



Prevalence of head lice infestation among schoolchildren in urban and rural areas in a region of western Iran-school year 2015–2016

Saman Nazari¹, Sasan Nazari¹, Reza Goudarztalejerdi² and Mansour Nazari^{3*}

¹Medical Student, Students Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

²M.Sc. of Medical Entomology in Asadabad city Health center, Asadabad, Iran

³Associate Professor, Department of Medical Entomology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

*Corresponding Email: ynazari@yahoo.com

ABSTRACT

The head louse with the scientific name of *pediculus capitis* (Anoplura: Pediculidae) is one of a global public health concern. A descriptive-analytic cross-sectional research performed on school students in urban and rural areas of Asadabad region in Iran from 2015 October to 2016 June. A total of 16438 subjects including 7712 (46.9%) school girls and 8726 (53.1%) school boys were selected for current study. The prevalence rate of *Pediculus capitis* among these subjects was separately studied in three various seasons and the obtained results showed that the total prevalence rate of 1.7% (828 students), which was more common among girls (n=718, 3.1%) than boys (n=110, 0.4%). Temporal distribution of the disease showed 400 (2.4%) of cases recorded in autumn, followed by winter 253 (1.5%) and spring 175 (1.1%), respectively. Totally the maximum pediculosis incidence was observed from preschool (n=55, 2.2%) followed by elementary school (n=564, 1.9%), middle school (n=170, 1.6%) and high school (n=42, 0.7%), respectively. The maximum head lice infestation rate was related to students of the urban area in autumn (n=269, 2.7%) and the lowest rate was also in urban area in spring (n=67, 0.7%). Totally the infection rate of pediculosis was 516 (1.7%) in urban area and 312 (1.6%) in rural area. There was not a significant difference between residence in urban/rural areas and infection (P=0.430). The results of current study indicated the reason of perpetuating this condition in school students has been the lack of knowledge about the importance of head lice infestation as well as the opposition for applying drugs of pediculosis capitis.

Keywords: Head lice, Pediculosis, Schoolchildren, Epidemiology

INTRODUCTION

One of a key parameter for developing a community is public health [1]. Lice infestation is one of the global public health concerns in all races, socioeconomic situations, family background or individual habit that goes back to 25 mya in primates [2]. Lice are insects whose whole life spending on body of humans and animals as external parasites. Lice (Anoplura: Pediculidae) infestations in human happen as different types of head lice (*pediculus capitis*), body lice (*pediculus corporis*), and pubic lice (*phthirus pubis*) [3]. The head louse, whose symptoms are pruritus (the most common sign), excoriation, conjunctivitis, and secondary bacterial infestations, is a worldwide community health concern [4]. Nits are fertilized eggs of sucking lice that are definitely attached to the shaft of hair. Consequently, development of eggs occurs via three nymph instars before becoming fully mature [5].

Head lice infestation-related indicators are applied for assessing rural and urban communities situation in terms of the health, culture, and economic [6]. Although this health problem is wildly spread all over the world, but its maximum prevalence is related to 5-11 years old school students who live in developing countries and in crowded places with poor socio-economic and bad hygiene status [7-9].

Direct contact between hosts is nearly the reason of all infestations of human head lice and scabies. Moreover, pediculosis resulted through personal accessories including comb, hat, scarf, underwear, towel and the sponge of headphones in electrical devices. Pediculosis dominantly transfers through a head to head contact with a host [10-12].

Human lice are able to transmit epidemic typhus, trench fever and epidemic relapsing fever. Other associated problem are feeling of body heaviness, rigidity of muscle, depression, hyperthermia, headache, deficit of attention in the class and failure in education, insomnia, lack of social position, rising secondary infections, losing hair, and allergies [13, 14].

Based on the outcomes of other research, the prevalence of head lice between primary school student in different countries was approximated as 1.2%, 35%, 4.8%, 28.8% and 29.7% in Turkey, Brazil, Netherlands, Venezuela and Argentina [15]. Such differences have been reported for several provinces of Iran including 2.3% in asadabad [16], 4% in Urmia [17], 6.8% in Hamedan [6], 4.7% in Sanandaj [18], 0.73% in Khorram Shahr [19] and 1.8% in Kerman [20].

The growing incidence of active pediculosis in school-aged children encouraged us to for conducting a research on the prevalence of this disease among the mentioned group who living in Asadabad County in west of Iran.

MATERIALS AND METHODS

Study Area

Asadabad is a city in Hamadan province of Iran with geographical coordinates of 34° 37' - 34° 50' N, 47° 51' - 47° 90' E, and altitude of 1591 meters. There are 16438 school student (Urban=10026 and Rural=6412) in this region. It is 5th biggest city in Hamadan province in terms of population, which is 59,617.

Samples and Data Collection

The present research is a descriptive-analytic cross sectional research performed on school-aged children living in urban and rural areas of Asadabad County, Iran during 2015 October - 2016 June.

The prevalence rate of pediculosis was evaluated among all school students of study areas. For this purpose, an epidemiological study was performed for recording the obtained data about several variables including season, gender, school grade and residential area. The measures for diagnosing pediculosis were the existence of at least one live adult [Fig. 1], nymph, or nit [Fig. 2], especially behind the ears and above the neck, using a hand magnifying glass, with the aid of a desk lamp for three-five minutes [21].



Figure 1: View of a head louse (Photo by Gilles San Martin)



Figure 2: Head louse nit attached to hair shaft (Left) and nits are present on the hair of the scalp (Right)

Statistical Analysis

The number and percentage (%) were considered as categorical variables. The Chi-square test (X^2) and the Fisher exact test of proportions homogeneity were applied for comparing the prevalence rate between several variables. Confidence intervals (CI) of the prevalence were considered 95 %. The SPSS software version 20 (Chicago, IL) was applied for statistical analysis. P-values of 0.05 or less were considered statistically significant.

RESULTS

A total of 16438 subjects including 7712 (46.9%) school girls and 8726 (53.1%) school boys were selected for current study. The prevalence rate of *Pediculus capitis* among these subjects was separately studied in three various seasons and the obtained results presented in table 1 indicated the total prevalence rate of 1.7% (828 students), which was more common among girls (n=718, 3.1%) than boys (n=110, 0.4%). A considerable difference was observed for pediculosis prevalence rate between two genders ($P<0.001$).

Temporal distribution of the disease showed 400 (2.4%) of cases recorded in autumn, followed by winter 253 (1.5%) and spring 175 (1.1%), respectively [Table 1]. Therefore, pediculosis incidence was significantly correlated with season ($P<0.001$).

Table 1. Head louse infestation in school pupils according to gender in different seasons

Season			Results		Total No. (%)	P-Value
			Uninfected No. (%)	Infected No. (%)		
Autumn	Gender	Girl	7395 (95.9)	317 (4.1)	7712 (46.9)	.000
		Boy	8643 (99.0)	83 (1.0)	8726 (53.1)	
	Total	16038 (97.6)	400 (2.4)	16438 (100.0)		
Winter	Gender	Girl	7467 (96.8)	245 (3.2)	7712 (46.9)	.000
		Boy	8718 (99.9)	8 (0.1)	8726 (53.1)	
	Total	16185 (98.5)	253 (1.5)	16438 (100.0)		
Spring	Gender	Girl	7556 (98.0)	156 (2.0)	7712 (46.9)	.000
		Boy	8707 (99.8)	19 (0.2)	8726 (53.1)	
	Total	16263 (98.9)	175 (1.1)	16438 (100.0)		
Total	Gender	Girl	22418 (96.9)	718 (3.1)	23136 (46.9)	.000
		Boy	26066 (99.6)	110 (0.4)	26176 (53.1)	
	Total	48486 (98.3)	828 (1.7)	49314 (100.0)		

Totally the maximum prevalence of pediculosis was observed from preschool (n=55, 2.2%) followed by elementary school (n=564, 1.9%), middle school (n=170, 1.6%) and high school (n=42, 0.7%), respectively. There was a significant difference between school grade and pediculosis ($P<0.001$) [Table 2]. The maximum incidence in different seasons was occurred in preschool and in autumn (4.1%) and the minimum incidence was related to high school in spring (0.1%).

Table 2. Head louse infestation in school pupils according to school grade in different seasons

Season			Results		Total No. (%)	P-Value
			Uninfected No. (%)	Infected No. (%)		
Autumn	School Grade	Preschool	753 (95.9)	32 (4.1)	785 (4.8)	.000
		Elementary	9778 (97.2)	278 (2.8)	10056 (61.2)	
		Middle School	3414 (98.2)	63 (1.8)	3477 (21.2)	
		High School	2093 (98.7)	27 (1.3)	2120 (12.9)	
	Total	16038 (97.5)	400 (2.4)	16438 (100.0)		
Winter	School Grade	Preschool	785 (100.0)	0 (0.0)	785 (4.8)	.000
		Elementary	9896 (98.4)	160 (1.6)	10056 (61.2)	
		Middle School	3396 (97.7)	81 (2.3)	3477 (21.2)	
		High School	2108 (99.4)	12 (0.6)	2120 (12.9)	
	Total	16185 (98.5)	253 (1.5)	16438 (100.0)		
Spring	School Grade	Preschool	765 (97.5)	20 (2.5)	785 (4.8)	.000
		Elementary	9930 (98.7)	126 (1.3)	10056 (61.2)	
		Middle School	3451 (99.3%)	26 (0.7)	3477 (21.2)	
		High School	2117 (99.9)	3 (0.1)	2120 (12.9)	
	Total	16263 (98.9)	175 (1.1)	16438 (100.0)		
Total	School Grade	Preschool	2303 (97.8)	52 (2.2)	2355 (4.8)	.000
		Elementary	29604 (98.1)	564 (1.9)	30168 (61.2)	
		Middle School	10261 (98.4)	170 (1.6)	10431 (21.2)	
		High School	6316 (99.3)	42 (0.7)	6358 (12.9)	
	Total	48486 (98.3)	828 (1.7)	49314 (100.0)		

Table 3 showed that the maximum infestation of head lice was related to students who live in the urban area during autumn ($n=269$, 2.7%) and the lowest rate was also in urban area in spring ($n=67$, 0.7%). Infestation of head lice showed a considerable in terms of season between residential area ($P<0.001$). Totally the infection rate of pediculosis was 516 (1.7%) in urban area and 312 (1.6%) in rural area. There was not a significant difference between residence in urban/rural areas and infection ($P=0.430$).

Table 3. Head louse infestation in school pupils according to residential area in different seasons

Season			Results		Total No. (%)	P-Value
			Uninfected No. (%)	Infected No. (%)		
Autumn	Residential Area	Urban	9757 (97.3)	269 (2.7)	10026 (61.0)	.009
		Rural	6281 (98.0)	131 (2.0)	6412 (39.0)	
	Total	16038 (97.6)	400 (2.4)	16438 (100.0)		
Winter	Residential Area	Urban	9846 (98.2)	180 (1.8)	10026 (61.0)	.001
		Rural	6339 (98.9)	73 (1.1)	6412 (39.0)	
	Total	16185 (98.5)	253 (1.5)	16438 (100.0)		
Spring	Residential Area	Urban	9959 (99.3)	67 (0.7)	10026 (61.0)	.000
		Rural	6304 (98.3)	108 (1.7)	6412 (39.0)	
	Total	16263 (98.9)	175 (1.1)	16438 (100.0)		
Total	Residential Area	Urban	29560 (98.3)	516 (1.7)	30076 (61.0)	.430
		Rural	18924 (98.4)	312 (1.6)	19236 (39.0)	
	Total	48486 (98.3)	828 (1.7)	49314 (100.0)		

DISCUSSION

Head lice are one of the main public health issues that have wildly speared all over the world. Various parameters affect on pediculosis risk. Head lice prevalence is more usual in regions with poor socioeconomic statuses and over populations because of lack of personal hygiene, health facilities and a school health teacher. Moreover, a head louse arises if washing hair and clothes are not performed frequently. Another parameters affecting pediculosis are parents attitude to standards of health and their educational levels [22].

In current research, the pediculosis prevalence for girls was 7.75 fold greater compared to boys due to their different habits including longer hair of girls and using scarf to cover hair, which is a barrier for realizing the pediculosis prevalence in girls on time. Many scientists state that the pediculosis risk for girls was greater comparing that for boys, as examples, the above-mentioned point was reported in the cities of Hamadan [6], West Azarbaijan [17], East

Azerbaijan [23] and Kerman [20]. Studies under taken in other countries such as Chile [24], Turkey [25] and Jordan [26].

The current research indicated the maximum frequently of pediculosis is related to the elementary school (564 cases), that shows pediculosis is reduced by increasing the educational level. The maximum prevalence of pediculosis at the lower grades (2.2%) may as well be due to pupils' poor knowledge and their inability to accomplish by the rules of personal hygiene, as having been documented by others [6, 17, 27].

In current research, the maximum pediculosis prevalence was related to the school students of urban areas (1.7%). However, the prevalence had no considerable statistical difference for urban and rural areas. In other research conducted by Riabi and Atarodi, a greater pediculosis infestation has been reported for urban areas (63.6 %) compared to rural areas (46.4 %) in Iran [28]. Furthermore, pediculosis was stated as an urban health issue in Nigeria [29], while the infestation rates of head lice were found higher in rural schools in Poland [13], as well as a research conducted by Dehghanzadeh et al. in northwest of Iran [30].

In the current research, the rates of head lice infestation among school students were obtained 400, 253 and 175 in autumn, winter and spring, respectively. The chances of head lice infestation infection are enhanced in cold months because of wearing more clothes. These outcomes are in accordance with previous studies conducted in Iran, and other countries [13, 16, 25, 30].

They tend to gather in big groups, try to get closer in school and in living place, have lower hygienic standards and are unaware of transmission mechanism.

CONCLUSION

The current study indicated the head lice infestation prevalence between school students, mainly girls in both areas, is high. This condition has been perpetuated in school students due to the lack of awareness about the importance of head lice infestation and the persistence to apply drugs of pediculosis capitis. In order to efficient control of pediculosis, it is required to design more health screening plans and large-scale data campaigns for reaching the majority of children and families. Collaborative efforts between health personnel, doctors, nurses, teachers, and parents are needed for maintaining efficient epidemiological surveillance and providing the best cure. So, monitoring of pediculosis is necessary.

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