



Prevalence and Associated Factors of Head Lice (*Pediculosis capitis*) Among Primary School Students in Varzaqan Villages, Northwest of Iran

Maryam Sepehri^{1,2,*} and Zahra Jafari²

¹Health Management and Safety Promotion Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran

²Department of Community and Family Medicine, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

*Corresponding author: Department of Community and Family Medicine, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran. Email: maryam_sepehri@hotmail.com

Received 2020 April 22; Revised 2020 December 19; Accepted 2021 January 20.

Abstract

Background: Pediculosis capitis or head lice infestation is one of the most critical public health problems, primarily involving primary school children.

Objectives: This study aimed to determine the prevalence of *Pediculus capitis* contamination among primary school students in the villages of Varzaqan city, East Azerbaijan province, Iran, in 2020.

Methods: Overall, 400 primary school students aged 7-12 were selected through convenience sampling. First, a demographic checklist was filled out for each participant, and then hair examination was carried out individually and privately to detect head lice or eggs/nits. The data analysis was performed using descriptive (frequency and percentage) and analytical methods, including chi-square and t-tests (SPSS, version 16). A P-value of less than 0.05 was considered significant.

Results: Of 400 students, 41 (10.3%) were infested with *P. capitis*. The prevalence rate significantly differed between boys (6.2%) and girls (14.8%). There was a significant association between pediculosis and mother's education, father's job, family income, history of infestation, number of combs per day, and frequency of hair washing per week.

Conclusions: According to the prevalence of head lice in primary school children, we need to increase the awareness and train children, parents, and teachers through further cross-sectoral cooperation between education and health centers. Also, the presence of a hygiene teacher at school to improve the health status of students can significantly reduce the prevalence of pediculosis.

Keywords: Head Lice, Primary School, Prevalence, *Pediculus*

1. Background

Human head lice (*Pediculus humanus capitis*) is one of the important lice species that only infects the human scalp (1). Head lice contamination is spread abroad parasitic contamination that causes serious health problems in many communities, particularly among school children (2). Pediculosis is a significant health problem in countries with fewer health standards (3). These human ectoparasites are transmitted mainly through direct head-to-head contact and indirect contact by sharing personal objects such as hats, combs, brushes, and scarves (4, 5). The primary sign of head lice infestation is severe itching because of lice feeding on the host scalp and neck area, subsequently leading to secondary bacterial infection (3, 6). It may lead to psychological and social problems and academic failure in children (7). Various head lice prevalence

rates have been reported in children around the world, such as 67.5% in Ethiopia (8), 26.6% in Jordan (9), and 23.2% in Thailand (10).

Several studies from different areas of Iran have reported various rates of head lice infestation. For example, a systematic review by Moosazadeh et al. reported a prevalence of 7.4% in primary school students (11). Other studies have shown different rates, including 10.5% in Khuzestan (12), 29.35% in Qom (13), 3.2% in Kormanj, North Khuzestan (3), 5.7% in Galugah, Mazandaran province (14), and 4.8% in Khaje, East Azerbaijan province (15). Also, Ziaoddini et al. showed an annual prevalence of head lice in East Azerbaijan province from 1.12% in 2014 to 6.70% in 2018 (16). In addition, some studies showed significant risk factors including prior infestation, number of combs per day, frequency of bathing, presence of a health teacher, sharing personal objects, knowledge of pediculosis, and the distance be-

tween children in each class (14), as well low parental literacy, long hair, number of family members, mother's job (housewife), father's job (worker/unemployed), using a common comb, lack of bathrooms at home, and low frequency of showering (11). Its prevalence also depends on the season, detection method, founding of head lice infestation or existence of nits, and the effectiveness of pediculicides (17).

2. Objectives

Due to the prevalence of head lice infestation in different areas, we need to improve the community's health and help regional policymakers and health providers. Therefore, the present study was conducted to determine the prevalence of *P. h. capitis* and related factors in primary school children in the villages of Varzaqan city in the Northwest of Iran.

3. Methods

This primary school-based, cross-sectional study was conducted in Varzaqan villages in the northwest of Iran from December 2019 to January 2020. The study was conducted among 400 boys and girls between 7 and 12 years old from 26 primary schools selected through convenience sampling in rural regions. The sample size was calculated using Cochran's formula of $n = \frac{z^2 pq}{d^2}$ in which $z = 1.96$ (3), $P = 0.5$, and $d = 0.05$. The consent of students and their parents to participate in the study and being a primary school student were the study's inclusion criteria. Students from other grades were excluded. The information was collected in two parts: demographic data and health examination results. A family doctor examined the participants' scalps and hair individually under the flashlight for all life cycle stages of head lice (such as nites/eggs, nymph, or adult lice). Also, a demographic checklist (with 13 questions) recorded the data on age, gender, school grade, parents' jobs, parents' literacy, number of combs per day, previous lice infestation, frequency of bathing per week, bathroom at home, family income, and presence of a health educator in school. The data analysis was performed using descriptive (frequency and percentage) and analytical methods, including chi-square and *t*-tests (SPSS software, version 16). A P-value of less than 0.05 was considered significant.

The Ethics Committee of Tabriz University of Medical Sciences approved the present investigation (Permit No. IR.TBZMED.REC.1398.863). However, written consent was obtained from all participants' legal guardians after being thoroughly informed of the study.

4. Results

Overall, 400 primary school students from 26 elementary schools (with 949 students) of 11 villages were included in this study. Most participants were boys (52.8%), and all of them lived in rural areas. The overall head lice infestation rate was 10.3% ($n = 41$), including 14.8% ($n = 28$) in girls and 6.2% ($n = 13$) in boys. There was a significant relationship between the pediculosis prevalence and gender of students ($P < 0.05$). The prevalence of head lice infestation was higher in children who had mothers with low educational levels ($P = 0.001$). On the other hand, the father's job had a significant relationship with pediculosis ($P = 0.001$). Also, pediculosis had significant relationships with factors such as a history of infestation ($P = 0.001$), the presence of a bathroom at home ($P = 0.002$), household income ($P = 0.001$) (Table 1), bathing per week ($P = 0.001$), and the number of combs per day ($P = 0.001$) (Table 2). Unfortunately, none of the schools in the study had a health teacher.

5. Discussion

Despite advances in health and medical science, head lice continues to be a public health problem in poor and developing countries (13). In the present study, the total prevalence of *P. capitis* among primary school children in the rural regions of Varzaqan city was 10.3%. As known, *P. capitis* is an infestation that often affects children. Depending on the socioeconomic status, these infestations may affect a large portion of a population (12). Previous epidemiological studies have shown various rates of head lice infestation in different countries, such as 3.3% in France (18), 5.3% in Australia (19), 87% in Pakistan (20), 23.2% in Thailand (10), 16.7% in Egypt (21), 4.1% in Korea (22), 13.5% (23) and 13.1% in Turkey (17). Various studies from different regions of Iran have shown different prevalence rates, from 0.47% in Isfahan in 2003 to 23.9% in Hormozgan in 2007 and 27% in Sistan and Baluchestan (1). According to previous studies, the prevalence of infestation is usually higher in rural areas (12, 13, 24), which could be due to better social, economic, and educational status in urban areas (24). It may also be related to better hygiene because there is often a health teacher in urban schools (12).

Similar to previous studies in Iran and other parts of the world (9, 11-14, 17), the findings of this study showed that the prevalence of pediculosis was more than two folds higher in schoolgirls than in schoolboys. This significant difference could be related to different behavioral patterns between boys and girls, such as long hair in girls that need better care and combing; besides, female hair is probably a suitable place for head lice because of covering with a

Table 1. Socio-demographic Variables of Study Subjects and Prevalence of Pediculosis Capitis Among Primary Schools of Varzaqan City, Iran, 2020

Variables	Total	Pediculosis Capitis Frequency, No. (%)	P-Value
Gender			0.004
Female	189	28 (14.8)	
Male	211	13 (6.2)	
Educational grade			0.660
I	44	7 (16)	
II	61	7 (11.5)	
III	66	6 (9)	
IV	93	11 (11.8)	
V	91	7 (7.7)	
VI	45	3 (6.6)	
Mother's education			0.001
Illiteracy	60	16 (39)	
Primary school	188	13 (31.7)	
Secondary school	96	6 (14.6)	
Diploma	54	6 (14.6)	
Father's education			0.780
Illiteracy	10	1 (2.4)	
Primary school	87	8 (19.5)	
Secondary school	222	16 (39)	
Diploma	165	15 (36.6)	
University education	16	1 (2.4)	
Mother's occupation			0.780
Unemployed	380	38 (10)	
Self-employed	15	3 (20)	
Teacher	2	0	
Father's occupation			0.001
Unemployed	6	3 (50)	
Worker	180	25 (13.8)	
Self-employed	197	10 (5)	
Teacher	3	0	
Employee	14	3 (21.4)	
History of infestation			0.001
Yes	29	12 (41.3)	
No	371	29 (7.8)	
Bathroom at home			0.001
Yes	385	35 (9)	
No	15	6 (40)	
Household income			0.001
Under 73 \$	49	16 (39)	
73 - 219 \$	282	23 (56.1)	
More than 219 \$	59	2 (4.9)	

scarf (12, 13). In the present study, socioeconomic factors such as mother's education level, father's job, and family income had a significant association with head lice infestation. On the other hand, the infestation was related to personal health habits like a history of infestation, low frequency of bathing, and combing hair. Several studies have shown relationships between socioeconomic status and head lice (11-14).

Our findings suggested a lower infestation rate in students with educated mothers, which may be due to the knowledge of pediculosis. Besides, educated mothers may have a more positive attitude and knowledge about hygiene. In general, higher education levels of parents can lead to more appropriate health behaviors in the family, which is supported by other studies (14, 24).

According to a third Turkish school survey, the rate of pediculosis was more common among students with a prior personal and family infestation. However, the frequency of bathing and using a common comb did not affect the prevalence of head lice (17). Another study conducted in Turkey showed that female gender, living with three or more siblings, and low parental literacy levels were risk factors of infestation (25). According to a cross-sectional study in Jordan in 2012, pediculosis was significantly related to sex, living in rural areas, a history of infestation, low income, long hair, lack of a bathroom, low frequency of bathing, and hair washing (9). A cross-sectional study in Mexico showed low income and low frequency of hair washing as risk factors for head lice infestation (26), which is consistent with the present study. This study showed that pediculosis is still a significant health problem in low socioeconomic regions.

This research had some limitations. It was conducted in a limited area and used a convenience sampling method that may have affected the generalizability of the results.

5.1. Conclusions

Since the contamination rate was high in the present study, we require special attention and operational planning. Nearly all related factors had socioeconomic, cultural, and behavioral backgrounds. Many of these factors are easily preventable by establishing and maintaining appropriate health behaviors through comprehensive and continuous training and overseeing. Therefore, we can defeat this public health problem by proper planning for treating and following up infected students and continuous and periodic training of students and their parents about transmission and prevention methods.

Table 2. Socio-demographic Variables of Study Subjects^a

Variables	Pediculosis Capitis Infestation		P-Value
	Yes	No	
Age	9.34 ± 1.54	9.65 ± 1.51	0.210
Bathing per week	1.36 ± 0.48	2.4 ± 0.85	0.001
Number of combs per day	1.34 ± 0.65	2.17 ± 0.56	0.001

^a Values are expressed as mean ± SD.

Acknowledgments

The authors would like to thank all participants, students, their parents, school staff, and the Social Determinants of Health Research Center of Tabriz University of Medical Sciences. There is no conflict of interest in this study.

Footnotes

Authors' Contribution: Study concept and design: Maryam Sepehri and Zahra Jafari; Data collection: Zahra Jafari; Analysis and interpretation of data: Maryam Sepehri and Zahra Jafari; Drafting of the manuscript and critical revision: Maryam Sepehri.

Conflict of Interests: There is no conflict of interest in this study.

Ethical Approval: The Ethics Committee of Tabriz University of Medical Sciences approved the present investigation (Permit No. IR.TBZMED.REC.1398.863).

Funding/Support: There was no funding for this research.

Informed Consent: Written consent was obtained from all participants' legal guardians after being thoroughly informed about the study.

References

- Service M. *Medical entomology for students*. 4th ed. Cambridge Cambridge University Press; 2008.
- Moradi A, Bathaie SJ, Shojaeian M, Neshani A, Rahimi M, Mostafaei E. Outbreak of pediculosis capitis in students of Bahar in Hamedan province. *J Cosmet Dermatol*. 2012;3(1):26-32.
- Firoozfar F, Moosa-Kazemi SH, Bahrami A, Ahmed Yusuf M, Saghaipour A, Armoon Z, et al. Head Lice Infestation (Pediculus humanus capitis) Prevalence and Its Associated Factors, Among The Kormanj Tribes in North Khorasan Province. *Shiraz E-Med J*. 2018;20(4):1-6. doi: [10.5812/semj.80292](#).
- Saghaipour A, Zahraei-Ramazani A, Vatandoost H, Mozaffari E, Rezaei F, KaramiJooshin M. Prevalence and risk factors associated with head louse (Pediculus humanus capitis) among primary school girls in Qom province, Central Iran. *Int J Pediatr*. 2018;6(4):7553-62.
- Kumar S, Preetha G. Health promotion: An effective tool for global health. *Indian J Community Med*. 2012;37(1):5-12. doi: [10.4103/0970-0218.94009](#). [PubMed: [22529532](#)]. [PubMed Central: [PMC3326808](#)].
- Dodd C. Treatment of head lice. *Br Med J*. 2001;323(7321):1084. doi: [10.1136/bmj.323.7321.1084](#). [PubMed: [11701562](#)]. [PubMed Central: [PMC1121589](#)].
- Doroudgar A, Sadr F, Sayah M, Doroudgar M, Tashakor Z, Doroudgar M. The prevalence and associated factors of head lice infestation in primary school children in Aran and Bidgol City (Isfahan Province). *Payesh*. 2011;10(4):439-47.
- Dagne H, Biya AA, Tirfie A, Yallew WW, Dagne B. Prevalence of pediculosis capitis and associated factors among schoolchildren in Woreta town, northwest Ethiopia. *BMC Res Notes*. 2019;12(1):465. doi: [10.1186/s13104-019-4521-8](#). [PubMed: [31362792](#)]. [PubMed Central: [PMC6668114](#)].
- AlBashtawy M, Hasna F. Pediculosis capitis among primary-school children in Mafraq Governorate, Jordan. *East Mediterr Health J*. 2012;18(1):43-8. doi: [10.26719/2012.18.1.43](#). [PubMed: [22360010](#)].
- Rassami W, Soonwera M. Epidemiology of pediculosis capitis among schoolchildren in the eastern area of Bangkok, Thailand. *Asian Pac J Trop Biomed*. 2012;2(11):901-4. doi: [10.1016/s2221-1691\(12\)60250-0](#).
- Moosazadeh M, Afshari M, Keianian H, Nezammahalleh A, Enayati AA. Prevalence of Head Lice Infestation and Its Associated Factors among Primary School Students in Iran: A Systematic Review and Meta-analysis. *Osong Public Health Res Perspect*. 2015;6(6):346-56. doi: [10.1016/j.phrp.2015.10.011](#). [PubMed: [26835244](#)]. [PubMed Central: [PMC4700766](#)].
- Nejati J, Keyhani A, Tavakoli Karesheh A, Mahmoudvand H, Saghaipour A, Khoramnasab M, et al. Prevalence and risk factors of pediculosis in primary school children in South West of Iran. *Iran J Public Health*. 2018;47(12-9):1923.
- Saghaipour A, Nejati J, Zahraei Ramazani A, Vatandoost H, Mozaffari E, Rezaei F. Prevalence and risk factors associated with head louse (Pediculus humanus capitis) in Central Iran. *Int J Pediatr*. 2017;5(7):5245-54.
- Kassiri H, Esteghami E. Prevalence Rate and Risk Factors of Pediculus capitis Among Primary School Children in Iran. *Arch Pediatr Infect Dis*. 2015;4(1). doi: [10.5812/pedinfect.26390](#).
- Shayeghi M, Paksa A, Salim Abadi Y, Sanei Dehkoordi A, Ahmadi A, Eshaghi M. Epidemiology of head lice infestation in primary school pupils, in khajeh city, East Azerbaijan province, Iran. *J Arthropod Borne Dis*. 2010;4(1):42-6.
- Ziaoddini A, Riahi R, Heidari-Beni M, Ziaoddini H, Zamani S. National and Provincial Prevalence of Pediculus humanus capitis among Urban Students in Iran from 2014 to 2018. *J Res Health Sci*. 2019;19(4).
- Gulgun M, Balci E, Karaoglu A, Babacan O, Turker T. Pediculosis capitis: prevalence and its associated factors in primary school children living in rural and urban areas in Kayseri, Turkey. *Cent Eur J Public Health*. 2013;21(2):104-8. doi: [10.2101/cejph.a3750](#). [PubMed: [24053067](#)].
- Durand R, Millard B, Bouges-Michel C, Bruel C, Bouvresse S, Izri A. Detection of pyrethroid resistance gene in head lice in schoolchildren from Bobigny, France. *J Med Entomol*. 2007;44(5):796-8. doi: [10.1603/0022-2585\(2007\)44\[796:doprgi\]2.0.co;2](#). [PubMed: [17915510](#)].

19. Currie MJ, Reynolds GJ, Glasgow NJ, Bowden FJ. A pilot study of the use of oral ivermectin to treat head lice in primary school students in Australia. *Pediatr Dermatol*. 2010;**27**(6):595–9. doi: [10.1111/j.1525-1470.2010.01317.x](https://doi.org/10.1111/j.1525-1470.2010.01317.x). [PubMed: [21138467](https://pubmed.ncbi.nlm.nih.gov/21138467/)].
20. Saddozai S, Kakarsulemankhel JK. Infestation of head lice, *Pediculus humanus capitis*, in school children at Quetta city and its suburban areas, Pakistan. *Pak J Zool*. 2008;**40**(1):45–52.
21. Abd El Raheem TA, El Sherbiny NA, Elgameel A, El-Sayed GA, Moustafa N, Shahan S. Epidemiological comparative study of pediculosis capitis among primary school children in Fayoum and Minofiya governorates, Egypt. *J Community Health*. 2015;**40**(2):222–6. doi: [10.1007/s10900-014-9920-0](https://doi.org/10.1007/s10900-014-9920-0). [PubMed: [25086565](https://pubmed.ncbi.nlm.nih.gov/25086565/)].
22. Oh JM, Lee IY, Lee WJ, Seo M, Park SA, Lee SH, et al. Prevalence of pediculosis capitis among Korean children. *Parasitol Res*. 2010;**107**(6):1415–9. doi: [10.1007/s00436-010-2016-6](https://doi.org/10.1007/s00436-010-2016-6). [PubMed: [20683614](https://pubmed.ncbi.nlm.nih.gov/20683614/)].
23. Karakus M, Arici A, Toz SO, Ozbel Y. Prevalence of head lice in two socio-economically different schools in the center of Izmir City, Turkey. *Turkiye Parazitolo Derg*. 2014;**38**(1):32–6. doi: [10.5152/tpd.2014.3447](https://doi.org/10.5152/tpd.2014.3447). [PubMed: [24659699](https://pubmed.ncbi.nlm.nih.gov/24659699/)].
24. Sanei-Dehkordi A, Soleimani-Ahmadi M, Zare M, Madani A, Jamshidzadeh A. Head Lice Infestation (pediculosis) and associated factors among primary school girls in Sirik County, Southern Iran. *Int J Pediatr*. 2017;**5**(12):6301–9.
25. Degerli S, Malatyali E, Mumcuoglu KY. Head lice prevalence and associated factors in two boarding schools in Sivas. *Turkiye Parazitolo Derg*. 2013;**37**(1):32–5. doi: [10.5152/tpd.2013.08](https://doi.org/10.5152/tpd.2013.08). [PubMed: [23619043](https://pubmed.ncbi.nlm.nih.gov/23619043/)].
26. Manrique-Saide P, Pavia-Ruz N, Rodriguez-Buenfil JC, Herrera Herrera R, Gomez-Ruiz P, Pilger D. Prevalence of pediculosis capitis in children from a rural school in Yucatan, Mexico. *Rev Inst Med Trop Sao Paulo*. 2011;**53**(6):325–7. doi: [10.1590/s0036-46652011000600005](https://doi.org/10.1590/s0036-46652011000600005). [PubMed: [22183456](https://pubmed.ncbi.nlm.nih.gov/22183456/)].