (0.85% NaCl) และ Lugol's iodine รวมทั้งวิธีเข้มข้นด้วย Mini Parasep® SF (Apacor, England) ส่วนการตรวจหาพยาธิเข็มหมุดทำโดยวิธี Scotch tape technique วิเคราะห์ผลการตรวจโดยใช้สถิติพรรณนา คือ ความถี่ ร้อยละ

ผลการศึกษา: ผลการตรวจอุจจาระ พบปรสิตในลำไส้ร้อยละ ๒๐.๘๓ ซึ่งส่วนใหญ่เป็นเชื้อโปรโตซัว โดยพบในเพศหญิงสูงกว่าเพศชาย (ร้อยละ ๒๕.๔๙ และ ๑๕.๕๖ ตามลำดับ) โดยปรสิตที่พบเป็นปรสิตที่ไม่ก่อโรคร้อยละ ๑๕.๖๒ และปรสิตก่อโรคร้อยละ ๕.๒๑ ชนิดของปรสิตที่พบสูงสุดคือ *Blastocystis* spp. (ร้อยละ ๖๕ ของปรสิตทั้งหมดที่พบ) ซึ่งในจำนวนนี้พบมากกว่า ๕ เซลล์/HPF อยู่ร้อยละ ๑๐ นอกจากนั้นยังพบปรสิตก่อโรคคือ *Giardia lamblia* ร้อยละ ๑๐ และไข่ของพยาธิเข็มหมุด (*Enterobius vermicularis*) ร้อยละ ๕ อีกด้วย สำหรับผลการตรวจหาพยาธิเข็มหมุด ด้วยวิธี Scotch tape technique พบการติดเชื้อพยาธิเข็มหมุดร้อยละ ๕.๔๑ โดยพบในเด็กชายมากกว่าเด็กหญิง (ร้อยละ ๗.๕๐ และ ๒.๙๔ ตามลำดับ)

วิจารณ์ และ สรุปผลการศึกษา: จากผลการศึกษาในครั้งนี้ พบการติดเชื้อปรสิตลำไส้สูงกว่าการศึกษาที่ผ่านมา และสูงกว่าค่าเฉลี่ยของทั้งประเทศ แม้ปรสิตที่พบส่วนใหญ่จะไม่ก่อโรค แต่ก็เป็นปรสิตที่มักพบปนเปื้อนในอาหารและน้ำดื่มที่ไม่สะอาด ซึ่งเป็นดัชนีบ่งชี้ถึงสุขลักษณะที่ไม่ดีสอดคล้องกับพฤติกรรมการดำรงชีวิตของเด็กที่อาศัยอยู่ในชุมชนโดยรอบโรงเรียน ซึ่งทำให้มีโอกาสติดเชื้อได้มาก โดยข้อมูลนี้จะเป็นข้อมูลเบื้องต้นในการวางแผนการรักษาและสร้างสุขาภิบาลในชุมชนต่อไป

คำสำคัญ: ปรสิตในลำไส้, นักเรียนประถมศึกษา, Simple direct smear, Scotch tape technique