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Incidence of Pediculosis in Primary School Age Group in Shebin Elkom City, Egypt

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ABSTRACT

Background: Head lice infestation (Pediculosis capitis) is a widespread public health issue among school-aged children, yet its hematological effects and the role of hygiene in infestation rates remain poorly understood.

Objectives: To determine the prevalence of head lice infestation among primary school students, identify associated demographic and risk factors, and evaluate potential hematological alterations in affected individuals.

Patients and Methods: A cross-sectional study was conducted in Menoufia during the first quarter of 2025, involving 242 students from two schools. Data on demographic characteristics, hygiene habits, and previous lice treatment were collected through structured questionnaires. Clinical examinations confirmed infestation based on the presence of live lice or nits. A complete blood count (CBC) analysis was performed. Statistical analysis was conducted using IBM SPSS version 20.0, with significance set at $p < 0.05$.

Results: The prevalence of head lice infestation was 16.5%, with significantly higher rates among students residing in rural areas (67.5 percent, $p = 0.002$). Bathing and hair combing frequency were strongly associated with infestation rates ($p < 0.001$). Hematological analysis revealed significantly lower hemoglobin levels ($p < 0.001$) and elevated eosinophil counts ($p = 0.001$) in infested students.

Conclusion: Head lice infestation persists in rural areas due to poor hygiene and ineffective treatments. Hematological findings indicate a possible immune response, highlighting the need for better screening, hygiene education, and improved treatment strategies.

Keywords: Hematological effects, Head lice infestation, Pediculosis capitis, Public health, School children.

INTRODUCTION

Head lice infestation (pediculosis capitis) is a common public health concern affecting individuals of all ages, with school-aged children being particularly vulnerable, irrespective of their socioeconomic background [1,2]. Transmission occurs primarily through direct head-to-head contact**,** although indirect transmission via shared personal items—such as combs, hats, and bedding—is also possible [3]. Girls are more frequently affected**,** likely due to factors such as longer hair and increased frequency of close social interactions [4,5]. In addition to the presence of lice and nits, infestation often causes physical discomfort, including intense itching, excoriated skin lesions, dandruff, and sleep disturbances. In some cases, secondary bacterial infections may develop due to persistent scratching [6,7]. The psychological impact includes stress, embarrassment, and reduced self-confidence, while social effects range from stigma and bullying to family strain [8,9,10]. Academic performance may suffer due to absenteeism and loss of concentration [1].

Various factors influence prevalence, including socioeconomic conditions, household size, previous infestations, hygiene habits, and personal item sharing [2,3,4]. Primary school children are particularly vulnerable, and infestation rates vary across urban and rural settings [5]. While prevalence and risk factors have been widely studied, qualitative research on personal experiences—particularly among adolescent girls—remains limited [6,7]. Effective control requires epidemiological data and risk factor identification specific to each community [8]. Studies in Jordan, Pakistan, and Saudi Arabia highlight how demographic and hygiene-related factors contribute to infestation [9,10].

The aim of this work was to determine the prevalence of head lice infestation among primary school students, identify associated demographic and risk factors, and evaluate potential hematological alterations in affected individuals.

PATIENTS AND METHODS

This cross-sectional study included a total of 242 students from two primary schools in Menoufia Governate, screened for head lice infestation. during the first quarter of 2025.

Various sociodemographic and lifestyle factors were assessed, including gender, age, place of residence, number of siblings, frequency of bathing and hair combing, history of previous head lice treatment, and reported clinical symptoms.

Inclusion Criteria: Students attending during the study period, students who provided assent and whose guardians gave informed consent, and students with no prior medical conditions affecting scalp health that could confound results.

Exclusion Criteria: students with known dermatological conditions affecting the scalp (e.g., psoriasis, seborrheic dermatitis) and students whose guardian declined participation in the study.

Data were collected using a structured questionnaire, which was followed by a clinical examination to assess the presence of head lice infestation. Infestation was defined as the detection of live lice or viable nits upon

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inspection of the scalp and hair. Additionally, a Complete Blood Count (CBC) was performed for all participants using Sysmex XN-Series analyzers, manufactured by Sysmex Corporation, Japan.

Ethical Considerations:

This study was approved by the Ethical Committee of Menoufia University, Faculty of Medicine (ID number: 2/2024DERMA6) and conducted in accordance with the Declaration of Helsinki. Informed consent was obtained from the student guardians, ensuring voluntary participation of all students. Confidentiality of personal data was strictly maintained, and ethical guidelines for research involving human subjects were rigorously followed.

Statistical analysis

Data processing was conducted using IBM SPSS (v20.0, IBM Corp, 2011) to ensure systematic statistical analysis. Both descriptive and inferential methods were employed. For descriptive analysis, categorical variables were summarized through frequencies and percentages, while quantitative data were represented using measures such as range, mean, standard deviation, median, and interquartile range (IQR). Normality of distribution was assessed using the Kolmogorov-Smirnov test, with statistical significance set at 5%. Inferential analysis involved multiple tests to assess group differences. The chi-square test evaluated associations between categorical variables, with Monte Carlo correction applied when expected cell counts fell below 5 in over 20% of cases. For quantitative data, the Student t-test was used for normally distributed variables, while the Mann-Whitney test was applied to non-normally distributed variables.

RESULTS

Among the 242 students included in the study, 40 of them were diagnosed with head lice, representing a prevalence rate of 16.5 percent. The remaining 202 students, accounting for 83.5 percent of the sample, were free from infestation. These findings indicated the presence of lice within the study population, though the majority of students remained unaffected. (Table 1)

Assessing demographic characteristics revealed notable trends. Female students had a higher infestation rate at 72.5 percent compared to male students at 27.5 percent. However, this difference did not reach statistical significance with a p-value of 0.052. The mean age of infested students was slightly higher at 8.88 years compared to 8.53 years in non-infested students, though this difference was also not statistically significant with a p-value of 0.186. (Table 1)

Residency was found to be a significant factor in infestation rates. Students residing in rural areas had a significantly higher prevalence of lice at 67.5 percent compared to urban students at 32.5 percent with a p-value of 0.002. This suggested that environmental and hygiene conditions in rural areas may contribute to an increased risk of infestation. (Table 1)

The number of siblings was assessed as a potential contributing factor. However, no significant association was observed with a p-value of 0.302. Despite this, students with three siblings exhibited a higher infestation rate at 30 percent compared to those with fewer siblings, suggesting that household crowding may play a role in transmission. (Table 1)

Table (1): Comparison between the two studied groups according to demographic data

	Total (n = 242)		Have lice (n = 40)		Don't have lice (n = 202)		p
	No.	%	No.	%	No.	%	
Gender							
Male	100	41.3	11	27.5	89	44.1	0.052
Female	142	58.7	29	72.5	113	55.9	
Age (years)							
Min. – Max.	6.0 – 12.0		7.0 – 12.0		6.0 – 11.0		0.186
Mean ± SD.	8.59 ± 1.48		8.88 ± 1.34		8.53 ± 1.51		
Median (IQR)	8.50 (7.0 – 10.0)		9.0 (8.0 – 10.0)		8.0 (7.0 – 10.0)		
Residency							
Rural	109	45.0	27	67.5	82	40.6	0.002*
Urban	133	55.0	13	32.5	120	59.4	
Number of brothers							
No	21	8.7	3	7.5	18	8.9	0.302
1	57	23.6	7	17.5	50	24.8	
2	110	45.5	16	40.0	94	46.5	
3	48	19.8	12	30.0	36	17.8	
4	6	2.5	2	5.0	4	2.0	

IQR: **Inter quartile range**, SD: **Standard deviation, t: Student t-test,** χ^2: **Chi square test**
p: p value for comparing between the studied groups, *: Statistically significant at $p \leq 0.05$

Bathing and hair combing frequency were significantly associated with head lice infestation. Students who bathed one to two times daily had the lowest prevalence of infestation at 5.0 percent, whereas those who bathed weekly showed a considerably higher infestation rate of 47.5 percent.

Similarly, students who combed their hair daily had a significantly lower infestation rate (12.5%) compared to those who combed their hair three to four times per week, who exhibited an infestation rate of 55.0%. These differences were statistically significant, with p-values < 0.001 for both bathing and hair combing frequency. These findings underscore the critical role of regular personal hygiene in the prevention of head lice infestation (Table 2).

Analysis of previous lice treatment also revealed a significant association with infestation rates. Among the study participants, 66.5% had never received prior treatment, while 33.5% reported having undergone treatment previously. Notably, 47.5% of infested students reported prior treatment, compared to 30.7% among non-infested students. This difference was statistically significant (p = 0.040), suggesting that previous treatment may not provide lasting protection against reinfestation. This could be attributed to ineffective treatment practices, incomplete eradication, or resistance to pediculicidal products (Table 2).

A significant association was also observed between clinical symptoms and lice infestation. Among non-infested students, 93.6% were asymptomatic, whereas only 42.5% of infested students reported no symptoms. Dandruff was reported by 35.0% of infested students, compared to just 1.0% among the non-infested. Itching was exclusively reported by infested students (12.5%), indicating its potential diagnostic value. Anemia was identified in 10.0% of infested students versus 5.4% in the non-infested group, although this difference was not statistically significant. These findings emphasize the importance of symptom-based screening, particularly for scalp symptoms such as dandruff and itching, in early detection and management of head lice infestation (Table 2).

Table (2): Comparison between the two groups studied according to bathing frequency, hair combing, previous treatment and symptoms

	Total (n = 242)		Have lice (n = 40)		Don't have lice (n = 202)		P value
	No.	%	No.	%	No.	%	
Bathing frequency							
1-2 daily	88	36.4	2	5.0	86	42.6	
<Weekly	3	1.2	3	7.5	0	0.0	<0.001*
Weekly	50	20.7	19	47.5	31	15.3	
2-3 weekly	101	41.7	16	40.0	85	42.1	
Hair combing							
1-2 daily	103	42.6	5	12.5	98	48.5	
<Weekly	2	0.8	2	5.0	0	0.0	<0.001*
Weekly	31	12.8	11	27.5	20	9.9	
3-4 weekly	106	43.8	22	55.0	84	41.6	
Previous treatment							
No	161	66.5	21	52.5	140	69.3	P=0.040
Yes	81	33.5	19	47.5	62	30.7	
Symptoms							
Asymptomatic	206	85.1	17	42.5	189	93.6	
Dandruff	16	6.6	14	35.0	2	1.0	P<0.001
Anemia	15	6.2	4	10.0	11	5.4	
Itching	5	2.1	5	12.5	0	0.0	

χ^2: **Chi square test**, p: p value for comparing between the studied groups. *: Statistically significant at $p \leq 0.05$

Significant differences were observed in hematological parameters between infested and non-infested students. Hemoglobin levels were lower among infested students, with a mean value of 9.80 g/dl compared to 11.02 g/dl in non-infested students. This difference was statistically significant with a p-value of less than 0.001.

White blood cell counts were significantly higher in the infested group, with a mean of 8.92 x10^3/µl compared to 7.63 x10^3/µl in non-infested students with a p-value of 0.007. Platelet counts did not show a significant difference between the two groups with a p-value of 0.801. These findings suggest that lice infestation may be associated with alterations in hematological parameters, potentially indicating immune response activation or nutritional deficiencies (Table 3).

Eosinophil levels were notably higher in students with lice, with a mean percentage of 5.38 percent compared to 2.53 percent in non-infested students.

This difference was statistically significant with a p-value of 0.001. This suggests that lice infestation may trigger an immune response leading to eosinophilia, potentially related to skin irritation or hypersensitivity reactions. (Table 3).

Table (3): Comparison between the two studied groups according to CBC

	Total (n = 242) Mean ± SD.	**Have lice (n = 40)** Mean ± SD.	**Don't have lice (n = 202)** Mean ± SD.	**p**
Hb (g/dl)	10.82 ± 1.21	9.80 ± 0.88	11.02 ± 1.16	<0.001*
WBC (×10^3/µl)	7.84 ± 1.92	8.92 ± 2.21	7.63 ± 1.83	0.007*
Platelets (×10^3/µl)	300.7 ± 72.63	303.4 ± 75.39	300.2 ± 72.25	0.801
Esinophils (%)	3.0 ± 0.74	5.38 ± 1.33	2.53 ± 0.62	<0.001

IQR: **Inter quartile range,** SD: **Standard deviation, t: Student t-test, U: Mann Whitney test**
p: p value for comparing between the studied groups, *: Statistically significant at p ≤ 0.05.

DISCUSSION

The prevalence of head lice infestation in the study population was 16.5%, which is consistent with the wide range of global prevalence rates reported in the literature. In Asia, prevalence has been reported to range from 0.7% to 59%, with an average of 15.1% [11]. The rate observed in this study is comparable to findings from Syria (14.3%) and Turkey (13.1%) [12]. However, higher prevalence rates, such as 65.7% in Ethiopia, highlight the influence of regional differences in environmental and socioeconomic factors on infestation risk [13].

The infestation rate among female students (72.5%) was in line with previous reports indicating a higher prevalence in females compared to males [14]. Factors such as longer hair length and more frequent close social interactions may contribute to this trend [15]. However, the lack of statistical significance in this study suggests that additional factors may influence susceptibility and warrant further investigation.

The place of residence was significantly associated with infestation, with students from rural areas exhibiting higher rates (67.5%) than their urban counterparts. This finding is consistent with prior research, which attributes higher infestation rates in rural settings to environmental conditions, limited access to healthcare, and lower hygiene standards [16]. Crowded living environments in rural households may also facilitate transmission.

Although the number of siblings was not statistically significant in this study, household crowding remains a relevant risk factor. Previous studies have shown that shared living spaces and close contact among family members increase the risk of transmission through direct physical contact and the sharing of personal items such as combs, hats, and bedding [17].

Strong associations were found between personal hygiene practices and infestation rates. Students who bathed once per week showed a significantly higher infestation rate (47.5%) compared to those who bathed daily (5.0%), reinforcing the importance of frequent bathing in preventing lice infestation [18]. Similarly, daily hair combing was associated with a lower infestation rate, supporting its role as both a preventive and diagnostic tool [19].

A significant association was observed between previous lice treatment and infestation. Nearly 47.5% of infested students had undergone prior treatment, compared to 30.7% among non-infested students. This suggests that reinfestation remains common, possibly due to ineffective treatment regimens, improper application, or resistance to pediculicides [20]. Incomplete removal of lice eggs (nits) may also lead to persistent infestation [21].

Notably, hematological differences were identified between infested and non-infested students, particularly in hemoglobin levels and eosinophil counts. This supports existing literature linking chronic heavy infestation with iron-deficiency anemia in school-aged children [22]. Elevated eosinophil counts observed in infested students suggest an immune response, likely due to hypersensitivity to lice saliva or bites, as reported in earlier studies [12]. While anemia is a recognized complication, further research is needed to clarify the role of eosinophilia and other white blood cell parameters in pediculosis.

The association between clinical symptoms and infestation was also evident. Among infested students, 35% reported dandruff and 12.5% reported itching, whereas these symptoms were rare or absent in the non-infested group. These findings are consistent with previous reports identifying scalp irritation, dandruff, and pruritus as hallmark symptoms of head lice infestation [11]. In addition to physical symptoms, pediculosis can cause psychological distress and contribute to secondary infections, emphasizing the need for early detection, hygiene education, and community-based control strategies [16].

CONCLUSION

It could be concluded that head lice infestation remains prevalent, especially in rural areas, where poor hygiene and ineffective treatments contribute to persistence. Hematological findings suggest a possible immune response, reinforcing the need for early detection. Improved screening, hygiene education, and enhanced treatment strategies are essential for effective control.

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