Original Article

Epidemiological Study of Pediculosis among Primary School Children in Sulaimani Governorate, Kurdistan Region of Iraq

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Abstract

Background: Pediculosis is a common parasitic public health issue. Many socio-demographic and economic factors affect the pattern and prevalence of pediculosis. It is widely spread among pupils, particularly those in elementary schools. This study aimed to determine the prevalence of *Pediculus capitis* infestation and its related risk factors in primary school children in Sulaimani Governorate, Kurdistan Region of Iraq.

Methods: This is a cross-sectional study, overall, 2064 primary school children (aged 5–14 years) during the period from October 2019 to February 2020 were randomly examined for the presence of any stage of *Pediculosis capitis* in both urban and suburban areas. The schools were selected by multistage sampling methods. A questionnaire was sent to the parents to get consent and fill in for every single pupil. The results were computed using the chi-square test and logistic regression analysis.

Results: The overall prevalence of head lice infestation was (9.16%). The study found a significant association of *Pediculosis capitis* infestation with gender, parents' education level, mother's employment, number of siblings, and previous infestation. The older age of children (≥12 years old) and the higher-grade pupils (4th to 6th class) were more infested.

Conclusion: Head lice remain a health problem for school children. It needs collaboration of many sectors for decreasing and early detection and treatment in both urban and suburban areas since they have a close rate of infestation.

Keywords: *Pediculosis capitis*; Risk factors; Children; Primary schools; Sulaimani governorate

Introduction

Lice as compulsory ectoparasites have a long relationship with the human host, indicating co-evolution between hosts and parasites (1). Blood sprinkling lice are wingless bugs that feed on sebaceous secretions and bodily fluids. The human body hosts three kinds of lice, including head louse, body louse, and pubic louse (2, 3). The head louse is an ectoparasite of humans, and unfed lice will die within 2 to 4 days if they are kept away from people and are denied a blood meal (4, 5). Lice infection is considered as one of the world's public health problems and especially in developing countries. Depending on the circumstances especially for school children and their developmental ages, this infection is of special importance.

The distribution of lice infection occurs across the world and especially with a wide range of pediculosis has been observed in the developing countries (6, 7). In epidemiological studies in schools around the Middle East countries, the prevalence of head lice in Iran is 7.6% (8), Syria 14.3% (9), Turkey 13.1% (10), Saudi Arabia 64.2% (11), and Jordan 20.4% (12).

The status of primary school children head lice infestation in Iraq varies from 3.6% in Bagh-

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dad (13) to 20.08% in primary schools in Kirkuk (14) and 34.7% in secondary schools in the same city (15). The highest infestation was ever reported was 56% among prisoners in Erbil. In the Kurdistan Region of Iraq, the total prevalence of the *Pediculus capitis* infestation was approximately 14% among school children (16–19). The variance in infection rate might be attributed to a variety of variables, including eradication methods, the number of head-to-head interactions, diagnostic procedures, school head lice policy (no-nit policy), pesticide resistance, and general head lice awareness (20).

Direct contact with infected people is the main route of transmission of lice. In addition, the disease is transmitted indirectly through contact with infected personal items such as combs or brushes, hats, and pillows (21). Also, various factors such as personal hygiene, parents' job, parent's education, hair length, and frequency of bathing per week can affect the prevalence of infection (22). The ectoparasite is found mainly in crowded places where close contacts occur, including schools, nurseries, sports facilities, playgrounds, camps, and prisons (2). The highest incidence is observed among children aged from five to thirteen years old. Nevertheless, the incidence among the 24–36-year age group is increasing due to their exposure to infected children. Pediculosis is more common in younger girls and those in crowded families (23, 24).

The itching scalp is already caused by lice bites, saliva, and fecal matter. Depression, sleeplessness, exhaustion, educational failure, mental problem, a decline in social stigma, and allergic responses are some of the additional symptoms that might occur. Because of the societal shame associated with infestations and the vast majority of cases are unreported (5, 25).

No thorough study on head lice infestation has been conducted over recent years in Sulaimani Governorate and considering the rising trend in pediculosis frequency among children in Sulaimani schools; therefore, this study was conducted to determine the prevalence of *P. capitis* infestation and the associated risk factors among primary school children.

Materials and Methods

Study setting and participants

The school-based, cross-sectional study was performed in the primary schools (classes 1–6) inside and outside the Sulaimani governorate. The study was performed in the Sulaimani Governorate/ Kurdistan Region of Iraq between October 2019 and February 2020. At the time of the study, 333045 children were enrolled in primary schools.

Sampling and data collection

A pre-test of about 3000 children was examined and semi-structured questionnaires were sent to the children's parents to fill in and get their consent. Only the respondent and completed forms were considered in the study. The sample size was estimated via using this formula: $n = \frac{z^2 X P(1-P)}{d^2}$, where *n* is the sample size, z is the confidence level at 95% (1.96), P is the expected prevalence (50%), and margin of error (d), at 5%. Based on this formula, the minimum sample size needed was 385 pupils; however, the sample size was increased to include all eligible pupils in the selected schools to increase the power and validity of the study. A total of 2064 primary school children (aged 5–14 years), in which 1046 boys and 1018 girls were included in this study from nine primary schools of both urban and suburban areas.

Multi-step, stratified, cluster sampling was used. The total number of children in the primary schools was divided into urban and suburban. Inside the urban areas (Sulaimani City) was also divided into western and eastern zones. The number of chosen schools was determined proportionally to the whole population. The schools were selected randomly among the areas. When a school was selected it was considered as a cluster and all the children’s heads

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from the first to the sixth classes were examined. Special attention was given to the back of the ears and neck area. The examination was done by the researchers and by at least nurses that manage the school health of that area. The infested child was recorded secretly and checked in the questionnaire form. The questions in the form were designed about sex, age, class, education levels of parents, mother's workplace, family size, and income. Hygiene-related questions were also added, which include frequency of head washing, combing, bathing, hair length and style, head wash materials, sharing bed and tools, and history of infestation.

Statistical analysis

The data were analyzed in the statistical software STATA v.14. Categorical variables were defined as the number and percentage (%) and analyzed using the chi-square test. For finding the relationship between the head lice infestation and potential predictors, the univariate logistic regression model was first used and then a multivariate logistic regression was used to calculate the adjusted Odds Ratios (ORs) for compromising the risk factors. Any variable having a P-value less than 0.20 was chosen to be entered in the multivariate logistic analysis. In both logistic regression models besides OR 95% confidence intervals (95% CI) were presented. A P-value of less than 0.05 was considered statistically significant.

Results

Head lice infestation was found in 189 school children out of 2064 one examined; the overall infestation rate was 9.16%. The infestation was significantly more common among girls (18.7%) than boys (1.82%). The mean and median age of the infested pupils were 9.4 and 9 years old, respectively. The rate of pediculosis was increasing as the age group increased as shown in (Table 1). The prevalence of *P. capitis* was higher significantly among the 6th class and aged ≥ 12 as well as among those who had 4–6 siblings and housewife mothers, parents with primary education levels, long or wavy hair, and those with the previous infestation. However, family income, living in suburban areas were not significantly associated with head lice. Also, none of the hygiene factors were found to have significant relation with head lice (Table 2).

Univariate analysis showed that prevalence of head lice was related to sex, age group, class grade, father and mother's education, mother' employment, number of siblings, the income of the family, hair length, sharing the bed, and either if the child had the previous infestation of pediculosis or not (Table 3). However, in the multivariate logistic regression model, 12 variables were adjusted as it is shown in (Table 4). It was found that girls were 12 folds more at risk to get head lice than the boys (OR= 12.21, 95% CI= 2.46 to 60.51). The odds of developing pediculosis are two times higher among the second class when compared with the first class (OR= 2.18, 95% CI= 1.19 to 3.99). Surprisingly, children whose fathers completed primary and secondary schools were 91% and twice more prone to have head lice than the illiterate ones (OR= 1.19, 95% CI= 1.08 to 3.38 and OR= 2.0, 95% CI= 1.09 to 3.67, respectively). In opposite, mothers who completed secondary school had their children were 42% less likely to have pediculosis compared to illiterate mothers (OR= 0.58, 95% CI= 0.35 to 0.98). Likewise, the employed mothers' children had less likelihood of developing head lice 55% than the children whose mothers were housewives (OR= 0.55, 95% CI= 0.23 to 0.88). The greater number of siblings increases the greater risk of pediculosis; however, the significance level of those who live with more than six siblings was almost on the borderline. Pupils who had been infested with a previous attack of the parasite had two folds more likely to get it again than those who get it for the first time (OR= 2.31, 95% CI= 1.56 to 3.41).

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Table 1. Characteristics of pediculosis in the infested and noninfested primary school children, 2019–2020

Characteristics	Examined Pupils n (%)	Infested pupils n (%)	P value
Age (years)			0.023
6–8	870 (42.15)	65 (7.47)	
9–11	920 (44.57)	89 (9.67)	
≥ 12	274 (13.28)	35 (12.77)	
Sex			<0.001
Boys	1046 (50.68)	19 (1.82)	
Girls	1018 (49.32)	170 (16.70)	
School Grade			0.032
1	425 (20.59)	21 (4.94)	
2	346 (16.76)	34 (9.83)	
3	337 (16.33)	33 (9.79)	
4	345 (16.72)	36 (10.43)	
5	305 (14.78)	30 (9.84)	
6	306 (14.83)	35 (11.44)	
Residency			0.891
Urban	1126 (54.55)	104 (9.24)	
Sub-urban	938 (44.45)	85 (9.06)	
No of Siblings			0.001
0–3	1560 (75.58)	121 (7.76)	
4–6	441 (21.37)	60 (13.61)	
≥ 7	63 (3.05)	8 (12.70)	
Education level of the father			< 0.001
Illiterate	261 (12.64)	19 (7.28)	
Primary	723 (35.03)	85 (11.76)	
Secondary	646 (31.30)	70 (10.84)	
Higher Education	434 (21.03)	15 (3.46)	
M_{other} Education level			< 0.001
Illiterate	372 (18.02)	43 (11.56)	
Primary	659 (31.93)	80 (12.14)	
Secondary	565 (27.37)	43 (7.61)	
Higher Education	468 (22.67)	23 (4.91)	
Occupation of the mother			< 0.001
Housewives	1552 (75.19)	170 (10.95)	
Work outside	512 (24.81)	19 (3.71)	
Family Income			0.137
Low	178 (8.64)	21 (11.80)	
Medium	1218 (65.13)	129 (9.58)	
High	495 (26.47)	39 (7.30)	
Hair Length			< 0.001
Short	1056 (51.16)	21 (1.99)	
Long	1008 (48.84)	168 (16.67)	
Hairstyle			0.018
Straight	1507 (73.01)	122 (8.10)	
Curly	158 (7.66)	21 (13.29)	
Wavy	399 (19.33)	46 (11.53)	
Previous infestation			< 0.001
Yes	234 (11.34)	52 (22.22)	
No	1830 (88.66)	137 (7.49)	
Total	2064 (100)	189 (9.16)	

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Table 2. Association between hygiene factors and the head louse infestation, 2019–2020

Characteristics	Examined Pupils n (%)	Infested pupils n (%)	P value
Frequency of body washing per week			0.448
≤ 1 time	60 (2.91)	3 (5.0)	
2 times	912 (44.19)	81 (8.88)	
≥ 2 times	1092 (52.91)	105 (9.62)	
Daily hair combing			0.753
Less than once	1179 (57.12)	110 (9.33)	
Once or more	885 (42.88)	79 (8.51)	
Sharing beds			0.169
Yes	725 (35.13)	75 (10.34)	
No	1339 (64.87)	114 (8.51)	
Sharing instruments			0.254
Yes	333 (16.13)	25 (7.5)	
No	1731 (83.87)	164 (9.47)	
Cleansing material for hair washing			0.860
Shampoo	1934 (93.70)	117 (9.20)	
Soap	16 (0.78)	1 (6.25)	
Both	114 (5.52)	11 (9.65)	

Table 3. Univariate logistic regression for predictors of head louse infestation among school children, 2019, 2020

Predictors	Crude OR (95% CI)	P value
Sex		<0.001
Male	1	
Female	10.84 (6.69–17.56)	
Age		0.006
6–8	1	
9–11	1.33 (0.95–1.85)	
≥ 12	1.81 (1.17–2.80)	
Class		0.006
1st	1	
2ns	2.10 (1.19–3.86)	
3rd	2.09 (1.84–3.68)	
4th	2.09 (1.28–3.92)	
5th	2.10 (1.18–3.74)	
6th	2.49 (1.41–4.36)	
Father's education		0.007
level	1	
Illiterate	1.70 (1.01–2.85)	
Primary	1.55 (0.91–2.63)	
Secondary	0.46 (0.23–0.91)	
Higher education		
Mother's education		<0.001
level	1	
Illiterate	1.06 (0.71–1.59)	
Primary	0.63 (0.40–0.98)	
Secondary	0.40 (0.23–0.67)	
Higher education		
Mother's Occupation		<0.001
Housewives	1	
Work outside	0.31 (0.19–0.51)	
No. of siblings		<0.001

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Table 3. Continued ...

≤ 3	1	
4–6	1.87 (1.35–2.60)	
≥ 7	1.73 (0.81–3.72)	
Income		0.046
Low	1	
Medium	0.79 (0.48–1.29)	
High	0.59 (0.33–1.03)	
Weekly Head washing		0.256
Once	1	
2 times	4.54 (0.62–33.39)	
> 3 times	4.87 (0.67–35.64)	
Combing frequency		0.753
Less than once	1	
Once or more	0.95 (0.70–1.29)	
Cleansing material		0.914
Shampoo		
Soap	0.66 (0.09–5.04)	
Both	1.06 (0.56–2.01)	
Hair Length		<0.001
Short	1	
Long	9.86 (6.21–15.66)	
Hairstyle		0.015
Straight	1	
Curly	1.18 (0.68–2.04)	
wavy	0.68 (0.47–0.97)	
Sharing instruments		0.256
No	1	
Yes	0.78 (0.50–1.20)	
Sharing bed		0.169
No	0	
Yes	1.24 (0.91–1.68)	
History of infestation		< 0.001
No	1	
Yes	3.53 (2.48–5.03)	

Table 4. Multivariate logistic regression for predictors of head louse infestation among school children

Predictors	Adjusted OR (95% CI)	P value
Sex		
Male	1	
Female	12.21 (2.46–60.51)	0.002
Age		
6-8	1	
9-11	1.11 (0.56–2.17)	0.772
≥12	1.80 (0.73–4.50)	0.204
Class		
1st	1	
2ns	2.18 (1.19–3.99)	0.012
3rd	1.86 (0.91–3.82)	0.091
4th	1.76 (0.72–4.32)	0.218
5th	1.55 (0.62–3.88)	0.352
6th	1.56 (0.57–4.25)	0.384
Father's education level		
Illiterate	1	
Primary	1.91 (1.08–3.38)	0.026

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Table 4. Continued ...

Secondary	2.00 (1.09–3.67)	0.025
Higher education	0.34 (0.23–1.75)	0.540
Mother's education level		
Illiterate	1	
Primary	0.89 (0.57–1.39)	0.617
Secondary	0.58 (0.35–0.98)	0.038
Higher education	0.93 (0.44–1.96)	0.841
Mother's Occupation		
Housewives	1	
Work outside	0.45 (0.23–0.88)	0.020
No. of siblings		
≤3	1	
4-6	1.47 (1.01–2.13)	0.044
≥7	2.33 (0.99–5.47)	0.052
Income		
Low	1	
Medium	1.79 (0.48–1.29)	0.859
High	0.59 (0.33–1)	0.438
Hair Length		
Short	1	
Long	0.92 (0.20–4.27)	0.913
Hairstyle		
Straight	1	
Curly	1.08 (0.59–1.97)	0.798
wavy	0.99 (0.42–1.47)	0.973
Sharing bed		
No	0	
Yes	1.16 (0.82–1.63)	0.400
History of infestation		< 0.001
No	1	
Yes	2.31 (1.56–3.41)	

Discussion

Head louse infestation is a widespread health concern that is most frequent in elementary schools worldwide, particularly in developing countries such as Iraq's Kurdistan region (8). It is most often affects children between the ages of 5 and 13 (4, 26). Worldwide, pediculosis has seen a considerable rise in recent decades as a consequence of inappropriate application of pesticides, louse resistance to conventional pesticides, and misdiagnosis (27, 28). According to the present research, the prevalence rate of head louse infection is 9.16 percent. According to the National Pediculosis Association of the United States of America's definition of an epidemic, 5% of the children in the study region are infected (9); hence, based on the findings of this research, head pediculosis will become epidemic in Sulaimani Governorate schools if ignored.

The overall prevalence of *P. capitis* among primary school children in the Sulaimani governorate was 9.16%. Previous epidemiological studies in Iraq reported different prevalence rate, 14.52% and 14% in Erbil (19), 14% in Najaf (17), 14.4% in Kalar (29), 21.9% in Tikrit (14), 3.6% in Baghdad (13) and 5.4% in Basrah (30). Although the prevalence rate in this study is less than in other cities except for Baghdad and Basrah, it demonstrates that *P. capitis* remains a significant public health issue in the Sulaimani governorate among school-aged children. Population density, school head lice policies, eradication techniques, number of close contacts per person, overcrowded housing, econom-

ic conditions, family income, and lack of care for head louse infection may all influence the infestation rate (20).

Girls had much greater infection rate than boys (16.1 and 1.82%, respectively); the association between sex and head lice was extremely significant, with a P-value of 0.002 in the final model of multivariate analysis. This finding corroborated the findings of many previous research papers (31–34).

Probably the disparity in head lice frequency is likely attributable to a variety of factors, including the behavioural differences between boys and girls, the appropriateness of female hair as a breeding ground for head lice, and girls have closer, prolonged, and more intimate head contacts in small groups (35, 36). Although, many studies suggested that may be the long hair in females is another reason, whereas a non-significant relationship was found between long hair and pediculosis in the current study.

The findings of this study are consistent with other research studies (10, 35, 37), which indicated that the prevalence of pediculosis was lower in children with educated parents than in children with uneducated parents, indicating that literacy plays a significant role in decreasing the prevalence of pediculosis. They also accord with our earlier observations, which showed that the children with mother's employment outside the home were less liable to head lice infestation. This may be due to the mothers who work outside may have higher educational level and their health awareness status could be greater.

In line with many prior researches, poor family incomes are predisposed to *P. capitis* (38, 39). However, this finding was not significant in the last model of analysis in the current study.

A significant prevalence of infestation was found among school children from households with larger siblings. Larger families may pay less attention to their children's hair care, putting them at a greater risk of infestation due to interaction with their siblings and house overcrowding. Close contact between siblings and a crowded household facilitates head lice transmission, particularly if another family member has been involved (40).

Moreover, the prevalence of *P. capitis* was directly associated with the history of the disease. It seems possible that the recurrent infestation is due to misdiagnosis, non-adherence to proper recommendations, poor product quality, use of alternative traditional remises such as kerosene, and/or parasite resistance to the available product (41–43).

Head louse infestation was more common among pupils with curly hair and long hair in the present study. However, in the multivariate analysis, they were not significant. In general, the lack of a major difference between the head louse prevalence rate and the hair length is consistent with previous publications. Contrary to popular belief, hair cutting does not seem to lessen the incidence of head louse infestation in school children (44).

Living inside and outside the city was not made a significant difference in the rate of *P. capitis* infestation. This can be explained by the number of pupils and the rate of infestation in both urban and suburban schools were close. Besides, the living standards, medical care system regarding head lice, and availability of anti-pediculosis agents are almost equal in both regions. The sample did not involve rural schools except one, which may have a higher index of suspicion.

None of the hygiene factors were found to be related to head louse infestation in this study. Some works of literature have shown that there is no significant association between head lice and inadequate cleanliness (3). Head louse transmission may readily occur through head-to-head contact, despite being sanitary. The increased incidence of pediculosis among individuals who were washed more often may be attributed to severe itching owing to infestation (3).

This study has some limitations. First, because the visual screening was used to identi-

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fy an infestation, some students with very low levels of head lice may have gone unnoticed. Second, the lockdown of the school due to COVID-19 did not let us cover all the schools that had been planned. Therefore, the researchers could not take any private schools. Also, because there were so many children who took part in this study, we didn't have access to some socioeconomic and cultural parameters. Third, like other cross-sectional studies, this study was not able to detect causation. The strengths of this study could be expressed as the first community-based study in Sulaimani Governate. Secondly, the sample size of this study was relatively high. Fortunately, the examination of the students accompanied by educational advice on personal hygiene especially hair hygiene.

Conclusion

The prevalence of *P. capitis* infestation among primary school children was (9.16%). It is more common among girls (16.70%) than in boys (1.82%), and more frequent in 6th class grade (11.44%) and ≥12 years old children (12.77%). The rate of infestation was almost equal among pupils who live in urban and suburban areas. Parents' illiteracy, housewife mother, crowded families, and history of infestation were considered as risk factors. For successful treatment of pediculosis, it is necessary to raise the awareness of the parents, teachers, and schools regarding the phenomenon through an educational program.

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Ethical Considerations

This study was reviewed and approved by the Ethical Committee of Technical College of Health, Sulaimani Polytechnic University (No. CH00026). The official permission was obtained from the General Directorate of Health and General Directorate Education, Principals of the schools, class teachers, and social workers. The signed letters of informed consent before the study were obtained from the pupil's parents. All pupils had the right not to participate in the study.

Conflict of interest statement

The authors declare that no conflict of interest exists.

References

1. Demastes JW, Spradling TA, Hafner MS, Spies GR, Hafner DJ, Light JE (2012) Cophylogeny on a fine scale: Geomydoecus chewing lice and their pocket gopher hosts, Pappogeomys bulleri. J Parasitol. 98(2): 262–270.
2. Maramazi HG, Sharififard M, Jahanifard E, Maraghi E, Sourestani MM, Malehi AS, Rasaei S (2019) *Pediculosis humanus capitis* prevalence as a health problem in girl's elementary schools, southwest of Iran (2017–2018). J Res Health Sci. 19 (2): e00446.
3. Mohammed A (2012) Head lice infestation in schoolchildren and related factors in Mafraq governorate, Jordan. Int J Dermatol. 51(2): 168–172.
4. Rukke BA, Soleng A, Lindstedt HH, Ottesen P, Birkemoe T (2014) Socioeconomic status, family background and other key factors influence the management of head lice in Norway. Parasitol Res. 113(5): 1847–1861.

5. Gholamnia Shirvani Z, Amin Shokravi F, Sadat Ardestani M (2013) Evaluation of a Health Education Program for Head Lice Infestation in Female Primary School Students in Chabahar City, Iran. Arch Iran Med. 16(1): 42–45.
6. Gutiérrez MM, González JW, Stefanazzi N, Serralunga G, Yañez L, Ferrero AA (2012) Prevalence of *Pediculus humanus capitis* infestation among kindergarten children in Bahía Blanca City, Argentina. Parasitol Res. 111(3): 1309–1313.
7. Salehi S, Ban M, Motaghi M (2014) A study of head lice infestation (*Pediculosis capitis*) among primary school students in the villages of Abadan in 2012. Int J of Com Based Nurs Mid. 2(3): 196–200.
8. Hatam-Nahavandi K, Ahmadpour E, Pashazadeh F, Dezhkam A, Zarean M, Rafiei-Sefiddashti R, Salimi-Khorashad A, Hosseini-Teshnizi S, Hazratian T, Otranto D (2020) *Pediculosis capitis* among school-age students worldwide as an emerging public health concern: a systematic review and meta-analysis of past five decades. Parasitol Res. 119(10): 3125–3143.
9. Ismail M, Kabakibi M, Al-Kafri A (2018) Epidemiology of *pediculosis capitis* among schoolchildren in Damascus, Syria. Indian J Paediatr Dermatology. 19(4): 331–334.
10. Gulgun M, Balci E, Karaoğlu A, Babacan O, Türker T (2013) *Pediculosis capitis*: Prevalence and its associated factors in primary school children living in rural and urban areas in Kayseri, Turkey. Cent Eur J Public Health. 21(2): 104–108.
11. Moussa S, El-edailli S, Alshammari R, Alobaidi S, Al-reshidi HF, Alshammari HN (2018) Knowledge and behavioral practice of *pediculosis* in Hail Region, Saudi Arabia. Int J Med. 4(5): 11–21.
12. Khamaiseh AM (2018) Head Lice among Governmental Primary School Students in Southern Jordan: Prevalence and Risk Factors. J Glob Infect Dis. 10(1): 11–15.
13. Al-Mendalawi, MD, Ibrahim JG (2012) Pattern of dermatoses in Iraqi children. EMHJ-Eastern Mediterr Heal J. 18(4): 365–371.
14. Suleiman AK, Magar EA (2014) Study of Distribution of Head Lice *Pedicalus humanus* Among The Students of Many Primary School in Kirkuk Province *Pediculus humanus capitis* De Geer (Anoplura: Pediculidae). Tikrit J Pure Sci. 19 (6): 1–6.
15. Kadir MA, Taher HM, Ali IS (2017) Head lice infestation among local and displaced secondary school girls and its effect on some haematological parameters in Kirkuk City. Kirkuk Univ Journal-Scientific Stud. 12(4): 1–10.
16. Khidhir KN, Mahmood CK, Ali WK (2017) Prevalence of infestation with head lice *Pediculus humanus capitis* (De Geer) in primary schoolchildren in the centre of Erbil City, Kurdistan Region, Iraq. Pak Entomol. 39(2): 1–4.
17. Salih HA, Shamran SJ, Al-shimerty DF (2017) Prevalence of *pediculosis capitis* (head lice) and treating among children in Al-Najaf City, Iraq. Al-Kufa Univ J Biol. 9(3): 179–183.
18. Obaid HM (2018) Home remedies for *Pediculus humanus capitis* infection among school children. Our Dermatology Online/ Nasza Dermatologia Online. 9(2): 131–136.
19. Abdulla BS (2015) Morphological study and Prevalence of head lice (*Pediculus humanus capitis*) (Anoplura: Pediculidae) infestation among some primary school students in Erbil City, Kurdistan Region. ZJPAS. 27(5): 29–36.
20. El-sayed MM, Toama MA, Abdelshafy AS, Esawy AM, El-naggar SA (2017) Prevalence of *pediculosis capitis* among primary school students at Sharkia Governorate by using dermoscopy. Egypt J Dermatol Venerol. 37(2): 33–42.

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21. Nejati J, Keyhani A, Tavakoli Kareshk A, Mahmoudvand H, Saghafipour A, Khoraminasab M, Tavakoli Oliaee R, Mousavi SM (2018) Prevalence and risk factors of pediculosis in primary school children in south west of Iran. Iran J Public Health. 47(12): 1923–1929.
22. Moosazadeh M, Afshari M, Keianian H, Nezammahalleh A, Enayati AA (2015) Prevalence of head lice infestation and its associated factors among primary school students in Iran: a systematic review and meta-analysis. Osong public Heal Res Perspect. 6(6): 346–356.
23. Meister L, Ochsendorf F (2016) Head Lice. Dtsch Arztebl Int. 113(45): 763–772.
24. Albashtawy M (2017) Pediculosis in school sitting: What is the role of school nurses?. Iran J Public Health. 46(9): 1301–1302.
25. Yousefi S, Shamsipoor F, Salim Abadi Y (2012) Epidemiological Study of Head Louse (*Pediculus humanus capitis*) Infestation among Primary School Students in Rural Areas of Sirjan County, South of Iran. Thrita J Med Sci. 1(2): 53–56.
26. Davarpanah MA, Kazerouni AR, Rahmati H, Neirami RN, Bakhtiary H, Sadeghi M (2013) The prevalence of *pediculus capitis* among the middle schoolchildren in Fars Province, southern Iran. Casp J Intern Med. 4(1): 607–610.
27. Hazrati Tappeh K, Chavshin AR, Mohammadzadeh Hajipirloo H, Khashaveh S, Hanifian H, Bozorgomid A, Mohammadi Bavani M, Jabbari Gharabag D, Azizi H (2012) *Pediculosis capitis* among primary school children and related risk factors in Urmia, the main city of West Azarbaijan, Iran. J Arthropod Borne Dis. 6(1): 79–85.
28. Boukan A, Mohebi L, Rashti R, Boukan A, Oshaghi MA (2022) Pediculosis capitis; the importance of accurate differentiation of nits and hair casts. Int J Trop Insect Sci. 42(1): 647–650.
29. Amin OM, Mahmood HF, Muhammed AA, Hussein SA, Mohammed LQ, Rostam BW (2019) Prevalence of head lice, *Pediculus humanus capitis* L. and their relation to anxiety among primary school children in Kalar District, Kurdistan Region-Iraq. J Garmian Univ. 6(2): 330–338.
30. Al-Rubaiy KK, Habib OS, Ebrahim S (2004) Pattern of skin diseases among primary school children in Basrah, southern Iraq. Med j Basrah Univ. 22(2): 41–43.
31. Oh JM, Lee IY, Lee WJ, Seo M, Park S (2010) Prevalence of *pediculosis capitis* among Korean children. Parasitol Res. 107 (6): 1415–1419.
32. Oncu E, Vayisoglu SK, Guven Y, Onen E, Bulut ER, Cekic H, Ozturk F (2018) The prevalence of *pediculus capitis* in primary schools in a city of Turkey and the efficacy of health education in treatment. Med Sci. 7(3): 469–475.
33. Nazari M, Goudarztalejerdi R, Anvari Payman M (2016) *Pediculosis capitis* among primary and middle school children in Asadabad, Iran: An epidemiological study. Asian Pac J Trop Biomed. 6(4): 367–370.
34. Khakshoor-Gharehsoo Z, Peyman N (2017) The effect of education to increase the awareness and preventive behaviors of pediculosis in female school students according to the health belief model in Mashhad. Health Education and Health Promotion. 5(2): 33–43.
35. Nor Faiza MT, Rampal L, Lye MS, Lim PY, Suhainizam MS (2018) Recurrent infestation with *pediculosis capitis* among aged 10–11 students in Hulu Langat, Selangor. Int J Med Sci Public Health. 5 (4): 95–108.
36. Saghafipour A, Nejati J, Zahraei Ramazani A, Vatandoost H (2017) Prevalence and risk factors associated with head louse (*Pediculus humanus capitis*) in Central Iran. Int J Pediatr. 5(7): 5245–5254.
37. Kokturk A, Baz K, Bugdayci R, Sasmaz T, Tursen U, Kaya TI, Ikizoglu G (2003)

The prevalence of *pediculosis capitis* in school children in Mersin, Turkey. Int J Dermatol. 42(9): 694–698.
38. Karakuş M, Arici A, Töz SÖ, Özbel Y (2014) Prevalence of head lice in two socio-economically different schools in the center of Izmir City, Turkey. Turkiye Parazitol Derg. 38(1): 32–36.
39. Djohan V, Angora KE, Miezan S, Bédia AK, Konaté A, Vanga-Bosson AH, Kassi FK, Kiki-Barro PCM, Yavo W, Menan EI (2020) *Pediculosis capitis* in Abidjan, Côte d'Ivoire: Epidemiological profile and associated risk factors. Parasite Epidemiol Control. 11: e00159.
40. Nordin RB, Che WA, Ibrahim NA, Naing L (2006) Prevalence and associated factors of head lice infestation among primary school children in Kelantan, Malaysia. Southeast Asian J Trop Med Public Health. 37(3): 536–543.
41. Jones KN, English JC III (2003) Review of common therapeutic options in the United States for the treatment of pediculosis capitis. Clin Infect Dis. 36(11): 1355–1361.
42. Gunning K, Pippitt K, Kiraly B, Sayler M (2012) Pediculosis and Scabies: A Treatment Update. Am Fam Physician. 86(6): 535–541.
43. Feldmeier H (2014) Diagnosis of Head Lice Infestations: An Evidence-Based Review. Open Dermatol J. 4(1): 69–71.
44. Kassiri H, Esteghali E (2016) Prevalence Rate and Risk Factors of *Pediculus capitis* Among Primary School Children in Iran. Arch Pediatr. 4(1): e26390.