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**Prevalence of Pediculosis in Some Primary Schools in Diyala Province, Iraq**

*Prevalensi Pedikulosis di Beberapa Sekolah Dasar di Provinsi Diyala, Irak*

**Noora Dhyaaldain Abed, nora.deea1980@gmail.com, (1)**

*College of Education for Pure Sciences, University of Diyala, Iraq, Iraq*

<sup>(1)</sup> Corresponding author

**Abstract**

Background: Pediculosis (human head lice) infestation is a global problem among primary schools. Aims: This study has been conducted to investigate the prevalence of head lice among some primary schools in Diyala province. Methodology and Results: The study samples were randomly collected from the city center and villages, during the period from October/2022 to February/2023. This study examined 1579 pupils to detect pediculosis. The results have revealed 234 infections among the school students which represents 14.819% of the total examined sample. The infections among females were higher than males (217) females were infected which represents 92.735% of the total infections. Moreover, the study found that the proportion of pediculosis in rural areas was higher than in urban, 60.256% and 39.743% respectively. The study has also shown the highest rate of infection among females in ages 10-14 years 39.316%, compared with other groups. Moreover, the study has shown the relationship between the mother's education level and pediculosis. The percentage of infection among students who have mothers without university degrees was 83.333% while those who have mothers with university degrees were 16.666%. The study has also pointed to the significant effect of family size on infection percentages. A high percentage was recognized among those who live in big families, 66.239%. Conclusion, significance, and impact of study: Infection is prevalent among pupils, and risk factors play an important role in this situation which requires that controlling the infection and treating infected pupils be given the utmost importance to increase awareness.

**Highlights:**

**Prevalence:** 14.8% of students infected, higher in females and rural areas.

**Risk Factors:** Low maternal education and large family size increase infection.

**Action:** Control measures and awareness programs are urgently needed.

**Keywords:** Pediculosis, Head lice, Nits, *Pediculus humanus capitis*

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## Introduction

Pediculosis is a disease of head lice infection, it is one of the most critical health issues in the world, it is caused by ectoparasite, head lice *Pediculus humanus capitis* (Subahar et al., 2024). Lice is a parasitic, wingless, and blood-sucking insect. Its mean length is 3mm, and the male is smaller than the female (Amanzougaghene et al., 2020). It belongs to the order Phthiraptera which is intrusive on the human body (Ali and Hama, 2018). The life cycle of lice, both males and females, lasts for 35 days a maximum in the human scalp and it consists of three phases: eggs, which are also known as nits, nymphs, and adults (Caldwell and Ann, 2022). During the life cycle, the insect sucks blood from the human scalp several times a day using its piercing-sucking mouth part (Rajan, 2018). The female insect lays more than 300 eggs a month (Álvarez-Fernández et al, 2023). These parasitic insects survive outside their hosts for up to 36 hours (Cardoso et al., 2020). It affects both-sex regardless of age (Valero et al,2024). It represents a critical health issue even in developed countries (Moussa et al, 2018). In developing countries, the incidence of the disease increases among primary schools and high schools females , health centers, and orphan care centers (Amiri et al,2020). The disease disseminates between individuals in two ways: directly, from the infected person to the healthy one as a result of direct contact and overcrowding; and indirectly, by sharing the combined brushes, clothes, and towels (Petri and Murlina,2024). Head lice cause clinical symptoms due to blood absorption by the parasite, and because of their salivary secretions and droppings. Furthermore, their movement in the hair may cause itching, discomfort, and consequently lack of sleep(Sudaysa, et al. 2018). Also, chronic lice infections can cause secondary skin infections as a result of bacteria invasion caused by severe skin itching. However, in severe cases and prolonged infection, infected persons may become anemic. Lice infection might, also, cause anxiety and stress for children because they feel ashamed among their friends (Rassami and Soonwera, 2012). Several previous studies have pointed to the prevalence of the disease, where 6-12 million infections per year have been reported in America (Dehghani et al., 2013). Also, 3.7% of Nigeria's children were reported infected, majority of them are females (Ebomoyi, 1994). In another study conducted in Korea, the incidence of lice infection among children was 21.9%. In the same context, many studies have been carried out in neighboring countries to Iraq; and have shown different incidences of infection. For example, the disease prevalence in Turkey and Iran was 9.4% and 4% respectively. However, a study conducted in Kurdistan reported the occurrence of the disease in the region as 14% (Inanir et al., 2011; Abdulla, 2015). The primary goal of any society is to ensure that its children are healthy to guarantee the evolution and continuity of our species. Schools play an important role in children's health, however, their environment can be a source of some diseases that result in unhealthy children and consequently unhealthy society. The present study was conducted to investigate the prevalence of head lice infection among primary school pupils in some areas of Diyala province. The study was also trying to identify some aspects that may affect the spread and outbreak of the infection by direct examination of the pupils

## Methods

Primary schools were randomly selected in to detect head lice infection. All phases have been detected (adult, immature, and nits). During the study, which was carried out during the period between October 2022- February 2023, a total of 1579 pupils were observed to detect the presence of lice. direct examination method was used for the detection, the hair was first combed, then a white piece of cloth was put under it before a manual magnifying glass was used to inspect the hair.

Pupils were asked to answer questions prepared in a special questionnaire to collect the required information. The questionnaire included information like sex, age, number of family members, mother's educational level, living situation, and area of residence.

The parasitic insect was categorized according to the insect's classification key:

- 1.The insect is wingless and intrudes externally on mammals.
- 2.Mouth parts are piercing and sucking.
- 3.The three chest rings are conjugated.
- 4.Respiratory openings are located on the dorsal surface of the body.
- 5.Insect legs are adapted for attachment (Clinging leg).
- 6.The wrist consists of one piece which bears claws gooseneck inward.

Permanent microscopic slides containing females, males, and nits (whole eggs before and after hatching) were prepared according to the permanent microscopic slides' preparation method (Salih, 2010).

## Result and Discussion



The current study has been conducted to study and investigate the head lice in some schools of Diyala province.

As the table shows The current study has recorded a total incidence of head lice infection of 14.819% and has found that the incidence ratio was higher among females than males (92.735% and 7.264%). This result can be attributed to many factors such as the length of female hair, as well as the difficulty of caring for the long hair and the cleaning process, and the close relationship between female pupils in schools. (Farjallah et al,2024). Another study in Iran reported that gender had no effect on lice infestation (Yousefi et al,2012). It shows the percentage of head lice infestation by the age groups for both sex. It was noted that the highest infestation incidence, 39.316%, was recorded among females aged (10- 14) years. Followed by 35.042% among females (8 -9) years, while 25.641% were recorded in (6-7) years group. However, the percentage was 47.058% for males in the age group (6 -7) years which is due to 8 recorded infection cases. Furthermore, 6 males aged (10-14) years and at least 3 males, aged (8-9) years were found infected. These represent a percentage of 35.294% and 17.647%, respectively. The reason behind the high infection incidence ratio among females at the age 10-14 years is the children's shyness from the infestation, close head contact, longer hair in females which leads to the worsening of the case (Khamaiseh,2018). Concerning the relationship between mothers' educational level and the lice infection incidence among their children in the schools considered in the study. The study showed that the highest level of infection was among children whose mothers' educational level was below a university degree. The total number of infections among these children was 195 which represents 83.333%. Out of that number, 13 infections were for males which is 76.470%. However, for mothers with a university degree, only 39 infections were recorded among their children, 4 of them were males. ( the total infestation percentage was 16.666%, and the male percentage was 23.529%). While it records 182 females whose mothers' educational level is below a university degree and 35 with a university degree, their percentages are 83.870%, and 16.129% respectively. The maternal education provides more opportunities for a child to get better care and to live in more hygienic conditions. However, the low level of maternal education may lead to ignorance of the correct rules of treatment, disease prevention, and modes of transmission (Souza et al,2022). The results showed a higher infestation ratio in rural areas and villages compared to the city center, 141,93 the percentage was 60.256% and 39.743% respectively. ( Represented 11,6 males with 64.705%,35.294%. and 130,87 females with 59.907%, and 40.092% in rural and urban

respectively). This is attributed to the higher social awareness, health conditions, and living standards in the city centers compared to the districts and villages (Hadeel,2021). Most city schools also have a health supervisor who monitors the health status of pupils (Nejati et al,2018). The current study also included the percentage of lice infestation according to the family size. It was shown an increase in infestation among the pupils who belong to families (more than 5 individuals). A total of 155 infected pupils with 66.239%, The study has recognized 14 infected males and 141 infected females, which represents 82.352% and 64.976% respectively. However, the number of infected students in families (less than 5 individuals) was 79 with 33.760%, 3 males and 76 females, which denote 17.647% and 35.023%, respectively. This finding is consistent with the previous studies that considered the infection in crowded areas. The high number of family members provides greater opportunities for contact by sharing blankets, sleeping beds, hair combs, and towels (Saleh, 2010; Hama-Karim et al,2022).



Characteristic	Number of infestation	Prevalence (%)	Infected male	Prevalence (%)	Infected females	Prevalence (%)
	234	14.819	17	7.264	217	92.735
<b>Age</b>						
6-7 Years	60	25.641	8	47.058	52	23.963
8-9 Years	82	35.042	3	17.647	79	36.405
10-14 Years	92	39.316	6	35.294	86	39.631
<b>Mothers education levels</b>						
Mothers with university degrees	39	16.666	4	23.529	35	16.129
Mothers with undergraduate degrees	195	83.333	13	76.470	182	83.870
<b>Region</b>						
Urban	93	39.743	6	35.294	87	40.092
Rural	141	60.256	11	64.705	130	59.907
<b>Family size(members)</b>						
5>	79	33.760	3	17.647	76	35.023
5<	155	66.239	14	82.352	141	64.976

Figure 1. The demographic characteristics of study participants' primary school children.

In the present study, 107 head lice adult samples were isolated from the infected pupils, 20 males, 87 female insects, and 140 nits. Lice eggs are characterized by their oval shape, they also have a cover at one end (Operculum) which is in grayish-white color. Eggs heavily exist at the hair roots, near the patient's scalp, and are concentrated in areas behind the ear and below the head (above the neck). When eggs were placed, they were strongly attached by a colloidal substance secreted by females while placing the eggs. The eggs hatched after removing the cover (Operculum) into nymphs, which were similar to the adults but smaller in size. They were sexually immature and creamy white, Adult parasites (females and males) were characterized by their small size (3-4mm) (Figure1).

The insect had flattened ventral and dorsal areas, its head was relatively small and elongated from the front. the legs are short and transformed into clinging legs. Also, the legs have a clear claw at the end which helps it to attach to the host's hair. The study of the morphological, macroscopic, and microscopic appearance of the head lice insect was carried out by isolating the collected samples as males, females, nymphs, and eggs. The outcomes regarding the description of the insect and its eggs were consistence with the studies conducted by Zuniga and Caro, (2010), and Abdulla, (2015) in Erbil, Kurdistan, Iraq.

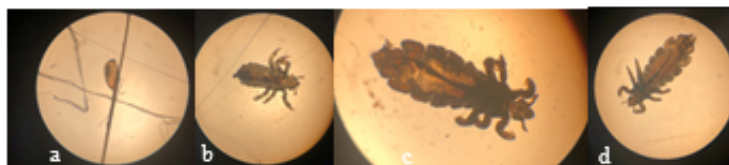


Figure 2. (a) The nit, (b) nymph phase, (c) adult male (d) adult female

## Conclusion

The study concluded that head lice infestation is a major public health problem and it was higher among females than males. In the countryside, the infestation occurrence was higher than in the city center. A high infestation ratio was recognized among children whose mothers' education level is below the university degree and large

families, the problem needs educational campaigns targeting mothers to educate about the disease.

## References

1. . B. S. Abdulla, "Morphological Study and Prevalence of Head Lice (*Pediculus humanus capitis*) (Anoplura: Pediculidae) Infestation Among Some Primary School Students in Erbil City, Kurdistan Region," *Zanco Journal of Pure and Applied Sciences*, vol. 27, no. 5, pp. 29-36, 2015.
2. . F. M. Ali and A. A. Hama, "Prevalence of Head Pediculosis Among Refugees in Sulaimania Governorate/Kurdistan - Iraq," *Iraqi Journal of Science*, vol. 59, no. 2C, pp. 1012-1018, 2018.
3. . B. E. Álvarez-Fernández, M. A. Valero, B. Noguera-Torres, and M. M. Morales-Suárez-Varela, "Embryonic Development of *Pediculus humanus capitis*: Morphological Update and Proposal of New External Markers for the Differentiation Between Early, Medium, and Late Eggs," *Acta Parasitologica*, pp. 1-10, 2023.
4. . N. Amanzougaghene, F. Fenollar, D. Raoult, and O. Mediannikov, "Where Are We With Human Lice? A Review of the Current State of Knowledge," *Frontiers in Cellular and Infection Microbiology*, vol. 9, p. 474, 2020.
5. . M. Amiri, F. F. Furia, and M. Bakari, "Skin Disorders Among Children Living in Orphanage Centers in Dar es Salaam, Tanzania," *Tropical Medicine and Health*, vol. 48, pp. 1-7, 2020.
6. . N. A. Caldwell and R. Ann, "The Life Cycle of Lice: What to Know," *Medical News Today*, 2022.
7. . A. E. C. Cardoso, A. E. O. Cardoso, C. Talhari, and M. Santos, "Update on Parasitic Dermatoses," *Anais Brasileiros de Dermatologia*, vol. 95, pp. 1-14, 2020.
8. . R. Dehghani, M. Limoe, and A. Ahaki, "First Report of Family Infestation With Pubic Louse (*Pthirus pubis*; Insecta: Anoplura: Pthiridae) in Iran - A Case Report," *Tropical Biomedicine*, vol. 30, no. 1, pp. 152-154, 2013.
9. . E. W. Ebomoyi, "Pediculosis Capitis Among Urban School Children in Ilorin, Nigeria," *Journal of the National Medical Association*, vol. 86, no. 11, pp. 861, 1994.
10. . D. Farjallah et al., "Prevalence of Pediculosis Among Primary School Children in Tunisia," *Eastern Mediterranean Health Journal*, vol. 30, no. 8, pp. 561-569, 2024.
11. . H. T. Al-Barrak, "Prevalence of Head Lice (*Pediculus humanus capitis*) Among Primary School Children in Baghdad Suburbs," *Journal of ...*, vol. 21, no. 1, pp. 280-284, 2021.
12. . Y. H. Hama-Karim, P. M. Azize, S. I. Ali, and S. A. Ezzaddin, "Epidemiological Study of Pediculosis Among Primary School Children in Sulaimani Governorate, Kurdistan Region of Iraq," *Journal of Arthropod-Borne Diseases*, vol. 16, no. 1, pp. 72, 2022.
13. . I. Inanir et al., "Prevalence of Skin Conditions in Primary School Children in Turkey: Differences Based on Socioeconomic Factors," *Pediatric Dermatology*, vol. 19, no. 4, pp. 307-311, 2002.
14. . A. M. Khamaiseh, "Head Lice Among Governmental Primary School Students in Southern Jordan: Prevalence and Risk Factors," *Journal of Global Infectious Diseases*, vol. 10, no. 1, pp. 11-15, 2018.
15. . S. Moussa et al., "Knowledge and Behavioral Practice of Pediculosis in Hail Region, Saudi Arabia," *Int. J. Med.*, vol. 4, no. 5, pp. 11-21, 2018.
16. . J. Nejati et al., "Prevalence and Risk Factors of Pediculosis in Primary School Children in South West of Iran," *Iranian Journal of Public Health*, vol. 47, no. 12, pp. 1923, 2018.
17. . A. Petri and N. Murlina, "Analysis of Personal Hygiene and Characteristics of Living Environment in Elementary Student With Pediculosis Capitis," *Berkala Ilmu Kesehatan Kulit dan Kelamin*, vol. 36, no. 2, pp. 81-87, 2024.
18. . J. K. Rajan, "The Prevalence of Pediculosis and Treatment Needs Among the School Children of Age 8-12 Years in Selected Rural Schools of Indore to Develop Health Education Module," *Journal of Bioscience and Applied Research*, vol. 4, no. 4, pp. 444-452, 2018.
19. . W. Rassami and M. Soonwera, "Epidemiology of Pediculosis Capitis Among Schoolchildren in the Eastern Area of Bangkok, Thailand," *Asian Pacific Journal of Tropical Biomedicine*, vol. 2, no. 11, pp. 901-904, 2012.
20. . W. M. Salih, "Study on *Pediculus humanus capitis* De Geer 1767 Among Some Primary School Pupils in Diyala Province," *Journal of Kerbala University*, vol. 8, no. 1, pp. 334-339, 2010.
21. . A. B. D. Souza et al., "Pediculosis Knowledge Among Schoolchildren Parents and Its Relation With Head Lice Prevalence," *Anais da Academia Brasileira de Ciências*, vol. 94, no. 2, pp. e20210337, 2022.
22. . R. Subahar et al., "Toxicity of 6-Gingerol and *Cymbopogon citratus* Against *Pediculus humanus capitis* De Geer (Phthiraptera: Pediculidae): Mortality, Detoxifying Enzymes, and Morphological Ultrastructure Alterations in Lice," *Research in Veterinary Science*, vol. 177, p. 105364, 2024.
23. . I. P. Sudayasa et al., "The Influence of Head Lice (*Pediculus humanus capitis*) Infestation on Nutritional Status and Anemia Occurrence on Female Elementary School Students," in *IOP Conference Series: Materials Science and Engineering*, vol. 434, no. 1, p. 012317, Nov. 2018.
24. . M. A. Valero et al., "Pediculosis Capitis Risk Factors in Schoolchildren: Hair Thickness and Hair Length," *Acta Tropica*, vol. 249, p. 107075, 2024.
25. . S. Yousefi, F. Shamsipoor, and Y. S. Abadi, "Epidemiological Study of Head Louse (*Pediculus humanus capitis*) Infestation Among Primary School Students in Rural Areas of Sirjan County, South of Iran," *Thrita*, vol. 1, no. 2, pp. 53-56, 2012.
26. . I. R. Zúñiga Carrasco and J. Caro Lozano, "Pediculosis: Una Ectoparasitosis Emergente en México," *Revista de Enfermedades Infecciosas en Pediatría*, vol. 24, no. 94, pp. 56-63, 2010.