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Head Lice Infestation among Internally Displaced Persons in Tikrit Camp/ Iraq

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Abstract

Background and Objectives: Head lice infestation is a health issue that frequently affects crowded populations with low social-hygiene status. This study aimed to investigate the prevalence and associated risk factors for head lice among internally displaced persons in Tikrit camp.
Subjects and Methods: This is a cross-sectional study which was conducted in the camps of internally displaced persons (IDPs) in Tikrit province, North of Iraq. The study included a total of 372 subjects (194 males and 178 females), mean age was 12.62± 8.65 years. All participants were examined in the inspection room. Visual inspection and dry comb test were used for detection of different developmental stage of lice in the head. A subject was considered infested when at least one of the developing stages of the parasite is detected. Demographic and personal characteristics of each subject were obtained using structural questionnaire.
Results: The prevalence of head lice infestation amonginternally displaced persons in Tikrit camp was (47.85%).Each of older age (<12 years) (OR= 0.53, 95%CI=0.25-0.98, p=0.048) and mother's secondary or above educational level (OR= 0.012, 95%CI= 0.02-0.06, p<0.001) were independent protective factors against pediculosis. In contrast, each of female sex (OR= 7.2, 95%CI=4.0-12.94, p<0.001), family size ≥8 (OR= 3.17, 95%CI= 1.37-13.25, p=0.039) and sharing others with the same bed (OR= 1.76, 95%CI=1.01-3.71, p= 0.044) were independent risk factors for pediculosis.
Conclusions: There is a relatively high prevalence of head lice infestation among internally displaced persons in Tikrit camp. Younger age, female sex, mother's educational level, increased family member and sharing others with the same bed are the main factors associated with this infestation.

Keywords: pediculosiscapitis, infestation, internally displaced persons

Introduction

Despite the modern hygiene standards and marked promotion in health and medical education, several ectoparasitic diseases still prevalent worldwide. Perhaps the most important disease in this regard is pediculosis, the infestation of head with the ectoparasite*Pediculushumanuscapitis*. It was estimated that 6 to 12 million head lice infestations occur every year [1]. However,

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infestations occur almost exclusively in vulnerable groups: school children, homeless people, refugees, and slum dwellers [2]. Thus the infestation rate can range from 5.8% to 35% depending on the cultural behavior, crowding, and treatment option [3].

The impact of pediculosis should be considered form three aspects: medical, social and economic. From medical point of view, the disease associated with blood loss, itching, inflammation of scalp and neck secondary bacterial skin infections (impetigo, cellulitis), conjunctivitis, and lymphadenopathy [4]. On the other hand, it is now evidenced that lice can transmit several pathogens. *Acinetobacterbaumannii* DNA was detected in 33% of head lice collected from 245 children in 44 schools in France [5]. Moreover, the nucleic acid of *Bartonellaquintana* (the agent of trench fever, endocarditis, bacillary angiomatosis and other disease manifestations) was frequently reported in these lice [6,7].

Sociologically, the stigma and mental health impact of pediculosis is arguably the most concerning aspect of the infestation. The negative social effects of this perception create more problematic issues than pediculosis itself [8]. These negative impacts include: formal social isolation via exclusion from school, voluntary home isolation, overtreatment with harsh chemicals, and a potentially negative psychological impact upon the infected person and family involved [9].

Aside from medical and social impact, head lice infestation has a substantial economic impact. The estimated annual direct and indirect costs of this infested in the United State was 367 million US dollars including consumer costs, lost wages, and school system expenses [10].

As such, the assessment of pediculosis incidence and related risk factors are of paramount importance and are considered a cornerstone for controlling programs. Most related previous studies whether local [11] or international [12,13,14,15] have focused on school children in main cities, while other occupational classes in counties were neglected. Therefore, the present study aimed to evaluate the incidence of pediculosis among general population in city/Tikrit.

Subjects and Methods

This is a cross-sectional study which was conducted in the camps of internally displaced persons (IDPs) in Tikrit province, North of Iraq (figure 1). The city has an area of about 2836 k^2. The city's population is 260,000. And located between latitudes 34° 35' 59.99" N and longitude 43° 40' 59.99" E.Tikrit has warm climate. The annual average rainfall is 180 mm.

The study included a total of 372 subjects (194 males and 178 females), mean age was 12.62± 8.65 years (range 5- 23 years) residing the United Nation camp (figure 2) for at least one years. Most families in the camp have come from a nearby Mosul province. The selected subjects were attending Ibn-Rushd Medical Center for primary health care during the period from 1st January to 30th April 2019 due to different complains other than lice infestation. A consent form was obtained from each participant or his/her parent before including in the study.

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Figure 1: Map showing the provinces of Iraq, highlighting the location of Salahiddin province and study city (Tikrit) where the camps are located

All participants were examined in the inspection room. Lice detection was performed with the aid of lenses and LED pen light along with fine-tooth comb. Firstly, the entire head was visually inspected for about 3 min, paying a special attention to the nape of head and areas behind the ears. Secondly, the head was systematically combed from the scalp to the end of the hair onto a white paper sheet. The comb was cleaned with a tissue and the tissue was carefully inspected to detect any developmental stage. A subject was considered infested when at least one of the developing stages of the parasite is detected[16].

Age, the chief illness, gender, parent educational level, family size, sleeping arrangement, bathing time/week, sharing personal tools, hair nature were obtained using preformed questionnaire.

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Figure 2: Tents of the Tikrit camp for internally displaced persons

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) for Windows (version 15.0 SPSS Inc., Illinois, USA) was used for all statistical analysis. Descriptive statistics was used to demonstrate percentage, means, and frequencies of the different variables. Cross tabulation and Chi square test were applied to determine the statistical significance of different factors. Variables which had p-value≤0.2 in this test were candidates for multivariable logistic regression for the final model [Ethiopia} The Omnibus test was used to test model performance. A p-value of ≤ 0.05 was considered significant.

Results

Demographic and personal Characteristics of the Study Population

The demographic characteristics of the study population are listed in table 1. The most common age class was 9-12 years accounting for about half of the population. All participants were attending Ibn-Rushd Medical Center/ Tikrit because they were complaining different illnesses other than pediculosis. The most common illness was diarrhea which was reported in 30.11% of the participant followed by anemia (12.53%) and diabetes (7.53%). Many other illnesses like common cold, influenza, psoriasis, hepatitis, leukemia, Hodgkin lymphoma and rickets were reported with minor frequencies. Males were predominant accounting for about two-third of study population. The percentage of illiterate fathers and mothers was 22.58% and 50.54%, respectively. Individual tent can have 2 to 9 family member, with the majority of tents (77.15%)

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had 5-7 members. Slightly more than half of the subjects (56.45%) were a school attendant in different stages of elementary and secondary schools. About two-third of investigated subjects share the same bed with the others during sleeping, while 82.26% of them was sharing their combs. Due to the shortage in water supply, the vast majority (87.63%) of the subject had on 1 or 2 times bathing/week.

Table 1: Demographic characteristics of the study population

Variables	Frequency	Percentage
Age, years		
5-8	79	21.23%
9-12	184	49.46%
>12	109	29.3%
Principle Comorbidity		
Diarrhea	112	30.11%
Anemia	38	12.22%
Diabetes	28	7.53%
Others	194	52.15%
Sex		
Male	261	70.16%
Female	111	29.84%
Father's education		
Illiterate	84	22.58%
Primary	248	66.67%
Secondary and above	40	10.75%
Mother's education		
Illiterate	188	50.54%
Primary	156	41.94%
Secondary and above	28	7.53%
Family size		
2-4	23	6.18%
5-7	287	77.15%
≥8	62	16.67%
School attendance		
No	162	43.55%
Yes	210	56.45%
Sleeping arrangement		
Alone	116	31.18%
With others	256	68.82%
Sharing combs		

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No	66	17.74%
Yes	306	82.26%
Bathing (times/week)		
1-2	326	87.63%
≥3	46	12.37%
Hair Nature		
Straight	249	66.94%
Curly	123	33.06%

Proportion of PediculosisCapitis

Out of 372 subjects included in this study, 178 (47.85%) were found to have at least one developmental stage of the *Pediculushumanuscapitis*in their hair or scalp according to visual and comb test.

Association of Demographic Characteristics with Pediculosis

Three demographic characteristics, out of six, were found to be significantly associated with pediculosis (Table 2). Younger ages (5-8 years) represented 26.97% versus 15.98% in infested and non-infested subjects respectively. Likewise, female accounted for about half of infested subjects compared with only 12.37% of non-infested subjects with a highly significant difference. Finally, mother of 65.73% of infested subjects were illiterate compared with 36.6% of non-infested subjects who had such a characteristic.

Although illiterate fathers and larger family size were markedly more frequent among infested than non-infested subjects, the differences were insignificant.

Table 2: Association of demographic characteristics with pediculosis

Variables	Infested (n= 178)	Non-infested (194)	p-value
Age, years			
5-8	48(26.97%)	31(15.98%)	0.03
9-12	84(46.07%)	100(51.55%)	
>12	46(25.84%)	63(32.47%)	
Chief morbidity			
Diarrhea	51(20.79%)	61(31.44%)	0.777
Anemia	21(11.8%)	17(8.76%)	
Diabetes	13(7.3%)	15(7.73%)	
Others	93(60.11%)	101(52.06%)	
Sex			
Male	91(51.12%)	170(87.63%)	<0.001
Female	87(48.89%)	24(12.37%)	

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Father's education			
Illiterate	32(17.98%)	52(26.8%)	0.068
Primary	129 (72.47%)	119(5.67%)	
Secondary and above	17(9.55%)	23(11.86%)	
Mother's education			
Illiterate	117(65.73%)	71(36.6%)	<0.001
Primary	56(31.46%)	100(51.55%)	
Secondary and above	5(2.81%)	23(11.85%)	
Family size			
2-4	8(4.49%)	15(7.73%)	0.115
5-7	134(75.38%)	153(78.87%)	
≥8	36(20.22%)	26(13.4%)	

Association of Personal Characteristics with Pediculosis

Table 3 demonstrates the association of personal characteristics with pediculosis. Only sleeping arrangement had significant association with pediculosis as 76.4% of infested versus 61.86% non-infested subjects share their beds with the others. Marginal significant association was found between fewer bathing (1-2 times/week) and pediculosis (p= 0,054).

Table 3: Association of personal characteristics with pediculosis

Variables	Infested (n= 178)	Non-infested (194)	p-value
School attendance			
No	73(41.0%)	89(45.88%)	0.334
Yes	105(59.0%)	105(54.12%)	
Sleeping arrangement			
Alone	42(23.6%)	74(38.14%)	0.02
With others	136(76.4%)	120(61.86%)	
Sharing combs			
No	26(14.61%)	40(20.62%)	0.129
Yes	152(85.39%)	154(79.38%)	
Bathing (times/week)			
1-2	162(91.0%)	164(84.54%)	0.054
≥3	16(9.0%)	30(15.46%)	
Hair Nature			
Straight	117(65.73%)	132(68.04%)	0.636
Curly	61(34.27%)	62(31.96%)	

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Multivariate Analysis

Multivariate logistic regression model was used to find out independent risk factors for pediculosis. All variables that give significant association as well as those having p-value ≤0.2 were entered in this model (Table 4). Almost the same variables (except family size) that had significant through χ^2, remained significant in multivariate analysis. Each of older age (<12 years) (OR= 0.53, 95%CI=0.25-0.98, p=0.048) and mother's secondary or above educational level (OR= 0.012, 95%CI= 0.02-0.06, p<0.001) were independent protective factors against pediculosis. In contrast, each of female sex (OR= 7.2, 95%CI=4.0-12.94, p<0.001), family size ≥8 (OR= 3.17, 95%CI= 1.37-13.25, p=0.039) and sharing others with the same bed (OR= 1.76, 95%CI=1.01-3.71, p= 0.044) were independent risk factors for pediculosis.

Table 4: multivariate analysis of factors associated with pediculosis

Variables	p-value	Odds ratio (95%CI)
Age, years		
5-8	0.224	1.0
9-12	0.365	0.74(0.38-1.43
>12	0.048	0.53(0.25-0.98)
Sex		
Male	<0.001	1.0
Female		7.2(4.0-12.94)
Father's education		
Illiterate	0.285	1.0
Primary	0.184	1.52(0.82-2.83)
Secondary and above	0.947	0.97(0.38-2.47)
Mother's education		
Illiterate	<0.001	1.0
Primary	<0.001	0.37(0.22-0.63)
Secondary and above	<0.001	0.12(0.28-0.67)
Family size		
2-4	0.041	1.0
5-7	0.067	3.17 (1.48-12.62)
≥8	0.039	4.32(1.37-13.25)
Sleeping arrangement		
Alone	0.044	1.0
With others		1.76(1.01-3.71
Sharing combs		
No	0.141	1.0
Yes		1.64(0.85-3.17)

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Bathing (times/week)		
1-2	0.274	1.0
≥3		0.65(0.3-1.41)

Discussion

Iraq has witnessed a lot of forced displacement after 2014 when of Islamic State of Iraq and Syria (ISIS) controlled over large parts in the North of the country. Camps used for settling the displaced families were usually lacking the standards hygiene. Accordingly, many epidemics can occur. This study aimed to investigate the prevalence of head lice infestation among IDPs in Tikrit. The overall prevalence of pediculosis in the present study was 47.85%. This is a very high figure compared with many studies [11,14,17,18,19). However, all these studies were conducted on elementary school children which implies that there are some educational programs and continuous monitoring of the general health of the pupils. Alternatively, there are several studies which reported almost similar or even higher rate than the present rate when the hygiene standards were extremely low. For example, a previous Iraqi study showed that 48.9% of pupil in primary schools in Baghdad were infested [20]. In one Iranian study, Soleimani-Ahmadi [21] investigated pediculosis in school children in 6 villages and reported an overall prevalence of 67.3%. In another study, Suleman et al. [22]reported 42% infestation rate among general population in Pakistan., while Saddozi et al. [23] found that 87% of primary schools in some Pakistani cities were infested.

Surprisingly, a previous local study on the refugees in Sulaimani Province, North of Iraq showed that only 1.12% of the camp residence were infested [24], while a similar Chinese study revealed 14.2% [25]. This high discrepancy between the two study is related to several factors the most important of which are the detection methods, sample size and the season of the year in which the study was conducted. It is well known that combing is highly sensitive method (has a sensitivity of 90%) for detection of active head lice infestation (presence of trophic stages and/or viable eggs) in children with low infestation intensity [26], and it is much better than visual examination. Supporting this conception is an Egyptian study in which the infestation arte was 14.9% and 33% using visual inspection and dermoscopy respectively [14]. Furthermore, studies during Winter season may reveal higher incidence than that conducted during summer season because of the frequent bathing during summer [27].

In the present study, multivariable logistic regression was used to identify the independent factors that may associate with the prevalence of pediculosis. Five factors were found to be independently affect such prevalence. Being older than 12 years was significantly associated with about two-fold protection against the infestation. Such a results echo several previous studies [17,28,29,30]. However, in most studies the age class 9-12 were the most affected ages, because at this age, children usually depend on themselves. The younger ages may less prone to infestation because of a complete dependence on parents for combing and washing or cleaning

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their hair which helps to early detection of infestation before its establishment. Usually older ages (<12 years) are more conscious and aware of personal hygiene, while young children are more prone to behaviors like clos contact and touching with friends and playmates.

The odds of being infested head lice was 7.2-time higher in female than males. This preponderance is in line with previous studies from Bangkok [31], Iran [32,33] Argentina [34] and Colombia [35]. This might be due to the habit of female students to have long hairs that can harbor the parasite. However, whether hair length indeed affects pediculosiscapitis infestation is still discussed controversially in the literature. [36,37]. Females also have close relationships with other girls, involving multiple and intimate body contact[38].On the other hand, boys have a tendency to brief contact, during their activities outside their houses [11]. Furthermore, using scarves, hats, combs, hair bushes, and other accessories can increase the transmission of lice between girls.

According to the present study, children with secondary or above educational level mothers have about 8.3-time less risk to have head lice compared with those with illiterate mothers. This is in agreement with other studies [15]. This might be because education is correlated with eagerness and ability to gain new knowledge and knowledge may help to have good personal hygiene practice which reduces infestation. However, in other studies maternal education was not associated [33,39].

The present finding revealed that family size ≥8 persons exposes the subjects to 4.3-fold increased risk of pediculosis. This results is consistent with studies from Greece, Malaysia and Iran, which show a significant positive association of family size with the occurrence of pediculosis [40,41]. In an overcrowded home, close contact between family members facilitates the transmission of head lice. Moreover, having more children may lead to higher infestation rates because parents pay less time per child to perform laundry and personal cleansing [15].

Finally, a person sharing the same bed with other will have 1.76-fold increase infestation risk compared with a person having a separated bed. In accordance with this result are studies in Nigeria, Venezuela, Yemen and Iran [36,39,42,43] However, some other studies did not found such association [14,44].Sharing beds is a sign of crowding and facilitates the direct and indirect head lice transmission through head-to-head contact and fomites. The trend is seemed logical because lying on the same bed with the same pillow certainly facilitate transmission the lice either through direct contact or indirectly throw the pillow.

Collectively, these data brought attention to the high prevalence of pediculosis among internally displaced persons in Tikrit camp. Each of younger age, female sex, illiterate mother's increased family member and sharing others with the same bed are the main risk factors associated with this infestation. Thus, policymakers should take the initiative step to deal with public health issue.

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Conflict of Interest

The authors declare that they have no competing interests.

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