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Research Article

The evaluation of epidemiological and clinical characteristics of head lice in North of Iran

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ABSTRACT

Head lice infection is the most common type of infection with external parasites among children. This study was conducted to investigate the prevalence of pediculosis from 2012 to 2020 in Mazandaran province. In this descriptive study, available data in the health system of Mazandaran province was used. The collected data were analyzed by SPSS software version 22. The total number of subjects was 247678. Out of 247678 people, 246077 (99.3%) had at least one type of head, body or pubic lice. Of the total number of people with head lice, 244,957 (99.5%) had head lice. People aged 6-13 years with a frequency of 116330 (47.2%) had the highest frequency, which was significantly higher than other groups (P-value <0.001). The prevalence in the city of Sari was significantly more than other cities (P-value <0.001). Frequency ratio in males in the two age groups including less than 6 years of age and aged 6–13 years was higher than female while in other two groups it was not. Therefore, in the 13-year-olds, the prevalence of patients was higher in males, but in olders prevalence in females is significantly higher (P-value <0.01). In addition, most females and villagers had head-lice. Personal hygiene, access to health care services and periodic examinations will be effective in preventing this disease.

1. Introduction

The development of any society depends on the public health of individuals; thus, the public health of any society is of special importance. Infection by insects, especially human parasites, is among one of the threats to public health which are still a health problem (Organization., 2014). Head lice are brown or gray wingless

insects that have been widely migrated to different parts of the world from 9000 years ago. These insects have a soft, relatively leathery body that is flat on the dorsal surface of the abdomen (Clark., 2021). The presence of lice on the body is called pediculosis. In humans, three types of head, body and crab lice cause

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pediculosis. Head lice is the most common type of infection among children (Clark., 2021, Woods et al., 2022). The disease is usually transmitted through direct contact between the patient's head with a healthy person or the use of the patient's personal equipment (Leung et al., 2022). After transmission, the adult parasite lives for one to two months. The adult female lays 5-10 eggs per day for its one-month life, which attach to the hair shaft near the scalp at a suitable temperature and humidity resembling white particles looking like dandruff. The lice eggs attach mainly around temples, above the ears and behind the neck, and do not separate easily (Baghdadi et al., 2021). After 7 days, the lice hatch from the eggs and turn into adult lice in 3 times of scaling. Eggs live near the scalp or at a distance of 3-4 cm, but those that are farther from the scalp are usually empty of a live embryo and cannot transmit the infection (Abdulrahman and Sharif., 2021). In people with head lice, Due to the injection of protein in the saliva of the insect the direct effects of lice bites emerge in the form of host irritation, sensitivity and fatigue appear. Frequent injections of lice saliva may cause acute allergies such as severe itching. Secondary infection may also occur by scratching the bite site, leading to skin inflammation, jaundice, and other similar conditions, and can cause depression, psychological irritation, and insomnia, and finally academic failure in children (Patel et al., 2021).

The risk of pediculosis infection depends on the conditions and characteristics of the host, including age, race, gender, as well as social and economic conditions. Head lice infection is more common in communities with poor social and economic status, high population density, poor personal hygiene, lack of health facilities and the absence of health educators in schools (AL-Marjan et al., 2022, Neuberg et al., 2022). Other important factors in the prevalence of pediculosis are the level of family knowledge and awareness about the disease. Many mothers do not recognize pediculosis as a health problem that needs to be treated and believe that it heals on its own. They are unaware about the fact that pediculosis is a pervasive disease. It means that one child in the classroom can spread the infection to other classmates. They are also at risk of carry the infection home and involve the whole family. According to studies, the

prevalence of head lice in Asia (0.7% - 59%), Europe (0.48% - 22.4%), Africa (0% - 58.9%), USA (3.6% - 61.4%) have been reported, and according to a study conducted in Oceania, the prevalence of head lice is 13% (AL-Marjan et al., 2022). This infection is widespread in Iran in areas with high density and poverty and non-compliance with the principles of personal hygiene. This infection is relatively common, especially in rural areas and especially among children. The prevalence of head lice in different parts of Iran has been reported from 6 to 30% (Khosravani et al., 2021).

Treating a person infected with pediculosis, even with the best methods, is not effective in controlling the infection alone. The most important principle in the fight against pediculosis is to remove the contamination from all the tools and equipment used and to examine the people in contact, such as classmates and family, and to study the environment of his residence (Clark 2021).

Humid climate and high population density have provided a suitable environment for increase in lice population in Mazandaran province. Epidemiological studies can determine the status of infection and determine its relationship with environmental factors (Yamaguchi et al., 2021). Due to the importance of this issue, this study will be conducted to investigate the prevalence of pediculosis from 1391 to 1399 in Mazandaran province.

2. Materials and Methods

This study was a descriptive study that used the data available in the health network of Mazandaran province. The questionnaire of this study considered criteria such as age, sex, place of residence, type of infection, date of diagnosis and treatment outcome, and data that lacked information were excluded from the study in this study. The data will be entered into Microsoft Excel from the surveillance registration portal and after refinement will be entered into SPSS (ver.16) software. The collected data were analyzed by SPSS software (ver. 22). In this study, Kolmogorov-Smirnov and Shapiro Wilk tests were used to evaluate the normality of quantitative data. Data were also analyzed through Q-Q chart and skew index. Continuous variables were expressed as mean standard deviation. Discrete variables were expressed as a

percentage and frequency. Chi-square test and Fisher's exact test were used to compare the variables. P value less than 0.05 was considered significant.

Necessary permits for the project were obtained from the university authority and research environment officials. In addition, this study did not cause any physical, psychological, financial, etc. harm to the study participants. All information in the patients' medical records was kept confidential by the project implementers until the end of the study.

3. Results

The number of subjects in this study was 247,678 of which the total of 246,077 (99.35%) had at least one type of head, body or crab lice. Among the total number of people with head lice, 244,957 (99.545%) had head lice. Chi-square test showed that the frequency of head lice was significantly higher than other cases (P-value <0.001). Among the patients, 208,248 (84.627%) were female, which was significantly

more frequent than males. (P-value <0.001, Figure 4-1). Also, 150,838 patients (61.297%) were living in rural areas, which was significantly more than people living in urban areas (P-value <0.001).

Table 1. Frequency of lice types in patients under study

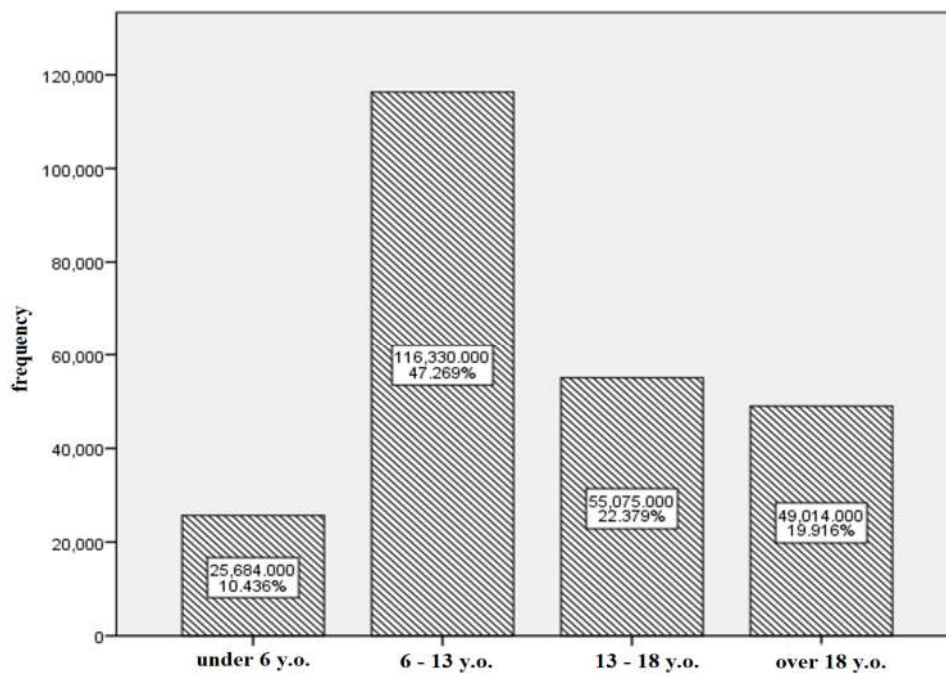
	Frequency	Percent (%)
Head louse	244,957	99.545%
Body louse	297	0.121%
Crab louse	10	0.004%

Table 2. Frequency and percentage of sex in patients with lice

	Frequency	Percent (%)
Males	37855	15.383%
Females	208248	84.627%

Table 3. Frequency and percentage of residence in patients with lice

	Frequency	Percent (%)
Rural	150838	61.297%
Urban	95159	38.670%



Graph 1. Column graph of frequency and frequency of patients by age classification

People aged between 6-13 years with the rate of 116330 (47.274%) had the highest frequency, which was significantly higher than other groups (P-value <0.001).

Table 4 shows the frequency and percentage of patients by city of residence. The city of Sari was significantly more frequent than other cities (P-value <0.001, Figure 4-4).

Table 5 shows the frequency and percentage of patients based on age and gender. Chi-square test was used to investigate the relationship between variables. This test showed that there is a significant relationship between the two variables (P-value <0.001, Figure 4-6). Post hoc test also showed that the frequency ratio in

males in the two age groups under 6 and 6 to 13 is higher than females and it is the opposite in the other two groups. This means that in the first 13 years, the prevalence of patients was higher in males, but afterwards prevalence in females is significantly higher (P-value <0.01).

Table 4 - Frequency and percentage of patients by city

City	Frequency	Percentage	P-value
Sari	32886	13.36%	
Amol	23357	9.49%	
Qaemshahr	22390	9.10%	
Joybar	22142	9.00%	
Babolsar	21597	8.78%	
Tonekabon	14418	5.86%	
Mahmoudabad	13039	5.30%	
Freydounkenar	12662	5.15%	
Neka	12403	5.04%	
Nowshahr	11820	4.80%	
Behshahr	11187	4.55%	<0.001
Miandoroud	10453	4.25%	
Chalous	8983	3.65%	
Ramsar	7713	3.13%	
Noor	5821	2.37%	
Abbas Abad	4963	2.02%	
Savadkouh	4440	1.80%	
Galougah	3778	1.54%	
Simorgh	1843	0.75%	
Kelardasht	182	0.07%	
Total	246077	100.00%	

Table 5. Frequency and frequency of patients based on age classification by gender

	Males (n = 37855)		Females (n = 208248)	
	Frequency	Percent (%)	Frequency	Percent (%)
Under 6 y.o.	5672	14.983%	20012	9.610%
6 – 13 y.o.	19359	51.140%	96971	46.565%
13 - 18 y.o.	6021	15.905%	49054	23.556%
Over 18 y.o.	6803	17.971%	42211	20.270%

4. Discussion

Many researchs on head lice have been conducted all around the world including in Iran. The main objectives of these studies were to analyze the prevalence and infection rate among students, however the aim of this study was to investigate the risk factors as well as demographic and clinical characteristics of

patients with pediculosis from 2012 to 2016 in the population covered by Mazandaran University of Medical Sciences. In the present study, the total number of subjects was 247,678 from which more than 99% had at least one type of head, body, or crab lice. Also, among people with pediculosis, more than 99% of patients had head lice, which was significantly higher. In the present study, females were significantly more

infected than males. Also, more than 60% of people lived in rural areas, which was significantly higher compared with urban residents. In the study of Moradi Asl et al. (2018), out of 1950 primary school students, 200 (10.25%) were infected with pediculosis. A total of 131 (12.42%) girls and 69 (7.71%) boys had head lice. There was no significant difference between head lice infection and students' sex ($P > 0.05$) (Moradiasl et al., 2018), which was different from our study. In this study, 400 students participating in the case-control in total, 249 (62.2%) lived in urban areas and 151 (37.8%) in rural areas. Most students infected with head lice (51.5%) lived in the central part of the city and this rate was significantly higher than the other two parts ($P < 0.05$), but between head lice infection and residential area there was no significant rural/urban relationship ($P > 0.05$) (23) which was not consistent with our results. In our study, most people had pediculosis of the head, which was significantly higher. Also, the number of females and rural residence was significantly higher. Some studies have shown that the incidence of pediculosis of the head is higher in girls aged 6-12 years (Soltani and Keshavarzi., 2018). In our study, people between the age of 6 and 13 years had the highest frequency, which was significantly higher than other groups, and was consistent with the results of these studies. The time and number of close contacts appear to be associated with a high prevalence of head pediculosis (Ziaoddini et al., 2019), which our results support this hypothesis.

In our studies, our results showed that the highest prevalence of pediculosis was in Sari city among the cities in Mazandaran province. The prevalence of this disease was highest in 2015 and 2016. In the study of Motavi Haghi (2014), 823 primary school children (out of 45237) were infected with lice in Mazandaran province. The average prevalence of infection in urban areas was 5.64% and in rural areas from Sari to Ramsar was 1.4% (Motevalli-Haghi et al., 2014) which was different from our results. This study also showed that the rate of infection with this disease from the west of this province, i.e. Ramsar to the east of this province i.e. Sari had an increasing trend. This study confirmed our study and showed that the prevalence of this disease is higher in the east of Mazandaran. Moreover, our results showed that

there was a significant relationship between age and gender. In the present study, the frequency ratio in males in the two age groups under 6 and between 6-13 was higher than females but the opposite in the other two groups. This means that in the first 13 years, the prevalence of lice was higher in males, but then this prevalence in females gets significantly higher. A study by Ziaodini et al. in 31 provinces in Iran the prevalence of pediculosis increased from 1.7% to 3.42% among urban students from 2014 to 2018 (Ziaoddini et al., 2019), which confirmed our studies. Also, in this study, in general, the prevalence of this infection in girls was significantly higher than boys ($P < 0.05$). The relative risk of head lice infection in autumn was 2.42 times higher than in spring (RR: 2.42, CI: 95%, 1.35 to 4.32). It seems that the difference between the prevalence pattern of this disease according to the variables of gender and age in our study and the study of Zia al-Dini et al. Is that in our study there was no age limit but in the study of Ziaodini et al. the country was participated (Ziaoddini et al., 2019).

In the study of Kasiri et al. (2016) in the city of Galougah, between pediculosis and previous infection, combing frequency per day, the number of hair washes (per week), having a health advisor, sharing health equipment, child health care There was a significant relationship between children's lives and parents, knowledge and information about pediculosis and children's distance in each class (Kassiri and Esteghali., 2016), which indicates the need to provide health infrastructure and personal hygiene to prevent the disease, especially children (Karim et al., 2015). The results of our study also supported this. Considering the increasing trend of this disease throughout the country and especially Mazandaran province (Kassiri and Esteghali., 2016) and paying attention to the results based on the upward trend of this parasite infection, especially in the east of the province, personal hygiene can be an important step toward preventing the spread this disease.

Conclusion

In the present study, it was revealed that the prevalence of patients was higher in males in the first 13 years but after this prevalence was significantly higher in females. Most females and rural residents were infected with

pediculosis of the head. In our study, the incidence of this disease was increasing and was higher in the east of Mazandaran province. Observing personal hygiene and creating a health infrastructure will be effective in preventing this disease.

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Refereces

- Abdulrahman, O. and G. S. Sharif (2021). "An overview of head lice infestation (*Pediculus humanus capitis*)."
- AL-Marjan, K. S., S. M. Abdullah and F. H. Kamil (2022). "Epidemiology Study of the Head Lice *Pediculus humanus capitis* Isolated among Primary School Students in Erbil city, Kurdistan Region, Iraq." *Diyala Journal of Medicine* 22(1): 141-160.
- Baghdadi, H. B., E. O. Omer, D. M. Metwally and R. Abdel-Gaber (2021). "Prevalence of head lice (*Pediculus humanus capitis*) infestation among schools workers in the Eastern Region, Saudi Arabia." *Saudi Journal of Biological Sciences* 28(10): 5662-5666.
- Clark, J. M. (2021). "New chemistries for the control of human head lice, *Pediculus humanus capitis*: A mini-review." *Pesticide Biochemistry and Physiology*: 105013.
- Karim, T., S. Musa, H. Khanum and D. Mondal (2015). "Occurrence of *Pediculus humanus capitis* in relation to their personal hygiene and social behaviour among the children in Dhaka City." *Bangladesh Journal of Zoology* 43(2): 327-332.
- Kassiri, H. and E. Esteghali (2016). "Prevalence rate and risk factors of pediculus capitis among primary school children in Iran." *Archives of Pediatric Infectious Diseases* 4(1).
- Khosravani, M., S. A. Amiri, A. Rafatpanah, C. Bandak, R. Latifi, M. Moradi, N. Mohebbi, F. Abdollahi Harat, S. M. Mohebbi Nodez and Z. Hatami (2021). "A Review of Pediculosis Studies in Iran During Three Decades (1990-2020)." *Journal of Health Sciences & Surveillance System* 9(4): 218-225.
- Leung, A. K., J. M. Lam, K. F. Leong, B. Barankin and K. L. Hon (2022). "Paediatrics: how to manage pediculosis capitis." *Drugs in Context* 11.
- Moradiasl, E., S. Habibzadeh, J. Rafinejad, M. Abazari, S. S. Ahari, A. Saghafipour, M. Mehrtak and H. Edalatkhah (2018). "Risk factors associated with head lice (pediculosis) infestation among elementary school students in Meshkinshahr county, North West of Iran." *International Journal of Pediatrics* 6(3): 7383-7392.
- Motevalli-Haghi, S. F., J. Rafinejad, M. Hosseni, J. Yazdani-Charati and B. Parsi (2014). "Prevalence pediculosis and associated risk factors in primary-school children of Mazandaran Province, Iran, 2012-2013." *Journal of Mazandaran University of Medical Sciences* 23(110): 82-91.
- Neuberg, M., I. Banfić, T. Cikač, R. Ribić, S. Zember and T. Meštrović (2022). "Knowledge, Attitudes, Psychosocial Perspectives and Applied Epidemiology in the Control of Head Lice (*Pediculus capitis*) in Croatian Preschool Children: A Qualitative Study on Childcare Professionals and Health Coordinators." *Children* 9(1): 66.
- Organization, W. H. (2014). *Vector-borne diseases*, WHO Regional Office for South-East Asia.
- Patel, P., A. Tan and N. Levell (2021). "A clinical review and history of pubic lice." *Clinical and Experimental Dermatology* 46(7): 1181-1188.
- Soltani, Z. and D. Keshavarzi (2018). "Increasing trend of pediculosis (*Pediculus Humanus Capitis*) in Lamerd, Farashband, and Marvdasht Cities, Southern Iran." *International Archives of Health Sciences* 5(2): 38.

- Woods, A. D., C. L. Porter and S. R. Feldman (2022). "Abametapir for the treatment of head lice: a drug review." *Annals of Pharmacotherapy* 56(3): 352-357.
- Yamaguchi, S., R. Yasumura, Y. Okamoto, Y. Okubo, T. Miyagi, H. Kawada and K. Takahashi (2021). "Efficacy and safety of a dimethicone lotion in patients with pyrethroid-resistant head lice in an epidemic area, Okinawa, Japan." *The Journal of dermatology* 48(9): 1343-1349.
- Ziaoddini, A., R. Riahi, M. Heidari-Beni, H. Ziaoddini and S. Zamani (2019). "National and Provincial Prevalence of *Pediculus humanus capitis* among Urban Students in Iran from 2014 to 2018." *Journal of Research in Health Sciences* 19(4): e00459.