

Pediculus humanus capitis Infestation Among Primary School Children in Van Province, Türkiye

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ABSTRACT

This study aimed to determine the prevalence of *Pediculus humanus capitis* infestation among primary school students in the Başkale town of Van Province and to evaluate associated demographic and behavioral factors.

This cross-sectional study was conducted in March 2018 among 530 students from four primary schools. Hair and scalp examinations were performed visually; suspicious samples were confirmed microscopically. Sociodemographic and hygiene-related data were collected through a structured questionnaire. Statistical analyses were performed using chi-square and Fisher's exact tests.

The overall prevalence of head lice infestation was 3.8% (20/530). Infestation was significantly higher among girls (6.8%) compared with boys (1.5%) ($p=0.003$). The highest prevalence occurred among third-grade students (12.2%). Medium (6.2%) and long hair (5.7%) were associated with significantly higher infestation rates ($p=0.005$). Wavy and curly hair demonstrated a higher tendency for infestation, although the association was not statistically significant. Larger household size (4–7 individuals) showed a noticeable clustering of cases.

Although the prevalence in Başkale was lower than many national and international figures, head lice infestation remains a relevant public-health issue. Female sex, younger age, longer hair, and crowded households were identified as key risk factors. School-based screening, parental education, and early detection programs are recommended to reduce transmission.

Keywords: *Pediculus humanus capitis*, pediculosis, school children, prevalence, Van

Introduction

Lice are wingless, hemimetabolic insects of the order Anoplura, and three species are known to parasitize humans: the body louse (*Pediculus humanus corporis*), the head louse (*Pediculus humanus capitis*), and the pubic louse (*Phthirus pubis*). These obligatory ectoparasites feed exclusively on human blood, causing allergic reactions, pruritus, and dermatitis, ultimately leading to pediculosis or phthiriasis (1). Body lice also have major epidemiological importance as vectors of epidemic typhus, relapsing fever, and trench fever (1).

Lice are among the oldest parasites associated with humans, with archaeological evidence showing lice and their eggs on Egyptian mummies dating back nearly 5000 years. Historical records demonstrate that infestation affected all social classes, including nobles and royalty. Scalp shaving and the use of wigs were widely adopted to reduce lice burden, although wigs often became colonization sites. Misconceptions persisted into the 18th century—most notably Linnaeus's belief that lice could protect children from

certain diseases—until scientific advances in the early 20th century clearly established the role of lice in transmitting epidemic diseases (1, 2). Despite improved understanding, lice infestation persists worldwide due to their resilience and highly efficient transmission mechanisms (2).

Pediculosis exhibits a cosmopolitan distribution and is influenced by climatic, ethnic, geographic, hygienic, and socioeconomic conditions (3, 4). Infestations occur more frequently in cold or temperate climates and show seasonal variation, peaking in winter. Humans constitute the primary reservoir for both pediculosis and phthiriasis, and transmission occurs mainly through direct person-to-person contact.

Among all lice infestations, pediculosis capitis is the most common, particularly among school-aged children. Although not life-threatening, head lice infestation has major impacts, including persistent itching, sleep disruption, secondary bacterial infections, psychological stress, social stigma, reduced academic performance, and school absenteeism (1, 5). Transmission occurs predominantly through head-to-head contact, making younger children especially

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vulnerable due to their close social interaction patterns (2).

Global prevalence varies widely (<1% to >30%) depending on diagnostic criteria, population characteristics, hygiene practices, socioeconomic conditions, cultural norms, and climate (1, 4). Studies from Türkiye also report considerable regional variation, with prevalence ranging from 3% to 22% and higher rates in Eastern and Southeastern Anatolia—regions characterized by colder climates, lower socioeconomic status, and larger household sizes (10–12).

Individual and environmental determinants influence infestation risk. Girls consistently exhibit higher infestation rates than boys, a pattern attributed largely to longer hair and closer physical contact (7). Hair length, density, and texture increase the available surface for nit attachment, and curly or wavy hair has been suggested to facilitate adhesion (8). Household overcrowding, low parental education, and limited hygiene resources further elevate transmission risk (2, 11). Contrary to common belief, infestation is not directly associated with poor personal hygiene, as lice can persist even in clean hair (5).

Although numerous studies have assessed pediculosis in different regions of Türkiye, data from Van—particularly from its rural districts such as Başkale—remain limited. The district's climatic characteristics, household structure, and socioeconomic profile may contribute to unique infestation patterns. Therefore, updated epidemiological data are needed to better understand local transmission dynamics and guide effective public-health interventions.

This study provides the first district-level epidemiological data on *P. h. capitis* among primary school children in Başkale, Van Province, and to identify demographic and behavioral factors associated with infestation.

Materials and Methods

Study Design and Population: This descriptive, cross-sectional study was carried out in March 2018 in four primary/secondary schools in the Başkale town of Van Province: Atatürk, Ayyıldız, Fatih, and Vali Özdemir schools. A total of 530 students aged 6–14 years participated in the study.

Data Collection: Hair and scalp examinations were performed under natural light, focusing on common infestation sites such as the nape and behind the ears. It should be noted that visual inspection may underestimate low-intensity infestations. Suspected samples (hair shafts containing nits or lice) were collected with

scissors, preserved in 70% ethanol with 5% glycerin, and examined under light microscopy for confirmation.

A structured questionnaire was administered to gather information on sex, grade level, hair characteristics (type, length), household size, bathing frequency, shampoo type, and parental education and occupation. The survey was conducted with the assistance of teachers. Hair length was classified as short, medium, and long, respectively, as follows: shorter than 5cm, between 5-15cm, and longer than 15cm.

Statistical Analysis: Data were analyzed using SPSS 15.0. Chi-square and Fisher's exact tests were applied to evaluate associations between infestation and categorical variables. A p-value <0.05 was considered statistically significant. Multivariate analysis was not performed due to the limited number of positive cases

Ethical Considerations: The study was approved by Gazi University Non-Interventional Ethics Committee (Decision 242; 26.03.2018). Official permissions were obtained from the Provincial Directorate of National Education (10/04/2018, 7309899). Participation was voluntary.

Results

A total of 530 students (251 girls and 279 boys) were examined. Twenty students (3.8%) were found to have *P. h. capitis* infestation. Girls had a significantly higher infestation rate (6.8%) compared with boys (1.5%) ($p=0.003$) (Fig. 1)

Infestation was most common among third-grade students (12.2%), followed by fifth-grade students (6.3%) (Fig. 2). No cases were identified among certain upper grades.

Medium-length hair (6.2%) and long hair (5.7%) were significantly associated with infestation ($p=0.005$) (Fig. 3). Students with wavy (7.7%) and curly hair (7.0%) showed higher rates compared with straight-haired peers, although the association was not statistically significant.

Most infested students (80%) lived in households containing 4–7 family members. Higher infestation rates were observed among children of self-employed or farming families, although these associations did not reach statistical significance.

Bathing frequency, shampoo type, and pet ownership were not associated with infestation.

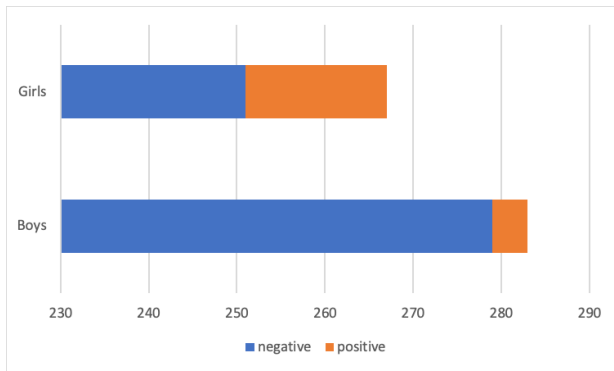


Fig. 1. Infestation Status According to Gender

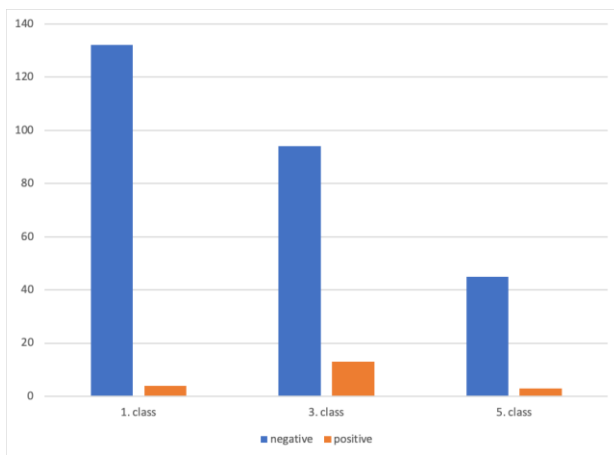


Fig. 2. Distribution of Infestation Among Classes

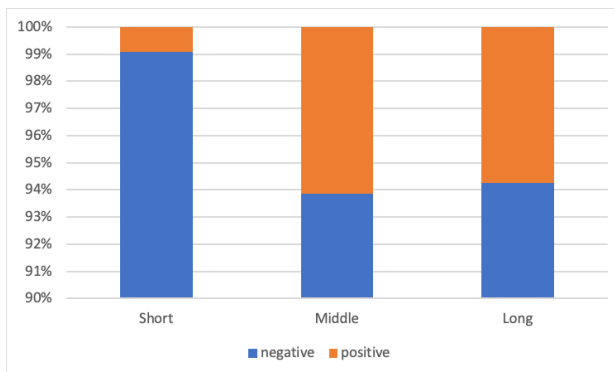


Fig. 3. 100% Stacked Column Distribution of Infestation According to Hair Length

Discussion

Pediculosis capitis is one of the most widespread ectoparasitic infestations globally and remains particularly common among primary school-aged children, consistent with patterns observed in both low- and high-income countries (1). The parasite thrives in cold and temperate climates and can persist regardless of personal hygiene levels, although overcrowded environments and limited household

resources facilitate its spread (2). Communal settings such as schools, dormitories, and military barracks provide ideal conditions for rapid transmission, as lice move efficiently between individuals mainly through direct head-to-head contact (2, 3).

The prevalence identified in this study (3.8%) was lower than global estimates, which indicate that more than 100 million cases occur annually, with a mean prevalence of approximately 19% (4). It was also lower than the rates typically reported in Türkiye, where prevalence often ranges between 10% and 22%, particularly in colder and socioeconomically disadvantaged regions (10–12). Several factors may account for this relatively low prevalence in Başkale. Increased awareness among families, improved hygiene education, and active school-based health monitoring programs may have contributed to reduced transmission. Seasonal timing may also play a role, as prevalence tends to peak during winter months (2). Also, the fact that the study was conducted in a single season can be considered a possible reason for the low prevalence rate.

Consistent with worldwide findings, infestation in our study was significantly more common among female students. Existing literature repeatedly demonstrates that girls have 3 to 5 times higher risk than boys, largely due to longer hair, closer physical contact patterns, and shared grooming practices (7). Our findings reinforce the significance of hair length, as medium and long hair were strongly associated with infestation. Hair characteristics such as density, waviness, and curliness have also been shown to facilitate nit attachment and parasite mobility, a trend observed in our study even though the association was not statistically significant (8).

Younger age groups, especially third-grade students, exhibited higher infestation rates. This aligns with evidence showing that children aged 6–10 years are the most vulnerable due to behavioral factors such as close physical play, limited hygiene awareness, and classroom seating arrangements that increase interpersonal contact (6). These behaviors amplify transmission opportunities, making early primary school groups a key target for prevention efforts.

Household crowding emerged as another important determinant. A large proportion of infested students lived in moderately crowded homes, consistent with studies showing that larger family size, shared sleeping arrangements, and limited personal space significantly increase intra-household transmission (9, 11). This highlights the need for interventions that address not only school-based but also household-level risk factors.

Interestingly, hygiene-related variables—including bathing frequency, shampoo type, and regular hair washing—were not associated with infestation. This finding reflects broader evidence demonstrating that head lice do not preferentially infest dirty hair and that pediculosis does not represent an indicator of poor hygiene (5). Persisting social stigma around lice may delay treatment, reduce reporting, and hinder effective management, underscoring the importance of accurate public education.

Overall, the findings of this study reinforce the need for continuous surveillance, early detection, and coordinated public-health strategies. School-based screening programs, combined with parental education and community awareness campaigns, are among the most effective measures for reducing transmission (13). Teacher training, timely case identification, and destigmatization of pediculosis should be key components of future prevention programs. Continued research in rural and underserved regions such as Başkale is essential to better understand local transmission patterns and implement appropriate intervention strategies.

Head lice infestation remains a relevant public-health issue. Although prevalence was relatively low, certain groups—girls, younger children, long-haired students, and those living in crowded households—were more vulnerable. Strengthening screening programs, increasing family awareness, improving hygiene education, and promoting early detection can help reduce transmission and prevent future outbreaks in the region.

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