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Prevalence of Head Lice Infestation (*Pediculosis Capitis*) Among Primary School Students in the Meshkin Shahr of Ardabil Province

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Abstract: Head lice infestation is so common in all parts of the world such as Iran especially in places with high population with poverty and lack of observing personal health principles. The maximum prevalence of louse infestation in children was observed in elementary school. Over prevalence of infestation in this age group and its relationship with education system and thus its generalization to the total population was the main reason of selecting this age group for the present study. This study was descriptive-analytical which aimed to determine the prevalence of head lice in elementary schools students of Meshkin Shahr city in Ardebil province in academic year 2015-2016. 1950 students were selected from 20 schools. For data analysis, the variables were analyzed as multivariate by chi-square test. In general, 1950 students were selected from 20 schools from which 200 students (10.25%) were infested to head lice. From 200 infested students (61%) were city and 78 students (39%) were from village. The ratio of the students in classes with more than 20 students was two times the others and the ratio of the students that studied in the schools with more than 100 students was three times the other schools. The difference between both groups was significant in terms of Pediculosis infestation. ($P<0.01$). It can be concluded that a set of important factors like crowdedness of students in classroom and school, high population of family, low level of parents' education were the main reasons of louse infestation and its increase in the current societies.

Keywords: Infestation, Head Lice, Elementary Student, Ardabil, Iran

1. Introduction

Lice are bloodsucking insects which belong to the arthropoda phylum and insecta class. They are considered as the most prevalent ectoparasites [1, 2]. Lice can transfer diseases like Typhus, Relapsing fever and have been always considered by different researchers. Head lice infestation is so common in all parts of the world such as Iran especially in places with high population with poverty and lack of observing personal health principles. This infestation is considered relatively common in villages especially among children. Head louse infestation in people causes the feeling of humiliation and lowliness, mental stimulation, depression and insomnia [3]. Louse infestation is a social problem which involves most human societies and is one of the health problems common in schools. This disease is often common in the areas with high population and low public health [4]. Head lice infestation is observed more or less in all parts of the world. This type of parasitic infestation involves 6-12 million people in the world every year [5]. In epidemiological studies in schools around the world, the

frequency of head lice in Mexico was reported 13.6% [6], in Jordan 26.6% [7], in South Africa 15.93% [8], in Thailand 23.32% [9], in Nigeria 26.4% [10], in the UK 28.3% [11] and also in Iran in different cities like Khomeyin 11.9% [12], in Mazandaran 5.64% [13], in Gilan 9.20% [14], and in Hamedan 1.3% [15]. The growth of population and poor health are the intensifying factors of this infestation. The possibility of this problem can be seen in all social-economic classes. [16 - 17]. According to the previous studies, the highest prevalence of louse infestation in children was observed in elementary school. Over prevalence of infestation in this age group and its relationship with education system and thus its generalization to the total population was the main reason of selecting this age group for the present study [18- 20]. Ardebil province is a proper environment for the activity of louse due to its cold and mountainous climate and also high population density [21]. Epidemiological studies not only determined the status of infestation and its relationship with environmental factors but also determined the best and most principle way to prevention and control it. The reason to select the research place was due to multiple reports of health care centers in Meshkin Shahr in Ardebil province as louse infestation in girl and boy schools in this city. The present study is an attempt for epidemiological study and determination of infestation prevalence in elementary students in 2015-2016 for the first time in this region.

2. Materials and Methods

This study was conducted in Meshkin Shahr city located on the central part of Ardebil province. Meshkin Shahr is located at 38 degrees and 23 minutes and 34 seconds northern latitude and 47 degrees and 1 minute and seven seconds eastern longitude [22-23]. The number of 20 elementary schools were selected and studied at different regions of the city that were in 10 villages and five cities. This study was performed in three parts of demographic and personal information of students, information of school and class and information of residential houses (figure 1). This study was descriptive-analytical which aimed to determine the prevalence of head louse in state-owned elementary schools of Meshkin Shahr County in Ardebil province in academic year 2015-2016. There are 238 elementary schools in this city that include 13477 elementary students in academic year 2015-2016.

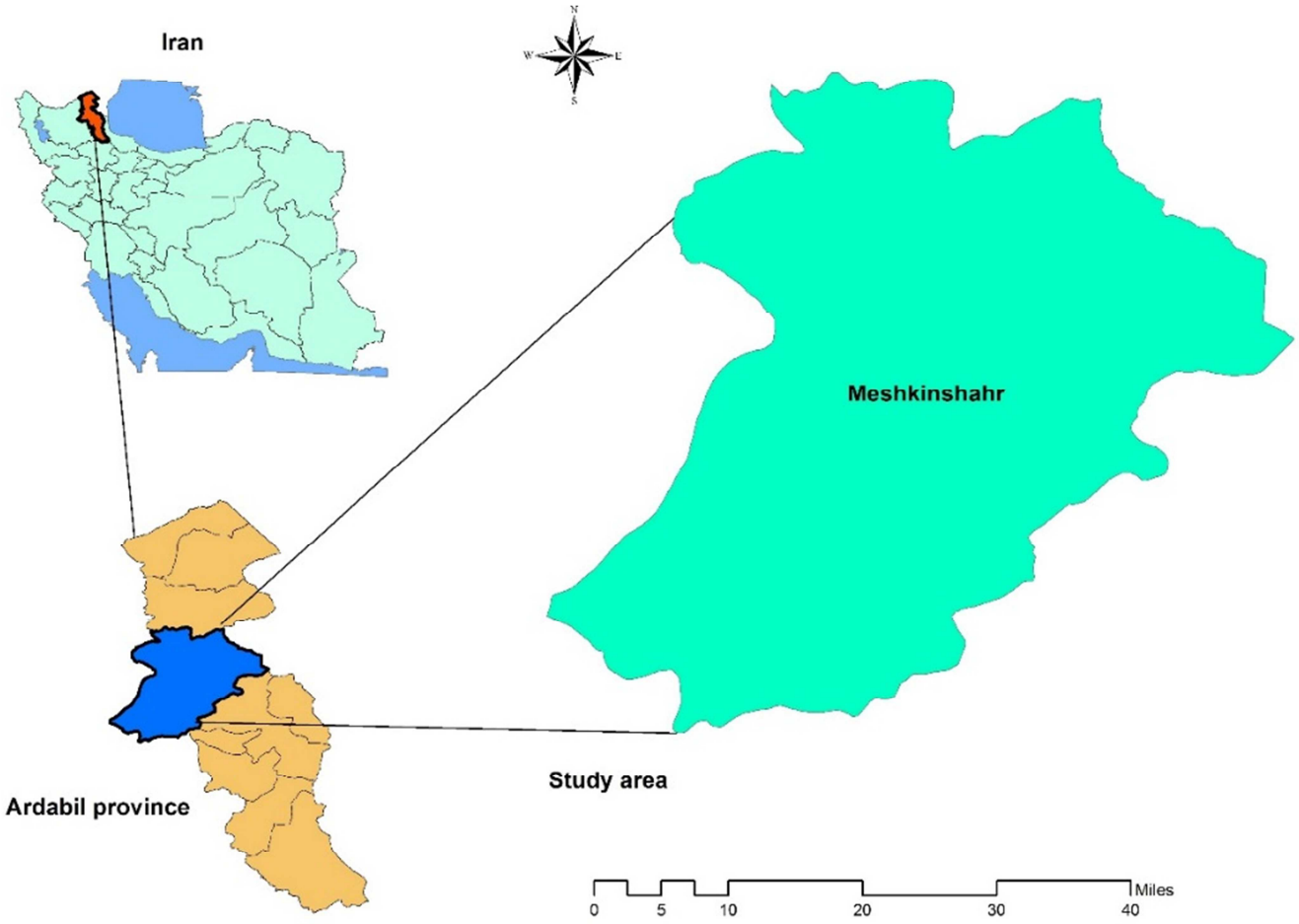

Figure 1. *The study area of Ardabil Province, Northwest of Iran.*

The number of 20 schools was selected randomly from city and village at three districts of central, western, and eastern. The data related to the study were collected through questionnaire and examination of hair in terms of louse

infestation. The questionnaire was designed to personal, family, school and class behaviors in addition to demographic information (student age, academic year, education level of father and mother, parents' age). To determine the prevalence of infestation, hair was examined and parasite was sampled. After gaining the license and coordinating with the health unit of schools, the health center and department of education in Meshkin Shahr, the students were interviewed directly and individually to determine the prevalence of infestation. A number of information was obtained from the health file of student(in the office of schools) or with the help of direct observation. The recognition of infestation according to the current standard (booklet of fighting against louse in schools, published by the deputy of health in ministry of health and medical education), was the existence of alive egg, nymph or adult so that infestation was separately studied in two parts of egg and louse. Hair (especially behind the ears and above the neck) was examined in the presence of sufficient light for about 10 minutes. For data analysis, the variables were analyzed as multivariate by chi-square test and the significance level of the test was considered as $P<0.05$. All analyses were conducted by using spss23 software.

3. Results

3.1. The Analysis Results of Personal and Family Information

In general, 1950 students were selected from 20 schools from which 200 students (10.25%) were infested to head lice. From 200 infested students 122 (61%) were located in urban area and 78 students (39%) in village. The infestation rate in the urban and suburb were more than villages and this difference was significant (P=0.05). 69 students (34.5%) were boy and 131 (65.5%) were girl and the infestation rate in girls was more than boys and there was a significant difference (P>0.05). The highest students (29.8%) were 7 years old and the minimum of them (8.3%) were 12 years old and the maximum infestation was observed in the age of 7 - 8 and the difference was significant (P<0.05). In general, head lice infestation in the studied students decreases with the increase of age. In the study of family aspect, 65% of families had four members or less and 28% of families had 5-6 members. Only 7% of families had more than 7 members but the rate of infestation in 5-6-year-old families (5.69%) was more than the two other groups and the difference is significant (P=0.05).

Table 1. *The Relationship between Head Lice Infestation and personal and family information.*

	Characteristics	No. of examination	No. of infestations	Prevalence (%)	Total (%)
Sex	Boy	895	69	3.54	10.25
	Girls	1055	131	6.71	
School grade	I	663	68	3.5	10.25
	II	390	40	2.1	
	III	390	40	2.1	
	IV	273	28	1.42	
	V	108	11	0.55	
	VI	126	13	0.66	
Habitat	Urban	600	122	6.25	10.25
	Rural	300	78	4	
Family size	≤4	1266	56	2.87	10.25
	5-6	545	111	5.69	
	>7	139	33	1.69	
Father's education	Literate or primary	869	146	7.5	10.25
	Diploma	733	42	2.13	
	University education	348	12	0.62	
Mother's education	Literate or primary	855	162	8.3	10.25
	Diploma	792	28	1.43	
	University education	303	10	0.52	

The first classes (3.5%) had the maximum infestation and fifth classes (0.55%) had the minimum infestation to head lice and the difference between classes was significant (P<0.01). In terms of education level of parents 50.75% of families had a degree less than diploma and 10% of parents had a degree higher than bachelor. The maximum infestation in fathers and mothers with a degree less than diploma was respectively 7.5 and 8.3% and this difference is significant (P<0.05) (Table 1). 34% of families and students infested to head lice have a history of head lice infestation, so that 24.5% of families had used anti-lice medicine and they had also the history of lack of using shampoo or incomplete treatment of previous infestation and this factor was among the effective factors in the severity of the next infestation (P<0.01). In terms of hair size, hair health status, hair type, the results showed that 29% of both genders of students had long hair, 76% had adverse health status (severe dandruff and itching) in their hair and 10.5% of students had bushy hair and the difference was significant in all three cases (P<0.05). But there was no significant difference in terms of hair type (curly, wavy and straight). (P>0.05).

3.2. School Information Analysis

The ratio of the students in classes with more than 20 students was two times the others and the ratio of the students that studied in the schools with more than 100 students was three times the other schools. The difference between both groups was significant in terms of Pediculosis

infestation (P<0.01). the students who were in two shift schools of mixed schools and sat on one bench with several students were 4 times infested to head lice than the single shift schools and single chairs and a significant difference was observed in the two variables (P<0.01). The results of this study showed that 88.5% of the students studied in schools with state-owned old buildings and had a significant difference with modern schools in terms of Pediculosis infestation (P<0.01). the presence of health teacher in schools and number of visits and examination by health teacher and health workers showed that 48% of schools had health teachers and 36% of students had been examined by health teachers and health workers at least once an academic year that the difference was significant (P<0.05). One of the other factors studied in schools was hanging clothes, scarf and hat on hanger or in front of window that was done by 53% of students. A significant difference was observed in comparison to the schools that had no hanger (P<0.05). (Table 2).

Table 2. *The Relationship between Head Lice Infestation and School information.*

	Characteristics	No. of examination	No. of infestations	Prevalence (%)	Total (%)
School shifts	I	325	21	1.1	10.25
	II	1099	126	6.46	
	Mixed	526	53	2.7	
Seat type in classrooms	Single	293	31	1.6	10.25
	Bench	1657	169	8.65	
School buildings situation	New building	225	23	1.18	10.25
	Old buildings	1725	176	9.07	
Having school health instructors	Yes	936	96	4.9	10.25
	NO	1014	104	5.35	

3.3. Residential Place Information Analysis

In terms of private bathroom in houses, 98% of students had private bathroom in their houses and 52% of bathrooms were inside the house and 46% were in the yard. The location of bathroom inside the house or in the yard had a significant difference with the rate of louse infestation (P<0.01). 67.5% of students used common things that is effective in infestation and 32.5% did not use and this difference was significant (P<0.01). The type of house building had no significant relationship with the rate of head lice infestation statistically (P>0.05). In terms of keeping livestock and poultry in houses and the distance between houses and schools, the status of drinking water and disposal of wastewater in residential environment were studied and no significant difference was observed (P>0.05). (Table 3).

4. Discussion

This study examined the status of elementary schools in Meshkin Shahr County in terms of demographic information, lifestyle, place of education and living place. The results of this study showed that the rate of head lice infestation in urban areas and suburbs were more than villages and there is a significant difference between them (P<0.001). The study of Dehghan Zadeh [24] is consistent with the results of this study. But in the study of Moradi et al [15] in Hamedan the infestation rate was estimated 1.66% in village and 0.66% in city.

Table 3. *The Relationship between Head Lice Infestation and residential place information.*

	Characteristics	No. of examination	No. of infestations	Prevalence (%)	Total (%)
Bath	In Home	1033	106	5.44	10.25
	Dooryard	858	88	4.5	
	Other	59	6	0.31	
The use of common items	Yes	1121	115	5.9	10.25
	No	829	85	4.35	
Building Home	New	946	97	4.97	10.25
	Old by Brick	536	55	2.82	
	Straw and mud	468	48	2.46	10.25

In the study of Edalat Khah [25], the infestation rate was 35.5% in rural students and 1.5% in village. The maximum infestation was observed in 7-year old students that were due to the lack of observing health principles and sitting on a bench in schools. These results were consistent with the study of Afshari [26] and Dorudgari [27]. But in the study of Salehi [28], the variable of age had no effect on infestation. High size and volume of hair in students prevents good washing and brushing and thus helps the process of infestation but hair type had no effect on infestation. These results were consistent with the studies of Noori [29] and Motevali Haghi [30]. The background of family louse infestation and the background of students were effective in louse infestation again. According to the study, the lack of using shampoo according to guidelines was the most important cause of re-infestation. The studies of Muhammadi [31], Noori [29] and Dorudgari [27] confirmed this results. The presence of too many students in one school and class and also sitting on the same bench due to more contact and lack of examination by school health teacher due to high

population were the main factors of louse infestation. According to this study, 80.5% of students in school with more than 100 students and 55% in class with more than 20 students and 84% of them were studying on a 3-4 student bench that led to more contact and transfer of infestation. The study results of Buczek [32] in the east of Netherland showed the effect of number of students in school on the increase of louse infestation. In terms of school building type, the buildings were state-owned old or state-owned new. Infestation in state-owned old schools was more than owned new ones. The presence of health teacher in schools and also the examination of health care staffs were the most important factors in prevalence of infestation and this difference was significant in schools ($P<0.01$). In the study of Saghafi Pour [33], Motevali [34] and Noori [29] the presence of teacher, number visit and examination of students were effective on the process of infestation. The use of common things in houses and hanging clothes such as scarf and hat in schools and putting clothes on each other in some schools at the time of break was another factor of the increase of infestation in this study. In the study of Warf [35], Farzinnia [36] and Dehghan Zadeh [22], the use of common things was effective in houses and schools. The location of bathroom inside the house or in the yard was effective in the process of infestation due to the mountainous province of Ardebil. So that 53% of private bathrooms were inside the house and 47% were in the yard and this 47% made their children take a bath once every 10-14 days in order to prevent cold. Having bathroom, and the number of washing hair in the studies of Yousefi [37], Hazrati Tape [38], Shayeghi [39], Rafi Nejad [40] and Motevali Haghi [30] had a significant relationship with louse infestation. But the studies of Moradi [15], and Wafa [35] were not consistent with the results of this study. The study of residential building type, status of students show that there is not such a difference in the process of head lice infestation ($P>0.05$). It was because most buildings were modern in the last few years and were built with better materials like brick and cement and in villages, conducting plans were running. In the study of Rafi Nejad et al [40], Moradiasl et al [41], Afshari et al [26] and Buczek [32], the type of building and toilet, healthy tap water, and number of rooms were effective in the infestation rate. Keeping livestock and poultry in houses and in this study had no effect on louse infestation but in the study of Dehghan Zadeh, keeping pets was effective in infestation [24].

5. Conclusion

The prevalence of head lice infestation in elementary school students in Meshkinshahr County, was relatively high in comparison to other studied areas of Iran. According to the result, it seems family size, students and their parents' history of infestation, type of bathrooms, and history of use shared hygiene items were probably risk factors associated with head lice infestation among students of primary schools in Meshkinshahr County; North West of Iran. Personal health especially at families with more siblings and not use of shared hygiene items are recommended to prevention of human head lice infestation.

Conflict of Interest

All the authors do not have any possible conflicts of interest.

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