

# Head Lice Infestation and Its Relationship with Hygiene and Knowledge among Urban School Children in Yogyakarta

Anastasia Joyce Lim Yit Zhen<sup>1</sup>, E. Elsa Herdiana Murhandarwati<sup>2,\*</sup>, Sitti Rahmah Umniyati<sup>2</sup>

<sup>1</sup>Undergraduate Program, Faculty of Medicine, Universitas Gadjah Mada; <sup>2</sup> Department of Parasitology, Faculty of Medicine, Universitas Gadjah Mada

\*Corresponding author: [herdianaelsa@yahoo.com](mailto:herdianaelsa@yahoo.com)

## ABSTRACT

**Introduction:** Pediculosis capitis is a common infestation in school children and is a worldwide public health concern. Despite this worldwide spread, incidence studies remain few. There is also a misconception that head lice infestation is rarely found in the urban environment.

**Objectives:** The objective of this study is to determine the proportion of head lice infestation among urban school children in Yogyakarta and study its relationship with hygiene and knowledge.

**Methods:** This is a cross-sectional study conducted upon 2 schools in Yogyakarta on 154 pupils. Children range from ages 9 to 13 years. Data was collected from the schools by trained persons. A detailed questionnaire was filled for each pupil prior to hair examination.

**Results:** In this research, we report the proportion of head lice infestation among urban school children in Yogyakarta and assess its risk factors. Nineteen pupils (12.3%) were infected with head lice, 5 boys (6.3%) and 14 girls (18.7%). There was a significant relationship between head lice infestation and sex ( $P < 0.05$ ). However, no significant relationship was found between head lice infestation with hygiene and knowledge.

**Conclusion:** The results show a total proportion of 12.3% among urban school children in Yogyakarta.

**Keywords:** pediculosis capitis, urban, hygiene, knowledge, school children.

## INTISARI

**Pendahuluan:** Pediculosis capitis (kutu kepala) merupakan infestasi yang umum pada anak sekolah dan merupakan permasalahan kesehatan masyarakat. Walaupun kasusnya banyak terjadi di seluruh dunia, penelitian tentang kasus kutu kepala masih terbatas. Kesalahpahaman bahwa kutu kepala tidak terdapat di lingkungan perkotaan masih sering terjadi.

**Tujuan:** Tujuan penelitian ini adalah menentukan proporsi infestasi kutu kepala di antara anak sekolah dasar di daerah kota Yogyakarta dan kaitannya dengan hygiene dan pengetahuan.

**Metode:** Penelitian ini merupakan penelitian cross-sectional yang dilakukan pada dua sekolah di Yogyakarta dan melibatkan 154 murid. Usia murid bervariasi antara 9 – 13 tahun. Pemeriksaan kutu kepala dilakukan oleh petugas yang telah dilatih dan kuesioner diisi oleh para murid sebelum pemeriksaan kepala.

**Hasil:** Penelitian ini melaporkan proporsi kutu kepala pada anak sekolah dasar dan faktor resikonya. Sembilan belas murid (12.3%) terinfeksi kutu kepala, 5 anak laki-laki (6.3%) dan 14 anak perempuan (18.7%). Terdapat hubungan yang bermakna antara infestasi kutu kepala dan jenis kelamin ( $P < 0.05$ ) dan tidak ada hubungan yang bermakna antara infestasi kutu kepala dengan hygiene maupun pengetahuan murid.

**Simpulan:** Hasil penelitian menunjukkan masih adanya infestasi kutu kepala pada anak sekolah dasar di daerah kota Yogyakarta.

**Kata kunci:** pediculosis capitis, urban, hygiene, pengetahuan, murid sekolah.

## INTRODUCTION

*Pediculus humanus capitis* is a common infestation in school children and is a worldwide public health concern<sup>1</sup>. Despite this worldwide spread, incidence studies still remain little<sup>2</sup>. Children have for a long time been known to act as reservoirs of infestation as shown by the fact that almost all the information available on this parasite has come from school surveys in Belgium<sup>3</sup>, Australia<sup>4</sup> and Nigeria<sup>5</sup>.

Lice often cause considerable inconvenience to their hosts. Physical irritation due to their bites may distract attention and cause social distress<sup>6</sup>. This distraction may also cause the school children to do poorly in school and cause a vicious cycle of distress. In Indonesia, there has not been any study on the proportion of head lice infestation in school children for the past 20 years. Therefore, many have ceased to see this as a problem due to the underreporting. Upon observation, there is also a common misconception that head lice infestation is not found in the urban environment. Personal reports from teachers and public health workers in Yogyakarta suggest that head lice infestation is still a significant problem. Control of infestation however is severely handicapped by the lack of awareness and the unavailability of over the counter remedies in pharmacies. This study serves to reveal the proportion of head lice infestation among urban school children in Yogyakarta and identify the role of hygiene and knowledge in head lice infestation.

## MATERIALS AND METHODS

This is a descriptive cross-sectional study. This study was done in December 2009. The research population encompasses elementary school children from Grades 4 to 6 from urban schools in Yogyakarta. Two schools have been selected to participate in this study, one was a Private school and another was a Public School. The process of data collection was done by handing out

questionnaires and examining the head of pupil who has met the inclusion and exclusion criteria. Hygiene variables were measured by co-sleeping habits, frequency of hair washing, sharing of combs, caps, towels and unwashed clothes and frequency of bed linen change. Knowledge was measured through pupil's knowledge on the method of spread, risk factors, signs of head lice infestation and method of prevention in which the total score was compared against a perfect score. Data was collected and analyzed with chi-square tests.

## RESULTS AND DISCUSSION

Throughout the specified period of the research, 154 pupils took part in the study of which 101 were from Private Elementary School and 53 were from Public Elementary School. Table 1 shows the proportion of head lice infestation. Out of 154 pupils that were examined, 19 pupils were positive for head lice infestation. The proportion of infestation in the urban school children was 12.3%. The proportion was higher in the Public School (17.0%) as compared to the Private School (9.9%).

Table 2 shows the proportion of head lice infestation in the urban school children, which was stratified by factors that make up the criteria for hygiene. Proportion of infestation among pupils who were co-sleeping with a large number (more than 4 people) was greater (20%) than the others (Table 2). This is in accordance with the findings of Nada *et. al.*<sup>7</sup>, in which co-sleeping, a habit with a close relation to the family size was also found to be of great influence on the infestation ratios. Co-sleepers are liable of infestation more than three and a half times than single sleepers.

There was a negative correlation between the frequency of hair washing and head lice infestation, in which pupils who washed their hair everyday had the highest proportion of

Table 1: Proportion of head lice infestation in urban school children in Yogyakarta by schools

Type of Elementary School	No. of Pupils Examined	No. of Infestations	Proportion of Infestation (%)
Private	101	10	9.9
Public	53	9	17.0
Total	154	19	12.3

Table 2: Proportion of head lice infestation in relation to hygiene of the urban pupils in Yogyakarta

Independent variables	No.	%	Proportion of Infestation		P-Value
			No.	%	
<b>Co-sleeping habit</b>					0.820
1-2 people	119	78.3	14	11.7	
3-4 people	28	18.4	4	14.3	
More than 4 people	5	3.3	1	20.0	
<b>Frequency of hair washing</b>					0.253
Everyday	82	53.9	13	15.9	
Two times a week	55	36.2	4	7.3	
Every week	15	9.9	1	6.7	
<b>Sharing of combs</b>					0.339
Yes	36	23.7	3	8.3	
No	116	76.3	15	12.9	
<b>Sharing of caps</b>					0.309
Yes	18	11.8	1	5.6	
No	135	88.2	18	13.3	
<b>Sharing of towels</b>					0.453
Yes	14	9.2	1	7.1	
No	138	90.8	18	13.0	
<b>Sharing of unwashed clothes</b>					0.763
Yes	2	1.3	0	0	
No	149	98.7	19	12.8	
<b>Frequency of bed linen change</b>					0.540
Two times a week	99	66.4	15	78.9	
Every week	41	27.5	4	21.1	
Every month	6	4.0	0	0	
Never	3	2.0	0	0	

infestation and the lowest proportion being those who washed their hair only once a week (Table 2). In spite of this, other studies have shown that head lice infestation was more prevalent in those with little frequency of hair washing in a week<sup>6,8,9</sup>. This may be because a clean scalp provides the lice with good supply of blood from which they feed on<sup>10</sup>. We suspected that the quality of hair washing might influence the head lice infestation. Instead of washing off the knits, the water poured would provide a humid environment making the favorable condition for the knits development.

Sharing of combs, caps, towels and unwashed clothes among school children showed no significant correlation with higher proportion of head lice compared to those who did not. This is inconsistent with other studies that clearly mention that sharing of these articles of clothing showed a higher proportion of head lice infestation in the school children<sup>11,12</sup>. Frankowski & Weiner<sup>12</sup> mentioned that the transmission of head lice by sharing of combs is less likely, but cannot be excluded from consideration. Lice found on combs are likely to be injured or dead<sup>13</sup> and a healthy louse is not likely to leave a healthy head<sup>14</sup>. Therefore, it is plausible that sharing of combs do not necessarily lead to higher proportion of head lice infestation. Studies that have been done in Ghana and Jordan show that the percentage of infestation was higher among those who share combs than single users<sup>6,9</sup>.

Sharing of caps among the school children showed a lower proportion of infestation as compared to those who did not (Table 3). This finding is inconsistent with other findings that clearly mention that sharing of this article of clothing, be it a cap, hat or a headscarf showed a higher proportion of head lice infestation in the school children<sup>11,12</sup>. A study done in which over 1000 hats in four Australian schools were investigated for head lice. No head lice were found

in all these hats and over 5500 head lice were captured from the heads of surveyed students who were wearing the very same hats. Thus, the results were 100% conclusive and found that hats do not sustain head lice transmission<sup>15</sup>.

Table 2 illustrates that head lice infestation is more prevalent in those who do not share either towels or unwashed clothes. Again, this finding is inconsistent with many other findings. In a study done by Bashtawi & Hasna<sup>9</sup>, a strong correlation ( $p < 0.0001$ ) was found between head lice infestation and sharing of either towels or unwashed clothes. This discrepancy in the above findings may be due to the fact that the practice of sharing of unwashed clothes is not one that is frequently done among urban school children.

Proportion of head lice infestation among pupils who change their bed linen as frequent as twice a week (78.9%) was greater than those who changed their bed linen once a week. The changing of bed linen is necessary especially in those who have an active infestation of head lice as it might pose a re-infection threat or transmit those sharing the same bed. To date, no studies have been done on the correlation between the frequency of bed linen change and the proportion of head lice infestation. We suspected that the quality to treat the bed linen after use might not kill the knit or the head lice properly.

It can be seen from Table 3 that those with a good knowledge on head lice had a lower proportion of infestation as compared to those who had a poorer knowledge. Our result was different as another carried out in Malaysia that found that poor knowledge about transmission had association to a higher proportion of head lice infestation<sup>16</sup>. We suspected that in this case, knowledge acquisition could be obtained if some ones already experienced this situation and not the opposite. Thus, pupils with head lice were more motivated to find out any information related to their experience. Perhaps, to help

Table 3: Proportion of head lice infestation in relation to the pupils' knowledge on head lice among urban school children in Yogyakarta

Pupils' knowledge	No.	%	Proportion of Infestation		p-Value
			No.	%	
Excellent (80-100%)	0	0	0	0	0.433
Good (60-79%)	23	14.9	2	8.7	
Average (40-59%)	131	85.1	17	13.0	
Fair (20-39%)	0	0	0	0	
Poor (0-19%)	0	0	0	0	

Table 4: Proportion of head lice infestation in relation to the socio-demographic characteristics of the urban school children in Yogyakarta

Independent variables	No.	%	Proportion of Infestation		P-Value
			No.	%	
<b>Age (years)</b>					0.244
≤ 10	82	52.9	11	13.4	
> 10	73	47.1	8	11.0	
<b>Mother's education</b>					0.428
Received formal education	134	96.4	15	11.2	
No formal education	5	3.6	0	0	
<b>Mother's occupation</b>					0.578
Employed	151	99.3	19	12.6	
Unemployed	1	0.7	0	0	
<b>Father's education</b>					0.470
Received formal education	138	97.2	16	11.6	
No formal education	4	2.8	0	0	
<b>Father's occupation</b>					0.655
Employed	97	63.8	13	13.4	
Unemployed	55	36.2	6	10.9	
<b>Sex</b>					0.018
Male	80	51.6	5	6.3	
Female	75	48.4	14	18.7	

them solve the embarrassing problem.

The infestation of head lice is more prevalent in those who were 10 years and younger as shown in Table 4. Counahan *et. al.*<sup>4</sup> illustrates similar findings, with a lower proportion in pupils older than 10 years as compared to those in the 8 to 10 age group.

Head lice infestation was higher in pupils whose mothers and fathers had received a formal education. The proportion was also higher in those with employed fathers and mothers (Table 4). The education and occupation of the pupils' parents were used as the parameters of socioeconomic status. A study on Iranian school children by Kamiabi & Nakhaei<sup>17</sup> showed higher proportion in those with illiterate fathers and mothers and also in those whose parents were unemployed.

In our study, the parent education had no significant correlation to their children head lice infestation. Under reported head lice in the last two decades caused this problem was never taught in formal or informal class. Therefore, it is common that majority of the parents are never exposed to this topic. It seems that the knowledge related to head lice was lost in one generation. Regarding parents occupation, we suspect that unemployed mother or father took their children more than the employed one. They might also had longer time to communicate with their older people in the family, thus this parent recognize the infestation better than the other group.

There is a higher proportion of head lice infestation among female school children (18.7%) as compared to male school children (6.3%) as shown in Table 4. Here, there is correlation between gender and the proportion of head lice infestation ( $p < 0.05$ ). This is consistent with many other studies<sup>8,16,17</sup>. This may be attributed to the difference in behavior patterns between female and male students. Girls tend to keep

longer hair than boys, and a longer hair length was more prevalent for head lice infestation, as shown by Kamiabi & Nakhaei<sup>17</sup>. School's policies in this region that not allow male students to have long hair also reduce the probability of head lice infestation in this group.

Based on chi squared tests, the relationship between the proportion of head lice infestation and all of the variables examined, except the variable on sex was not statistically significant as none had p-values that were less than 0.05. This may be due to the fact that the number of observations was insufficiently large enough to support the findings as statistically significant. Confounders such as age, sex, hair length and socioeconomic status may have played a role in determining the proportion in each of the variables tested.

## CONCLUSION

The study has revealed that the total proportion of head lice infestation among urban school children in Yogyakarta was 12.3%. There was a significant relationship between infestation and sex. However, the study has also shown no significant relationship between the proportion of head lice infestation with hygiene and knowledge among urban school children in Yogyakarta. Although the proportion of head lice infestation was low among urban school children in Yogyakarta, it might be an iceberg phenomenon as this study only involved two schools and limited subjects. Improved methodology and larger sample size would reveal the real situation of head lice infestation among urban school children in Yogyakarta.

## REFERENCES

1. Ko CJ, Elston DM. Pediculosis. *Journal of the American Academy of Dermatology*. 2004;50(1):1-14.
2. Rook A, Wilkinson DS, Ebling FS. *Textbook*

- of Dermatology. Oxford: Blackwell; 1968 p. 992.
3. Willems S, Lapeer H, Haedens H, Pasteels I, Naryaert JM, Maeseneer J. The importance of socio-economic status and individual characteristics on the proportion of head lice in schoolchildren. *Eur J Dermatol.* 2005;15(5):387-92.
  4. Counahan M, Andrews R, Buttner P, Byrnes G, Speare R. (2004). Head lice proportion in primary schools in Victoria, *Aus J Paediatr Child Health.* 2010;40(11):616-9.
  5. Ogunrinade AF, Oyejide CO. Pediculosis capitis among rural and urban school children in Nigeria. *Transactions of The Royal Society of Tropical Medicine and Hygiene.* 1984;78(5):p590-2
  6. Kwaku-Kpikpi JE. The incidence of head louse (*Pediculus humanus capitis*) among pupils of two schools in Acra. *Transactions of the Royal Society and Tropical Medicine and Hygiene.* 1982;76(3):378-81.
  7. Nada EA, El-Nadi A, Soha H. Epidemiological studies on pediculosis capitis in Sohag governate. *Egyptian Dermatology Online Journal.*2006;2(9):1-6.
  8. Shayegi M, Paksa A, Salim AY, Sanei-Dehkoordi A, Ahmadi A, Eshaghi M, Bazrafkan S. Epidemiology of head lice infestation in primary school pupils in Khajeh city, East Azerbaijan province, Iran. *Iranian J Arthropod-borne Dis.* 2010;4(1):p42-6.
  9. Bashtawi M, Hasna F, 'Pediculosis capitis among primary school children in Mafraq Governate, Jordan' PhD thesis, Philadelphia University. 2010.
  10. Koch, T. Brown, M. Selim, P. & Isam, C. Towards the eradication of head lice: literature review and research agenda. *Journal of Clinical Nursing.* 2001;10(3):364-71.
  11. Rodina MS. *Pediculus capitis*, infestation according to sex and social factors in Gaza Governorate. *The Islamic University Journal (Series of Natural Studies and Engineering).* 2008;16(1):75-83.
  12. Frankowski BL, Weiner LB. Head lice. *American Academy of Pediatrics.* 2002;110(3):638-43.
  13. Chung RN, Scott FE, Underwood JE, & Zavarella KJ. A pilot study to investigate transmission of head lice. *Can J Public Health.* 1991;82(1):207-8.
  14. Maunder JWHuman lice: some basic facts and misconceptions. *Bull Pan Am Health Org.* 1985;19(1):194-7.
  15. Speare R & Buettner P. Hard data needed on head lice transmission. *International Journal of Dermatology.* 2000;39(1):877-8.
  16. Bachok N, Nordin R, Awang CW, Ibrahim NA, Naing L. Proportion and associated factors of head lice infestation among primary schoolchildren in Kelantan, Malaysia. *Southeast Asian J Trop Med Public Health.* 2006;37(3):536-43.
  17. Kamiabi F, Hosain-Nakhaei F. Proportion of pediculosis capitis and determination of risk factors in primary-school children in Kerman. *La Revue de Sante de la Mediterranee orientale.* 2005;11(5):988-92.