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Pinworm infections in suburban government schools in Lak Hok Subdistrict, Muang Patumthani, Thailand

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Abstract

In this study, we aimed to provide public-health services from the Faculty of Medical Technology, Rangsit University, and survey *Enterobius vermicularis* infections in 3 government schools (N, R, and S school) during the period May-June 2011. Using the Scotch-tape technique, from a population of 977 individuals, 616 (63%) samples were screened and registered as participants. The average rate of infection was 10.4%. S school showed the highest prevalence (14.3%), followed by N school (13.7%); the lowest rate was found in R school (8.0%), but there was no statistically significant difference between the schools ($p>0.05$). The infection rate was not significantly different between males (10.5%) and females (8.5%) ($p>0.05$). The highest prevalence was among students in Prathom 2 or aged about 7 years (12.9 %) with the lowest in Prathom 3, or aged about 8 years (6.9%), but the difference between the age groups was not statistically significant ($p>0.5$). Students who sometimes or always sucked their thumbs had a higher rate of pinworm infection than those who did not; the difference was statistically significant ($p<0.5$). The highest rate was also found among parents who were agriculturists (13.5%), followed by workers (11.2 %.). No infection was found among parents who worked in government service or government enterprises, or among parents with salaries > 13,000 Baht/month. The average rate of infection from a single examination was still > 10% in government schools in suburban areas. Health education regarding pinworm infection should be implemented in these schools.

***Keywords*:** *pinworm, suburban area, government school, Thailand*

บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เป็นบริการวิชาการของคณะเทคนิคการแพทย์ มหาวิทยาลัยรังสิต และเป็นการสำรวจหาพยาธิเข็มหมุดในโรงเรียนรัฐบาล 3 แห่ง ได้แก่ โรงเรียน N, R และ S ระหว่างเดือนพฤษภาคม ถึงมิถุนายน พ.ศ. 2554 (ค.ศ.2011) โดยใช้วิธีสก็อตเทป จากประชากร 977 คน มีนักเรียนเข้าร่วมลงทะเบียนทั้งสิ้น 616 คน (ร้อยละ 63) พบอัตราเฉลี่ยการติดเชื้อ ร้อยละ 10.4 โดย โรงเรียน S พบการติดเชื้อสูงที่สุด ร้อยละ 14.3 ตามด้วยโรงเรียน N (ร้อยละ 13.7) และน้อยสุด โรงเรียน R (ร้อยละ 8.0) แต่ไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติระหว่างโรงเรียน ($p>0.05$) เพศชายพบร้อยละ 10.5 และไม่มีความแตกต่างกันทางสถิติกับเพศหญิงซึ่งพบ ร้อยละ 8.5 ($p>0.05$) พบการติดเชื้อสูงสุดในชั้นประถม 2 หรืออายุประมาณ 7 ปี (ร้อยละ 12.9) และต่ำสุดในชั้นประถม 3 หรืออายุประมาณ 8 ปี (ร้อยละ 6.9) แต่ไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติระหว่างกลุ่มอายุ ($p>0.05$) เด็กที่มีพฤติกรรมชอบดูดนิ้วพบการติดเชื้อสูงกว่าเด็กที่ไม่เคยดูดนิ้วอย่างมีนัยสำคัญทางสถิติ ($p<0.05$) พบการติดเชื้อสูงในกลุ่มเด็กที่ผู้ปกครองมีอาชีพเกษตรกรรม (ร้อยละ 13.5) รองลงมาคือ รับจ้าง (ร้อยละ 11.2) และไม่พบในนักเรียนที่ผู้ปกครองมีอาชีพรับราชการ หรือทำงานรัฐวิสาหกิจ และ ผู้ปกครองที่มีรายได้สูงกว่า 13,000 บาทต่อเดือน การพบเชื้อพยาธิเข็มหมุดในโรงเรียนรัฐบาล เขตชานเมืองโดยการตรวจเพียงครั้งเดียวครั้งนี้ พบเชื้อถึง ร้อยละ 10 ดังนั้นจึงควรมีการให้ความรู้ทางด้านสุขภาพเกี่ยวกับโรคพยาธิเข็มหมุดในโรงเรียน

คำสำคัญ: *พยาธิเข็มหมุด, เขตชานเมือง, โรงเรียนรัฐบาล*

1. Introdution

The pinworm (*Enterobius vermicularis*) is distributed worldwide (Garcia, 2009; Burkhart & Burkhart, 2005) and is the most common helminth infection in Thailand (Nateeworanart, Vitta, & Lee, 2007; Bunchu et al., 2011; Kaewpitoon & Kaewpitoon, 2011). In humans, the most common clinical manifestation of a pinworm infection is an itchy anal region. When the infection is heavy, there can be a secondary bacterial infection due to the irritation and scratching of the anal area (CDC, 2012). Many cases are asymptomatic. Symptoms may be accompanied by mild nausea, vomiting, abdominal pain, irritability, or difficulty in sleeping. Anorexia and weight loss may be present.

In small children, poor gut absorption contributes to the development of malnutrition, reduced growth and development. Heavy infections may cause intestinal inflammation and abdominal pain with secondary bacterial infection and appendicitis (Babekir & Devi, 1990). Pinworm spreads from host to host through contamination. Pinworm infections are common among people living in close contact, and tend to infect all people in a household (Cook, 1994). The prevalence of pinworm is not associated with gender (Cook, 1994) nor with any particular social class, race, or culture (Garcia, 2009). Pinworms are particularly common in children, with reported prevalence rates in this age group as high as 38.32% in Nakhon Pathom Province, Thailand (Wahah & Ratanaponglakha, 1992). In 2011, reports showed that the rate of *E. vermicularis* infection in lower northern Thailand was 19.9% by Scotch-tape technique (Bunchu et al., 2011). In Ubon Ratchathani Province, in the northeast, the infection rate was 7.73% (Kaewpitoon & Kaewpitoon, 2011). A prevalence study of intestinal parasitic infections among schoolchildren in central Thailand, using the formalin-ether concentration technique, also reported the prevalence of pinworm as 0.19% (Saksirisampant et al., 2006). A study of pinworm infection was conducted in Maharach Foundation orphanages, Pathum Thani, in 2000; the rate reported among pre-school children was 10.26%, and 12.15% in the Maharach Foundation (males) (Kitvatananchai, Marujiwat, Petabut, & Thawornpol, 2000). Later, Pethleart et al. (2010) found no pinworm eggs in the kindergarten of Thammasart University, Pathum Thani Province; this may be because most parents (73%) were of good socioeconomic status and 64% were university graduates (Pethleart et al., 2010). There are 3 suburban government schools near Rangsit University, Pathum Thani, which have never reported the prevalence of pinworm infection, so we were interested to discover whether there were any cases of infection in these 3 schools.

2. Objectives

This study aimed to determine current *E. vermicularis* infection rates among children living in suburban government schools near Rangsit University, Pathum Thani Province, by Scotch-tape technique.

3. Materials and methods

3.1 Study area

A cross-sectional survey was conducted in 3 suburban government schools (N, S, and R school) near Rangsit University Campus in Lakhok Subdistrict, Muang District, Pathum Thani Province, central Thailand. This Subdistrict is just north of Bangkok (Figure 1). The study was approved by the Ethics Committee of Rangsit University, Pathum Thani, Thailand (RSEC 01/53).

Figure 1 Map of Thailand showing the location of Mueng Pathum Thani Province; the study was conducted in Lak Hok Subdistrict (shown in zoomed area box) (Wikipedia Organization, 2014).

3.2 Subjects and specimen collection

This study was carried out between May-June 2011, in 3 urban government schools in Lakhok Subdistrict, Muang District, Pathum Thani Province, Thailand. A total of 977 students aged between 4–8 years were provided with consent forms and questionnaires. The study procedures were explained to the parents or legal guardians of the children interested to participate in the study, who then completed the questionaires and signed the informed consent forms. Parents who agreed to have their children participate in the study were asked not to wash their child's bottom on the day of the Scotch-tape test. The questionnaires were collected from the students the next morning, when they entered the testing site. Students who agreed with their parental permission were examined between 07.30 to11:00 hr.

3.3 Scotch-tape examination technique

The prevalence of pinworm infections was determined by Scotch-tape technique, the gold standard for the diagnosis of this parasite (Shoup, 2001). Briefly, a piece of clear adhesive tape was used to obtain a sample from the perianal surface. The sample was then mounted on a glass slide and labeled with a code. The slides were taken back to the University laboratory for examination under a light microscope.

3.4 Data analysis

Data were interpreted by descriptive statistics and prevalence expressed as percentage (%). All data were classified according to sex, age, and school, and analyzed by chi-square test. P-value was considered statistically significant at $p<0.05$.

4. Results

4.1 Study compliance

Of 977 children, a total of 616 (63.0%) from 3 government schools participated; their ages ranged between 4-8 years. Forty seven point one per cent (47.1%) were male and 52.9% female.

4.2 *Enterobius vermicularis* infections by school, sex, and age group

The average rate of *Enterobius vermicularis* infection was 10.4% from 3 government schools, with no significant difference by school, sex, or age ($p>0.05$). Infection rates by school, sex, and age are shown in Figures 2-4, respectively.

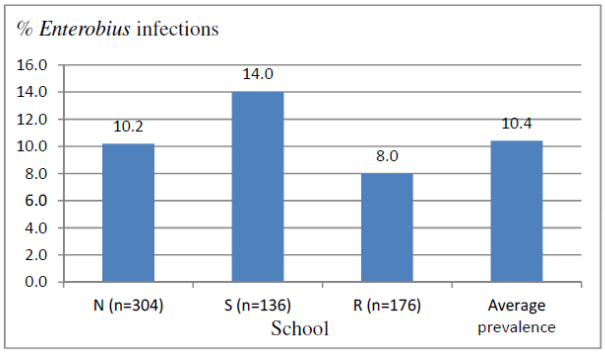

Figure 2 The prevalence of *Enterobius vermicularis* infections by school (χ^2= 3.006, df=2, p=0.222)

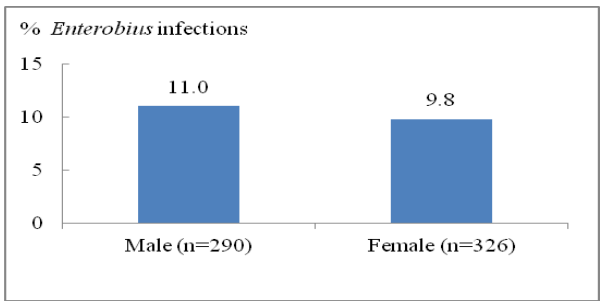

Figure 3 The prevalence of *Enterobius vermicularis* infections by gender (χ^2= 0.245, df=1, p=0.621)

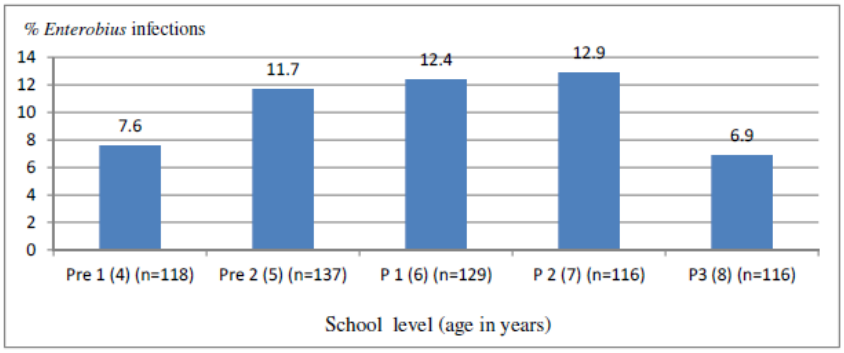

Figure 4 The prevalence of *Enterobius vermicularis* infections by school level (age in years)
χ^2=4.099, df=4, p=0.393

4.3 Relationship between *Enterobius vermicularis* infection and socioeconomic/behavioral factors

An analysis of the relationship between rate of infection and parent's occupation (Table 1) found no pinworm infection among children whose parents were housewives and government employees. Table 2 shows that the highest infection rate was among children whose parental income was between 5,000-7,000 Baht/month (12%). No infection was found among children whose parental income was > 13,000 Baht/month.

Table 1 Relationship between *Enterobius vermicularis* infection and parental occupation.

Parent's occupation	No. of infections/ Total of examinations (%)
Housewife	0/6 (0)
Government service or government enterprise	0/18 (0)
Private business	4/55 (7.3)
Employee	29/260 (11.2)
Agriculturist	5/37 (13.5)

Remark χ^2 = 3.971, df =4 , p = 0.410

Table 2 Relationship between *Enterobius vermicularis* infection and parental income

Parental income/month (Baht)	No. of infections/ Total examined (%)
< 5,000	4/58 (6.9)
5,000 – 7,000	15/125 (12.0)
7,001 – 9,000	9/83 (10.8)
9,001 – 11,000	4/41 (9.8)
11,001 – 13,000	2/21 (9.5)
> 13,001	0/31 (0)

Remark χ^2 = 4.810, df =5 , p = 0.439

There was no relationship between pinworm infection and frequency of changing bed sheets, taking a shower, cleaning the bottom, or itching at night time ($p>0.05$).

However, Table 3 shows students who sometimes or always sucked their thumbs had higher rates of pinworm infection than students who never sucked their thumbs, with statistically significant difference ($p<0.5$).

Table 3 The relationship between *Enterobius vermicularis* infection and thumb-sucking

Sucked their thumbs	No. of infections/ Total examinations (%)
Sometimes/ always	22/180 (12.2)
Never	12/197 (6.1)

Remark $\chi^2 = 4.309$ df =1 , p = 0.038

5. Discussion

This study aimed to provide community public-health services from the Faculty of Medical Technology, Rangsit University and survey *E. vermicularis* infections. The overall prevalence of *E. vermicularis* infection in the 3 suburban government schools studied in Lakhok Sub district, Muang District, Pathum Thani Province, was 10.4%, which was similar to a previous study in Pathum Thani orphanages (Kitvatananchai et al., 2000). This finding contrasts with Pethleart et al. (2010), who found no pinworm eggs in the kindergarten of Thammasart University, Pathum Thani Province (Pethleart et al., 2010). This may be because this study was conducted in a government school, where the students' parental income was < 13,000 Baht/month, and thus the parents were of lower socio-economic status. This study found no infections among the group with parental incomes >13,000 Baht/month. In 2011, the rate of *E. vermicularis* infection reported in lower northern Thailand was 19.9%, which was higher than our study (Bunchu et al., 2011). In Ubonratchathani Province, in the northeast, the infection rate was 7.73%, which was lower than this study (Kaewpitoon & Kaewpitoon, 2011). No significant differences were found by school, sex, or age ($p>0.05$), which may be because all of the government schools were in the same area of Lakhok, and the children lived in a similar environment. No pinworm infections were found among the children, whose parents were housewives and government employees, perhaps because the parents could spend more time taking care of their children. However, the prevalence of *Enterobius* infections in this study was approximately 10.4% from a single detection, which may have yielded a lower result than the previous study by Oothuman et al. (1992), which reported that no subjects had *Enterobius* eggs in samples taken on day 1, while examination of samples over 3 consecutive days found 72.7%, which rose further to 100% when examinations were conducted over 6 consecutive days (Oothuman et al., 1992). It appears that a true reflection of pinworm prevalence can only be obtained by examining many samples taken successively, whenever possible. It would be ideal to provide a pinworm-detection kit for parents to test their children, especially early in the morning after the children wake up, and before a shower, for more reliable results.

6. Conclusion

Enterobius infection in suburban government schools should not be neglected, since the prevalence of infections is still > 10% and infection is transmissible among children. To avoid the symptoms, anal itch, sleeping disorders, and/or abdominal pain, monitoring and control of pinworm are needed, especially among school children not living/learning in urban areas.

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