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Prevalence and Associated Factors of Pediculosis capitis among Male Schoolchildren in Helmand Province, Afghanistan

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ABSTRACT

Background: Pediculosis capitis (head lice infestation) is a significant public health concern, particularly among schoolchildren, because apart from physical symptoms, it also leads to their psychological distress, social stigma, and negative impacts on their school attendance and learning. Despite its global impact, there is a lack of research on this issue in Afghanistan.

Methods: This descriptive cross-sectional study was performed among male schoolchildren from Jan to Dec 2023, in Helmand Province, Afghanistan. Data were collected through physical examination and a structured questionnaire, which gathered information on participants' demographics, socioeconomic status, physical characteristics, environmental factors, and hygiene practices. Statistical analysis of the prevalence and associated risk factors was performed using SPSS.

Results: Of the 306 participants, 26 (8.5%) had head lice infestation. Significant associations were observed between longer hair and higher infestation rates, as well as between older bathrooms and higher prevalence. Children from higher-income families had lower infestation rates, as did those with sweaty scalps. No significant associations were found with age, grade level, family size, parental education, physical traits, hair-washing products, or animal contact.

Conclusion: This study offers critical baseline data on pediculosis capitis in Afghanistan and highlights the need for targeted public health interventions. It also establishes the basis for future research on the socio-economic and environmental factors contributing to lice infestations in the region.

Keywords: Pediculosis capitis, Afghanistan, Prevalence, Lice

Introduction

The two species of lice that parasitize humans are *Pthirus pubis* and *Pediculus humanus*, the latter of which consists of two ectotypes: head lice (*P. humanus capitis*) and body lice (*P. humanus corporis*) (1). *P. humanus capitis* are wingless, obligate blood-sucking ectoparasites that inhabit the human scalp (2). These lice spend their entire lives on the host and affect individuals across all socioeconomic backgrounds (3). *P. humanus capitis* is primarily transmitted through direct head-to-head contact with an infected individual and can also be spread indirectly by sharing personal items such as hairbrushes, hats, towels, pillowcases, and clothing (4).

Pediculosis capitis is a global concern, affecting approximately 19% of

schoolchildren worldwide, with the highest rates of infestation observed in children aged 3 to 11 yr (5, 6). The lice feed on blood approximately every 3 to 4 h, leading to continuous itching and irritation (7). Repeated scratching can result in abrasions and damage to the skin, thereby raising the likelihood of secondary bacterial infections (8). Beyond the physical symptoms, pediculosis capitis also has significant psychological impacts. The social stigma associated with head lice can result in embarrassment and psychological distress, which may negatively affect a child's school attendance and overall learning experience (9). Moreover, *P. capitis* can transmit several life-threatening bacteria, including *Rickettsia prowazekii*, *Bartonella Quintana*, *Borrelia recurrentis*, *Acinetobacter baumannii*, *Yersinia pestis*, *Coxiella burnetti*, *Anaplasma* spp., and *Ehrlichia* spp. (10).

Pediculosis capitis is widespread in both developed and developing countries, with notable variations, particularly in tropical regions and areas with high humidity (11). Numerous studies have assessed the prevalence of *P. capitis* among school-age children worldwide. A systematic review and meta-analysis of studies from the past five decades, revealed that the highest prevalence of *P. capitis* among schoolchildren was found in Central and South America, followed by Africa, Australia, Asia, and North America, with Bangladesh exhibiting the highest prevalence in Asia, while Iran had the lowest infestation rates (6).

High infestation rates of head lice have been reported among schoolchildren in the neighboring countries of Afghanistan. For instance, studies in Pakistan indicate significant prevalence rates. An infestation rate was found of 25.3% in Karachi, with no noticeable gender differences (12). Similarly, elevated prevalence rates was observed in Hyderabad (13). An alarming infestation rate reported of 79% in Quetta and its surrounding areas (14). Additionally, a study in Muzaffargarh, which focused on the general population rather than just schoolchildren, found an infestation rate of 69.4% among children under 15 yr (15).

Thorough research has also been conducted in Iran. A review study reported high prevalence rates over three decades (1990-2020) and suggested that the actual rates may be statistically higher (16). Complementing this, a comprehensive systematic review and meta-analysis among primary school-aged students in Iran noted a prevalence rate of 7.25% (17). Despite extensive research in neighboring countries, few studies have focused on Afghan refugees in Iran. A high prevalence of head lice found (16.84%) among Afghan refugees under 13 yr old in Sirjan County from 2010 to 2011 (18). Similarly, Majidi et al. reported significantly higher rates (16.11%) of infestation among Afghan children compared to their Iranian peers (6.41%) (19). Furthermore, a high prevalence of 6.31% was observed among Afghan immigrants residing in a camp in Kerman, with children under the age of 10 being significantly affected (53.2%) (20).

While limited data exist on the prevalence of head lice among Afghan refugees in Iran, there is a notable absence of research conducted in Afghanistan. We aimed to address this gap by presenting data on the prevalence and risk factors of pediculosis capitis among male schoolchildren in Helmand Province, southern Afghanistan.

Materials and Methods

Study area, design, and population

A descriptive cross-sectional study was performed from 1 Jan 2023 to 31 Dec 2023, involving male schoolchildren in Helmand Province. The province spans an area of approximately 58,584 km^2 and has an estimated population of 1,525,188 (21, 22). The study population consisted of 306 male schoolchildren, aged 5 to 14 yr, enrolled in primary schools across the province during the study period.

Data collection

Data were collected through a combination of physical examination and a structured questionnaire.

A census method was used to ensure all eligible students were included in the study. A team of trained researchers conducted physical examinations to identify head lice infestations. Each student's hair, scalp, behind the ears, and the nape of the neck were thoroughly inspected under adequate lighting for four minutes. The presence of adult lice, nymphs, or viable nits was recorded.

Following the physical examination, a structured questionnaire was distributed to the students and their parents to gather detailed information on participants' demographics, socioeconomic status, personal and physical characteristics, and environmental and hygiene-related practices.

Demographic and socioeconomic variables included age, family size (small: ≤5 members, large: >5 members), family income (low, middle, or high), parent's education level (father's and mother's education: illiterate, primary, secondary, or higher), and student's grade level (I, II, or III).

Personal and physical attributes included skin color (fair, medium, or dark), hair characteristics (length: short or long, color: black, brown, or blonde, thickness: thick or fine, and shape: straight or curly), and the scalp condition (dry or sweaty). Hair length was classified as 'long' if above the 5 cm or 'short' if below the 5cm.

Environmental and hygiene-related factors included type of bedroom (shared or private), type of bathroom (old or modern), hair-washing product used (shampoo, soap, or water), and animal contact (yes or no).

Data from the clinical examination and the questionnaire were recorded using standardized forms to ensure consistency and accuracy.

Ethical considerations

Study protocol was reviewed and approved by Biomedical Ethic Committee of Ghalib University, Kabul, Afghanistan (AF.GUK.REC.1401.007). The study adhered to ethical standards and received approval from the relevant authorities and school administrators. In line with established international ethical standards, written informed consent was acquired from the parents or legal guardians of all participants before their inclusion in the study. The consent covered participation in the physical examination and completion of the questionnaires. To ensure confidentiality, each participant's data was recorded separately and anonymized using unique codes. Strict measures were taken to protect participants' privacy, with explicit assurances that their personal information would remain confidential throughout the study.

Statistical analysis

Data analysis for the hypotheses in this study was performed using SPSS software (ver. 26) (IBM Corp., Armonk, NY, USA). An alpha error of 5% was set as the threshold for determining the rejection or acceptance of the null hypothesis. All comparisons of means were performed using two-tailed tests. The statistical methods applied in the analysis included Chi-square tests, Fisher's exact tests, and Mann-Whitney U tests.

Results

Among the 306 participants, 26 tested positive for *P. capitis*, resulting in an overall prevalence of 8.5%. Several factors were identified as having significant associations with the head lice infestation. Specifically, children from higher-income families had significantly lower infestation rates (P<0.0001) (Table 1), while those

from lower-income families showed higher prevalence.

Children with longer hair had a higher infestation rate than those with shorter hair (Table 2). Scalp condition was also a key factor, with dry scalps associated with a higher risk of infestation, while sweaty scalps were significantly linked to a lower risk of head lice (Table 2). Additionally, the presence of older bathrooms in the home was correlated to an increased incidence of head lice (Table 3).

In contrast, no significant associations were observed between head lice prevalence and factors such as age, grade level, family size, or parental education. However, certain demographic and socioeconomic factors appeared to increase the risk of infestation. Specifically, younger children, particularly those in Grade I, children from larger families (more than five members), and those with lower parental education levels seemed to be at higher risk.

Although physical traits such as darker skin tones, black hair, straight hair, or fine hair were commonly observed in children with head lice, these associations were not statistically significant. Similarly, while the type of hair-washing product used showed no significant association with infestation, a trend noted that children who used shampoo had a lower prevalence of *P. capitis* than those who used soap or water alone. Animal contact was not found to be significantly linked to head lice occurrence. Finally, all participants were found to live in shared bedrooms.

Table 1: Demographic and socio-economic factors.

Characteristic	***Positive Cases***		***Negative Cases***		***X^2***	***P-value***
	n	%	*n*	%		
Grade					0.910	0.635
I	19	73.1	184	65.7		
II	1	3.8	24	8.6		
III	6	23.1	72	25.7		
Family Size					1.881	-
≤5	0	0.0	19	6.8		
>5	26	100.0	261	93.2		
Father's Education Level					20.913	-
Illiterate	23	88.5	118	42.1		
Primary	3	11.5	105	37.5		
Secondary	0	0.0	32	11.4		
Higher	0	0.0	25	9.0		
Mother's Education Level					2.117	-
Illiterate	25	96.1	243	86.7		
Primary	1	3.9	23	8.3		
Secondary	0	0.0	9	3.2		
Higher	0	0.0	5	1.7		
Family Income					31.658	<0.0001
<10,000	14	53.8	34	12.1		
10,000 – 20,000	8	30.8	189	67.5		
>20,000	4	15.4	57	20.4		

Table 2: Personal and physical attributes.

Characteristic	*Positive Cases*		*Negative Cases*		X^2	*P-value*
	n	%	*n*	%		
Skin Color					1.614	-
Pale	0	0.0	5	1.9		
Fair	1	3.8	13	4.7		
Medium	5	19.2	33	11.8		
Dark	20	77.0	228	81.6		
Hair Length					24.556	<0.0001
Short	1	3.8	153	54.6		
Long	25	96.2	127	45.4		
Hair Color					1.776	-
Black	26	100.0	262	93.6		
Brown	0	0.0	3	1.1		
Blonde	0	0.0	15	5.4		
Hair thickness					1.05	0.489
Fine	25	96.2	252	90.0		
Thick	1	3.8	28	10.0		
Hair Shape					3.156	0.106
Straight	23	88.5	269	96.1		
Wavy/Curly	3	11.5	11	3.9		
Scalp Sweat					17.889	<0.0001
Yes	7	73.1	14	95.0		
No	19	26.9	266	5.0		

Table 3: Environmental and hygiene practices.

Characteristics	*Positive Cases*		*Negative Cases*		*X2*	*P-value*
	n	%	*n*	%		
Type of Bedroom					-	-
Shared	26	100.0	280	100.0		
Private	0	0.0	0	0.0		
Type of Bathroom					56.01	<0.0001
Old	24	92.3	64	22.9		
Modern	2	7.7	216	77.1		
Type of hair-washing product used					38.65	-
Shampoo	13	50.0	214	77.0		
Soap	10	38.5	64	23.0		
Plain Water	3	11.5	0	0.0		
Animal contact					0.178	0.757
Yes	4	15.4	35	12.5		
No	22	84.6	245	87.5		

Discussion

Pediculosis capitis remains a significant public health issue globally, with prevalence rates varying across regions and populations. This study was conducted exclusively among male schoolchildren in Helmand due to cultural norms and practices in the region, which limit the inclusion of female students in certain research settings. The infestation rate observed in this study was 8.5% among male schoolchildren, which is notably lower than the 28.42% prevalence in Karachi, Pakistan, in a similar study (24). Compared to male populations in other

studies involving both genders, our findings were higher than those reported in studies conducted in Iran (17, 19, 25-27), Libya (5), Korea (28), Turkey (29), and Saudi Arabia (30), while lower than those observed in studies from Pakistan (12-14), Jordan (31, 32), Iraq (33), and Australia (34). These variations may reflect differences in demographics, socioeconomic status, environmental conditions, cultural practices, and public health measures.

This study found significant associations between head lice infestation and factors such as family income, hair length, scalp condition, and bathroom type. The infestation rate increased as family income decreased, which aligns with the findings of Ali and Ramzan in Dera Ismail Khan, Pakistan, who reported similar variations across different economic levels (35). Lower-income families often face challenges maintaining hygiene or accessing healthcare, potentially increasing their susceptibility to infestations. Additionally, families with lower income are more likely to live in overcrowded conditions, where sharing of rooms, bathrooms, and personal belongings heightens the risk of head lice infestations. These results have important implications for public health interventions, suggesting that improving access to affordable hygiene products and healthcare could help reduce infestation rates in lower-income families.

Our study also identified a strong association between longer hair and an increased likelihood of head lice infestation, which aligns with other studies (36-38). A possible explanation for this finding is that longer hair provides more space for lice to attach and remain unnoticed, increasing the chance of infestation.

Furthermore, our study found a significant negative association between head lice infestation and scalp condition, particularly among students with sweaty scalps. In contrast, a higher frequency of infestation was observed among students with dry scalps. The reasons for this trend remain unclear, as the relationship between scalp moisture and lice infestation has not been extensively studied. One possible explanation is that a sweaty scalp may create a less favorable environment for lice, as the moisture may hinder their ability to remain attached to the scalp. Further examination of environmental or behavioral factors that influence scalp moisture and sweat production in children with and without lice could help clarify this association.

The type of bathroom in a household was also a significant factor associated with infestation rates. Children living in homes with older bathrooms had higher infestation rates, which may reflect lower sanitation standards and inadequate hygiene practices. While previous studies have investigated factors such as bathroom access and sanitation (38-41), none have specifically examined the impact of bathroom age (old versus modern) on infestation rates. This gap in the literature underscores the importance of considering the type of bathroom infrastructure in future studies, as inadequate sanitation facilities may contribute to the transmission of pediculosis capitis.

Although several factors were significantly associated with infestation rates, other factors also suggested potential trends that may influence the prevalence of *P. capitis*. For instance, no significant association was found between family size and head lice infestation, a finding consistent with studies such as the one that was conducted in Iran (8). However, a significant positive association was observed between larger family size and head lice prevalence (42), suggesting that overcrowded living conditions may facilitate lice transmission.

The relationship between grade level and head lice prevalence was not statistically significant, however, higher infestation rates were observed among Grade I students. This finding aligns with a study conducted in southwest Iran, which, while reporting no significant relationship,

observed the highest infestation rates among Grade I students (43).

Regarding other hair characteristics, our study found no significant association between hair thickness, color, or shape and head lice prevalence. However, students with straight, fine, or darker hair might be more susceptible to infestations. This observation is consistent with the findings that suggested straight or darker hair could increase susceptibility to head lice. Additionally, hair thickness was inversely related to the risk of infestation, with thicker hair offering some degree of protection (36).

Another factor considered was the skin color but no significant association was found with infestation rates. This aligns with findings from Brazil, where students with brown skin were more likely to have head lice, though the relationship was statistically non-significant (44).

Neither animal contact nor parental education level showed a significant association with head lice infestation, which is consistent with the study in Istanbul, Turkey, who also found no significant relationship between these factors and infestation rates (45). However, some trends in our study suggested that higher parental education levels might be associated with lower infestation rates. This finding is in line with research in Kayseri, Turkey, where a positive association was found between parental education level and reduced head lice prevalence (23).

All the participants lived in shared rooms, a common practice in Afghanistan, as rooms are typically shared with other family members and overcrowded living conditions usually exacerbate the spread of head lice.

Conclusion

The present study reported a high prevalence of head lice among male schoolchildren in Helmand, with significant associations between lice infestation and factors such as family income, hair length, scalp sweat, and bathroom type. It is the first study to examine the prevalence and risk factors of *P. capitis* in Afghanistan, laying the groundwork for future research. It also offers valuable insights into pediatric health and epidemiology in the country. The findings highlight the need for public education and the establishment of effective strategies for prevention and treatment. Future research should include female participants, larger sample sizes, and further investigation of factors such as scalp sweat and bathroom type (old vs. modern), identified as potential contributors to lice infestation in the present study.

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Conflict of interest

The authors declare that there is no conflict of interests.

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