

Prevalence of Pediculosis and Associated Risk Factors among Elementary School Females in Mashhad, Iran, during 2017-2018

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A-R-T-I-C-L-E-I-N-F-O

Article Notes:

Received: Oct 26, 2019

Received in revised form:

Jan 05, 2020

Accepted: Jan 05, 2020

Available Online: Jan 27, 2020

Keywords:

Epidemiology

Lice Infestations

Risk Factors

Schools

A-B-S-T-R-A-C-T

Background & Aims of the Study: Pediculosis is a parasitic disease and one of the main factors affecting the health level of the society. The present study aimed to determine the risk factors associated with the prevalence of pediculosis in elementary school females in Mashhad, Iran, from 2017 to 2018.

Materials and Methods: This descriptive and analytical study included 3062 elementary school female students who were selected by a multistage systematic random sampling in Mashhad, Iran. Experienced health experts examined the students for the presence of nits or live lice. Demographic information form was employed to collect data on gender, place of residence, and others. The data were analyzed in SPSS software (version 18.0) through a Chi-square analysis. A P-value less than 0.05 was considered statistically significant.

Results: Out of 3062 elementary school females, 417 cases were infected with pediculosis and the average infection rate of 13.6%. The results showed that head lice infestation was significantly correlated with factors, such as age, school grade, sleeping in a common room, using shared personal instruments, personal health care, parents' educational level, and hair shape ($P < 0.05$). On the other hand, head lice infestation was not significantly correlated with health expert presence at schools, family size, and fathers' occupational status ($P > 0.05$).

Conclusion: The enhancement of standards for personal health and raising the awareness of teachers and parents about the prevention methods and risk factors associated with pediculosis can significantly reduce the prevalence of this infection among female school children in the regions under study.

Please cite this article as: Mohammadi ME, Motevalli Haghi SF, Rafinejad J, Yazdani Charati J, Hosseini Vasoukolaei N, Dehghan O. Prevalence of Pediculosis and Associated Risk Factors among Elementary School Females in Mashhad, Iran, during 2017-2018. Arch Hyg Sci 2019;8(4):245-252

Background

Head lice infestation is a public health issue leading to apparent morbidity among school

children worldwide. This infection is caused by an ectoparasite (i.e., *Pediculus humanus capitis*) of humans found on the hair and belongs to the order Anoplura (1). The head louse cannot fly or jump, and therefore, it is commonly

transmitted through physical or direct contact with the hat, scarf, comb, bedding, and clothing of the infected person (1, 2). In addition, it is not a disease vector; however, it sucks human blood for its nourishment, and therefore, leads to head itching, irritations, discomfort, sleep loss, and the pruritus secondary bacterial infections, such as impetigo. Furthermore, its saliva may lead to allergy and other psychological effects that hinder students from attending school (3).

The head lice infestations caused by *pediculus capitis* are often associated with poor communities in neglected conditions leading to considerable health problems in many societies, especially among children between 3 and 14 years of age (4). Epidemiologic studies indicated that the prevalence rates of pediculosis were 6.8%, 26.6%, 23.32%, and 26.4% in Turkey (5), Jordan (6), Thailand (7), and Nigeria (8), respectively. In the United States, 6-12 million people are infested every year with an estimation of \$100 million being spent annually on the treatment (9).

Some investigations have been conducted in Iran on the epidemiology of the head louse and its related risk factors. Several studies from various regions in Iran have reported the rates of head lice infestation varying between 28.5% and 0.47% (10). However, previous studies conducted in different areas in Iran showed the infestation rates of 0.7%, 10.25%, and 12% mostly in the school children in Kashan, Meshkinshahr, and Boushehr, respectively (11-13).

Pediculosis is a public health problem in different countries. The factors related to the host that can be associated with head lice prevalence include race, age group, gender, socioeconomic status, and hair characteristics. Given that Mashhad attracts plenty of international tourists and pilgrims every year, it is of utmost importance to investigate the risk factors influencing pediculosis. This study was conducted to determine the pediculosis

prevalence rate and the effective factors in the elementary school-aged female students in Mashhad, Iran, from 2017 to 2018. The obtained results can be used to develop programs in order to manage the prevalence of this condition among elementary schools across Iran.

Materials & Methods

This study was conducted based on a descriptive and analytical design. In total, 20 state elementary schools were selected randomly from all districts in Mashhad, Iran. Out of these schools, 3062 female students were selected using a multistage-systematic random sampling. All students (first- to sixth-grade students) were examined for head lice infestation by health experts. Furthermore, the diagnosis of pediculosis capitis was confirmed by clinical inspection of scalp and hair under the light of a reading lamp using a manual magnifier for the presence of adult lice, or eggs (i.e., nits). Before examining the students, demographic characteristics form covering information, such as age, school grade, sleeping in a common room, using shared personal instruments, personal health care, family size, parents' educational level, parents' occupational status, and hair shape, were recorded for each student (14).

Data Analysis

The data were analyzed in SPSS software (version 11.0). Moreover, the Chi-square test was used to compare the qualitative variables. A P-value less than 0.05 was considered statistically significant.

Ethical Considerations

With respect to the ethical considerations, written informed consent was obtained from all participants. Moreover, they were informed about the confidentiality of their information.

Results

Out of 3062 elementary school students, 417 (13.6%) cases were identified infested with head lice. The results obtained from the relationship between fathers' occupational status and head lice infestation rate revealed that the students whose fathers were unemployed (17.1%) obtained the highest rate

of infestation. On the other hand, the lowest rate of infestation was observed among those whose fathers had a government job (10.3%). However, this difference was not statistically significant ($P=0.14$, Table 1). Regarding the family size, the majority of the students with head lice infestation were from families with 2 members; however, there was no statistically significant difference between family size and the infestation rate (Table 1).

Table 1) The relation between the pediculosis and demographic characteristics of the elementary students in Mashhad, Iran

Maslamah, Iran							
Population	Infected		Non-infected		(P-value)	Df	X2
	Number	%	Number	%			
Age (year)							
1	91	20	364	80	0.0001	6	32.205
2	57	11.1	458	88.9			
3	80	15.2	447	84.8			
4	77	14.5	453	85.5			
5	48	11.1	383	88.9			
6	63	11.7	475	88.3			
7	1	1.5	65	98.5			
Total	417		2645				
School grades							
1st	95	20	380	80	0.0001	5	30.352
2nd	53	10.4	459	89.6			
3rd	84	16	442	84			
4th	74	14.1	452	85.9			
5th	47	10.6	396	89.4			
6th	64	15.34	516	89			
Total	417		2645				
Fathers' occupational status							
Unemployed	45	17.1	218	82.9	0.14	3	5.411
Business man	329	13.5	2116	86.5			
Government job	43	10.30	311	87.8			
Total	417		2645				
Fathers' educational level							
Illiterate	48	17.5	239	85.5	0.007	4	13.943
Under diploma	273	14.6	1598	85.4			
Diploma	79	10.6	665	89.4			
Academic degree	17	10.7	143	89.3			
Total	417		2645				
Family size (member)							
2	6	24	19	76	0.06	5	10.609
3	63	18.1	286	81.9			
4	174	13.3	1132	86.7			
5	101	11.9	751	88.1			
6	46	14.2	278	85.8			
7 and more	27	13.1	179	86.9			
Total	417		2645		P=0.0001	1	160.456

Table 2) Relationship between the pediculosis and the questionnaire variables in Mashhad, Iran

Population	Infected		Non-infected		(P-value)	Df	X2
	Number	%	Number	%			
Health expert presence							
No	279	14.2	1679	85.8	0.175	1	0.836
Yes	138	12.5	966	87.5			
Total	417		2645				
Mother's educational level							
Illiterate	62	17.5	237	82.5	0.0007	4	13/943
Under diploma	282	14.6	1581	85.4			
Diploma	54	10.6	680	89.4			
Academic degree	19	10.7	111	89.3			
Total	417		2645				
Sleeping in a common room							
Yes	280	15.5	1530	84.5	0.0001	1	12.893
No	137	10.9	1115	89.1			
Total	417		2645				
Hair shape							
Straight	358	14.4	2129	85.6	0.0001	1	6.715
Curly	59	10.3	516	89.7			
Total	417		2645				
Personal health care							
Yes	331	11.5	2553	88.5	0.0001	1	193.392
No	86	48.3	92	51.7			
Total	417		2645				
Using shared instruments							
Yes	341	81.77	2361	71.4	0.0001	1	19.441
No	76	18.23	284	78.9			
Total	417		2645				

On the other hand, a significant difference was observed between age groups and school grades regarding the prevalence of pediculosis among students ($P=0.0001$, Table 1). Furthermore, the health expert presence at school was not correlated significantly with the prevalence of head lice infestation among schoolchildren ($P=0.175$). The pediculosis prevalence rates at schools with and without health experts were 87.5% and 85.8%, respectively.

Additionally, the rates of infestation among students using shared and non-shared personal instruments (i.e., combs and scarf) were 81.77% and 18.23%, respectively (Table 2). There was a significant difference between the prevalence rate of pediculosis and using shared instruments ($P=0.0001$). Furthermore, a significant difference was observed between the prevalence of pediculosis and parents'

educational level ($P<0.05$, Table 2). In the present study, the rates of infestation with and without considering the personal hygiene were obtained at 11.5% and 48.3%, respectively, which was statistically significant ($P<0.05$, Table 2). Similarly, Table 2 depicts a significant relationship between the prevalence of pediculosis and the hair shape ($P<0.05$).

Discussion

Despite the advances in hygiene practices in communities, pediculosis still remains the main health concern in poor and developing countries. Previous studies indicated the presence of pediculosis in different areas of Iran (14). In this study, the prevalence rate of pediculosis was estimated at 13.6% among children in Mashhad. Similar relevant studies

reported the pediculosis prevalence rates among elementary schools in different parts of Iran, such as Mazandaran (5.7%) (15), Hamadan (1.3%) (16), and Sanandaj (7.7%) (17). According to the results of a systematic review study in Iran, the prevalence rate of pediculosis was estimated at 9% among female schoolchildren (18).

In a similar vein, the findings in the present study revealed that the prevalence of pediculosis was higher in Mashhad, compared to other cities in Iran. This significant difference can be attributed to the increasing rate of migration, the emergence of marginal communities, and the lack of proper health education in Mashhad, Iran. In this study, the prevalence rate of head lice infestation correlated with the age groups and the school grades. Several investigations revealed the differences between the infestation rates and the age groups (age range: 6-13 years) (13,19). This difference may be due to the increased awareness of the students in higher school grades regarding health issues and their observance of personal hygiene to prevent the spread of infectious diseases.

The findings also suggested a decrease in the rate of infestation among the children of employed and educated parents since they had greater knowledge and attitude regarding personal hygiene and pediculosis. In general, a higher level of the parents' education led to more suitable health behavior throughout the family, which is consistent with the finding of other studies (20). In this study, the rate of pediculosis infestation was lower in families with 2 persons.

Head lice are considered as well-known obligate ectoparasites of mammals, especially humans, and they spread by direct contact from person to person (21). Therefore, the prevalence of pediculosis is expected to be higher in crowded families. In a similar study conducted in Belgium, the lice infestation rate was significantly increased in families of low

socioeconomic status, individuals with large families, and those with long hair (22). Parents of large families are less likely to pay attention to their children's health status, which in turn increases the prevalence of pediculosis. Furthermore, the larger the family size, the more the utilization of shared personal belongings.

According to the current study, there was a significant relationship between the hair shape (i.e., long straight and tangled hair) and infection rate since this type of hair is brushed with difficulties. On the other hand, wearing scarves with long hair can provide the temperature needed for the growth of this insect. This can be one of the reasons for the increase in head lice among females who have long straight hair.

In this study, no significant relationship has been found between the pediculosis and the hairstyle, which is in line with the results of a study conducted by Doroodgar *et al.* In the aforementioned study, 88.2% and 11.8% of the cases had straight and curly hair, respectively (20), which was in line with the findings obtained from this study.

The majority of the students with head lice infestation had a history of using shared instruments in the present study. This finding was significant and consistent with the results of studies performed by Wafa and AL-Megrin (2015) and Dehghanzadeh *et al.* (2015) in which they reported the effect of using shared instruments at homes and schools on the increased rate of pediculosis (23, 24). Head lice generally spread through direct transmission via head-to-head contact with an infected person or indirect transmission by sharing common instruments.

Considering the obtained results, a statistically non-significant difference was noticed among the students in primary schools with and without health experts though the presence of health experts at elementary schools plays a crucial role in the reduction of

pediculosis rate. It seems that health experts do not have sufficient knowledge about pediculosis. However, this finding is not consistent with the results of a study conducted by Jahandideh (25).

In the present study, no significant relationship was observed between the hair condition and lice infestation rate, which was in line with the findings reported by Soultana *et al.* (26) and inconsistent with the results of a study carried out by Rafinejad *et al.* (27). The results of the present study are in accordance with those of the previous findings indicating that good hair care and personal hygiene will go a long way in reducing the prevalence of lice infestation (14, 28).

Previous studies have shown that regular brushing with the wooden fine-toothed comb has mostly been used as a physical preventive method that not only reduced the prevalence of the infestation but also healed it (29). According to the results of this study, sleeping in a common room was one of the factors contributing to the infestation rate, and the pediculosis rate was higher among students living in large families. It is worth mentioning that as soon as a family member is infested, the other family members have a high risk of getting infested due to using shared instruments (30).

Conclusion

It is necessary to provide parents, teachers, and students with health education and prevention methods regarding the management of pediculosis capitis through holding workshops and training sessions to reduce the prevalence rate of this infection.

Footnotes

Acknowledgements

The authors would like to thank the staff of

the health and treatment office in Mashhad, Iran, as well as the health experts at schools, officials, and staff of the Ministry of Education in Mashhad, Iran. Moreover, the authors show their sincere gratitude to school principals and teachers for their cooperation with conducting this study.

Funding

The study protocol was approved under approval No. 10204. Moreover, this study was conducted and financially funded by Mazandaran University of Medical Science, Sari, Iran.

Conflict of Interest

The authors declare that they have no conflict of interest regarding the publication of this study.

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