



## PREVALENCE OF INFESTATION WITH HEAD LICE *PEDICULUS HUMANUS CAPITIS* (DE GEER) IN PRIMARY SCHOOLCHILDREN IN THE CENTRE OF ERBIL CITY, KURDISTAN REGION, IRAQ

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### ABSTRACT

The prevalence of *Pediculus humanus capitis* were investigated in three selected primary-school children age ranged from 6 to 11 years located in Erbil city, Kurdistan region – Iraq. Overall, 3490 students (14.52%) were found infested with nits, immature or adult. There was no significant difference in the prevalence between girls (28.03%) and boys (1.98%), but there was a significant difference for long hairs (24.83%) and short hairs (10.78%), Smooth hairs (9.80%) and Wrinkled hairs (28.31%) traits as well as between children of different age groups, and the studied months in which highest ratio of infestation was seen in December (19.91%) and the lowest ratio were in April (11.60%) with significant difference between the periods of study in months.

**Keywords:** Prevalence, *Pediculus humanus capitis*, Erbil, Iraq, Schoolchildren

### INTRODUCTION

Head lice infestation, or pediculosis, is the manifestation of the obligate ectoparasite, *Pediculus capitis*, which only infects the human scalp where they are connected to human hosts during all life stages and feed only on human blood. While they do not occur on pests or other animals and do not have wings and cannot jump (Gratz, 1997; Watcharawit and Mayura, 2012). However, head lice are generally spread through direct transmission via head-to-head contact with an infected person that is the major route or indirect transmission by sharing clothing, hairbrushes, hats, towels or other personal items of a person already. Head lice infestation is usually detected by three types of evidence; itching and inflammation of the scalp and neck, sighting of lice and detection of eggs attached to hair shafts (Gratz, 1997).

The clinical symptoms, pruritus, lymphadenopathy, conjunctivitis and allergic reaction of head lice infestation have been frequently seen more in infested children and chronic heavy infestation among school children may lead to anemia (Janniger and Kuflik, 1993; Burgess, 1995). In addition, head lice infestation causes not only physical symptoms but also psychological stress because children believe that head lice infestation is a result of being dirty. However, head lice are a common infection in school-age

children worldwide and according to the national pediculosis association of USA which defines head lice infestation rate more than 5% has been considered to be an epidemic (Leung *et al.*, 2005; Canadian Pediatric Society, 2008).

The status of primary schoolchildren head lice infestation in the center of Erbil city is still unclear. Therefore, the objective of this study was to determine the prevalence of head lice infestation among primary school children in Erbil city, Kurdistan region -Iraq.

### MATERIALS AND METHODS

A total of 3490 school children aged 6–11 years in Grades 1 to 6 from randomly selected three schools were examined during five months from December 2013 to April 2014. The head lice infestation was recorded by visual examination where the school children heads by using both visual inspection of scalp and fine-tooth combing to detect infestation because they were sensitive methods for head lice detection, as well as cheap and easy to perform in field (De Maeseneer *et al.*, 2000). The children would be considered as positive if there was any evidence of head lice (e.g., detected head lice adults or nymphs, and live or dead eggs) (Kokturk *et al.*, 2003). The following details were recorded for each child: age, sex, hair length and hair type. For length, hairs were

classified as short (0 to 3 cm), and long (> 10 cm). Frequency and percentage were calculated for prevalence of head lice. The associations between infestation and variables at univariate level were analyzed by using chi-square test. The level of significance was set at  $p$  less than 0.05 for all hypotheses tested in this study.

## RESULTS AND DISCUSSION

The crude prevalence rate of head lice infestation for each of the three schools surveyed at Erbil city is reported in Table 1, 2, 3, 4 and 5. The survey included a sample of 3490 school children of which 1680 were girls and 1810 were boys. There are many reports on the extent of head lice infestation, particularly among school children, however, rate of infestation varies greatly from place to place. In our study, average infestation rate was 14.52% and overall no significant differences were noticed through Chi-square test between girls and boys, within the three surveyed schools although girls had a higher infestation rate 28.03% than boys (1.98%). Similar result was noticed by (Chunge, 1986), while studying head lice infestation in among primary school children in Kenya, he reported that infestation was not sex related. Similarly, the distribution of head louse in male and females was found to be broadly similar by (Boyle, 1987). Also, there were significant differences between the surveyed schools which could be attributed to the fact that our study population consisted of children attending schools in both high and low economic level of living.

The rates of lice infestation among school children vary quite considerably across the world ranging from 5 to 78% (Bahamdan *et al.*, 1996; Al-Shawa, 2006). Furthermore, there has been reported an increase in worldwide pediculosis prevalence since 1965 (Kokturk, 2003). However, it is higher than that detected in other Middle Eastern countries, for example Egypt (5.5%) (El-Basheir and Fouad, 2002), Turkey (5.1%) (Atambay, 2007), Palestine (Al-Shawa, 2006), Islamic Republic of Iran (1.8%) (Motovali-Emami, 2008). In Jordan, as in other Arab and Islamic countries, the most serious social consequence facing affected schoolchildren is social stigma (Motovali-Emami, 2008; Hodjati *et al.*, 2008). Table (2) indicate the infestation ratio of the head louse regarding the hair length where it reached in overall (10.78%) in children's with short hair while it was (24.83%) in children's with long hair. Furthermore, Table-3 indicate the infestation ratio of the head louse regarding the hair type where it reached in overall (9.80%) in children's with smooth hair while it was (28.31%) in children's with wrinkled hair, the hair type and length characters showed to be significantly associated with infestation, longer hair increasing the likelihood of infestation. Generally, those have longer and wrinkled hair were much infested and this could be related to the lack of awareness. Long and wrinkled hair is more difficult to comb and keep it clean in comparison with short hair. There is also closer contact between primary school children and the predominance of long-haired may provide a reservoir for the survival and reproduction of lice. Furthermore, the poor hygiene also could be regarded as an explanation to such significantly results that we obtained.

Better hygiene has been defined as an important component for prevention of pediculosis.

A study from Jordan determined a significant association between more frequent hair washing and lower rate of infestation (Mohammed, 2012). Similarly, a higher pediculosis rate was detected in school children with a low frequency of bathing.

While Table-4 show the infestation ratio of the head louse regarding the age group in which the minimum infestation was 13.33% in children's of 10-11 age group and the highest ratio of infestation was 16.10% in children's of 6-7 age group, with significant differences between age groups. In agreement with international trends, children aged 6-8 years were the most frequently affected with head lice (Motovali-Emami, 2008; Hodjati *et al.*, 2008). This can be explained by behavioral factors whereby children at this age have more direct physical contact with each other. Furthermore, the degree of close contact with friends and family at this age might affect the infestation rate which may decrease as the children get older. In Baghdad city (Mahmood, 2010), demonstrate that the head louse prevalence rate was found to be highly influenced by the age (the rate was significantly higher (18.7%) among the age group of >8-10 years compared to other age groups. Another study from Jordan also reported a higher infestation rate in younger children (>9 years) (Mohammed, 2012). Whereas a survey from Greece showed that risk increased by 15% for every year of age (Soultana *et al.*, 2009). In contrast with previous researchers, we found increases prevalence of head lice with decreasing age, this may be due to careless of their mothers according to here traditions and more social activities with friends and the lack of information about pediculosis transmission routes may facilitate infestation of smaller children. Moreover Table-5 show the total infestation ratio of the head louse in each surveyed school according to the studied months in which the highest ratio of infestation was in December (19.91%) and the lowest ratio were observed in April (11.60%) with a significant differences between the studied months and this differences could be related to the cold climate during December which lead to increase the crowding of classes during playing and resting that increase the friction of body between childrens. While this direct contact seems to be decreased during march and April when the weather became changed to be less cold that provide the children's more freedom in playing and will decrease the frictions between them.

## CONCLUSION

Since the infestation rate was more prevalent among children's in Erbil primary schools so it has been considered to be an epidemic. For this, providing appropriate information to parents and weekly visiting of nurseries by health care providers in order to find infected children and referring them to health care centers can decrease the prevalence rate of head lice infestation. Also allocating proper funding for low income families to provide health care facilities for them can decrease the infestation rate.

**Table 1**

Infestation ratio of the head louse *Pediculus humanus capitis* L. in each studied school during five months December 2013-April 2014 regarding the gender.

School Name	Gender						Total	
	Male			Female			Examined Male+Female	Percentage %
	Examined Number	Infested Number	Percentage %	Examined Number	Infested Number	Percentage %		
Havalan	505	11	2.17	615	104	16.91	1120	10.26
Kamaran	660	15	2.27	450	156	34.66	1110	15.40
Siver	645	10	1.55	615	211	34.30	1260	17.53
Total	1810	36	1.98	1680	471	28.03	3490	14.52

Cal.  $\chi^2 = 4.04$ ,  $\chi^2$  tab in d.f (2) = 5.991

**Table 2**

Infestation ratio of the head louse *Pediculus humanus capitis* L. in each studied school during five months- December 2013-April 2014 regarding the hair length.

School Name	Gender						Total	
	Male			Female			Examined Male+Female	Percentage %
	Examined Number	Infested Number	Percentage %	Examined Number	Infested Number	Percentage %		
Havalan	820	72	8.78	300	43	14.33	1120	10.26
Kamaran	885	99	11.18	225	72	32	1110	15.40
Siver	855	105	12.28	405	116	28.64	1260	17.53
Total	2560	276	10.78	930	231	24.83	3490	14.52

Cal.  $\chi^2 = 8.16$ ,  $\chi^2$  tab in d.f (2) = 5.991

**Table 3**

Infestation ratio of the head louse *Pediculus humanus capitis* L. in each studied school during five months- December 2013-April 2014 regarding the hair length.

School Name	Hair type						Total	
	Smooth			Wrinkled			Examined Male+Female	Percentage %
	Examined Number	Infested Number	Percentage %	Examined Number	Infested Number	Percentage %		
Havalan	860	74	8.60	260	41	15.76	1120	10.26
Kamaran	860	80	9.30	250	91	36.4	1110	15.40
Siver	880	101	11.47	380	120	31.57	1260	17.53
Total	2600	225	9.80	890	252	28.31	3490	14.52

Cal  $\chi^2 = 11.75$ ,  $\chi^2$  tab in d.f (2) = 5.991.

**Table 4**

Infestation ratio of the head louse *Pediculus humanus capitis* L. in each studied school during five months December 2013-April 2014 regarding the age group.

Age	6-7 years			8-9 years			10-11 years		
	Examined Number	Infested Number	Percentage %	Examined Number	Infested Number	Percentage %	Examined Number	Infested Number	Percentage %
Name of School									
Havalan	370	35	9.45	485	52	10.72	265	28	10.56
Kamaran	360	69	19.16	365	63	17.26	385	39	10.12
Siver	400	78	19.5	460	70	15.21	400	73	18.25
Total	1130	182	16.10	1310	185	14.12	1050	140	13.33

Cal.  $\chi^2 = 7.77$ ;  $\chi^2$  tab in d.f (2) = 5.991

**Table 5**Total Infestation ratio of the head louse *Pediculus humanus capitis* L. in each studied school according to the studied months.

Month	December			January			February			March			April		
School	EN	IN	%	EN	IN	%	EN	IN	%	EN	IN	%	EN	IN	%
Havalan	224	31	13.83	224	25	11.16	224	23	10.26	224	19	8.48	224	17	7.58
Kamaran	222	42	18.91	222	37	16.66	222	32	14.41	222	32	14.41	222	28	12.61
Siver	252	66	26.19	252	55	21.82	252	28	11.11	252	36	14.28	252	36	14.28
Total	698	139	19.91	698	117	16.76	698	88	12.6	698	87	12.46	698	81	11.6

Cal.  $\chi^2 = 6.1$  ,  $\chi^2$  tab in d.f (2)=5.991 ; EN = Examined Number ; IN = Infested Number**ACKNOWLEDGEMENTS**

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**CONFLICT OF INTEREST**

The authors declare no conflict of interest in this study.

**AUTHORS' CONTRIBUTION**

Kurdistan N. Khidhir conducted experiments while Chra K. Mahmood participated in collecting the data and Wand K. Ali designed the experiment and prepared the manuscript with revision the contents.

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