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Hair hygiene associated with female students' pediculosis capitis at a boarding secondary school

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ABSTRACT

Pediculosis capitis is an infestation of the ectoparasite Pediculus humanus var. capitis on the hair and scalp, which remains a public health issue with a high prevalence, particularly among school-aged children and adolescents. Islamic boarding schools are highly vulnerable to transmission due to communal living patterns and the frequent sharing of personal items. This study aimed to determine the relationship between hair hygiene knowledge and the occurrence of Pediculosis capitis among female students. An observational-analytic, cross-sectional study was conducted with 52 respondents selected according to inclusion and exclusion criteria. Data were collected through microscopic examination of hair lice samples. The results revealed a significant relationship between hair hygiene knowledge and Pediculosis capitis infestation. The students' knowledge and hair hygiene practices were relatively low, as reflected by the high prevalence rate of infestation (72.5%). Therefore, increasing health education and promotion regarding hair hygiene in boarding schools is essential as a preventive strategy against Pediculosis capitis.

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INTRODUCTION

Pediculosis capitis, commonly known as head lice infestation, remains a ubiquitous public health challenge worldwide, regardless of socioeconomic status (Fu et al., 2022). Caused by the ectoparasite Pediculus humanus var. capitis, this condition is particularly prevalent among school-aged children and individuals living in high-density settings (Castro et al., 2023). Head lice transmission primarily occurs through direct head-to-head contact. However, indirect transmission via fomites, such as shared combs, scarves, hats, and bedding, also plays a significant role (Logamoorthy & Karthikeyan, 2025). While often viewed as a minor nuisance, persistent infestation can lead to secondary bacterial infections, sleep disturbances, and significant psychosocial distress, including stigma and school absenteeism (Neuberg et al., 2022). Consequently, understanding the epidemiological drivers of Pediculosis is essential for developing effective control strategies within educational settings (Nasirian, 2024).

Demographic factors significantly influence the prevalence of head lice, with adolescence representing a peak period for infestation (Delie et al., 2024). Epidemiological data indicate that children aged 12 to 15 years are most frequently affected, likely due to increased social interaction and changing hygiene habits during puberty (Valero et al., 2023). Furthermore, a distinct gender disparity exists; females are reported to be two to four times more likely to

experience infestation than males (Nasirian & Ahmadi, 2024). This heightened vulnerability is frequently attributed to longer hair, which provides a more conducive environment for lice attachment and oviposition, as well as to gender-specific social behaviors that involve closer physical contact. Therefore, hair hygiene practices and maintenance emerge as critical modifiable risk factors in this demographic (Sukesi et al., 2024).

The risk of pediculosis capitis is further exacerbated by environmental conditions, particularly in communal living settings such as boarding schools (Anindita et al., 2024). In these institutions, students share confined sleeping quarters and personal spaces, creating an ideal ecosystem for the rapid spread of parasites (Petri et al., 2024). The communal nature of boarding schools often necessitates the sharing of personal items, and the high resident density facilitates frequent direct contact (Astuti & Asyfiradayati, 2025). Unlike day schools, where students return to separate households nightly, boarding schools present a continuous exposure risk. This unique environmental context suggests that standard preventive measures effective in general populations may need to be adapted to address the specific structural and behavioral dynamics of residential educational institutions (Kotus et al., 2025).

Despite the recognized link between hygiene and infestation, the role of health knowledge in mitigating risk within specific cultural contexts remains underexplored (Toghroli et al., 2022). While health education interventions are theoretically capable of reducing prevalence by improving hygiene-related behaviors, empirical findings regarding their efficacy remain varied (Beyhan & Ozkan, 2026). Crucially, there is a paucity of research addressing the context of Islamic boarding schools in Indonesia. These institutions possess unique sociocultural and structural characteristics, including strict communal living arrangements and specific religious practices that may influence personal hygiene practices (Sutrisno & Febriani, 2025). Understanding the relationship between hair hygiene knowledge and infestation rates in this setting is vital, as the risk profile differs substantially from that of general school populations (Tomia & Tuharea, 2024).

To address this gap in the literature, this study aims to analyze the relationship between hair hygiene knowledge and the infestation of Pediculus humanus var. capitis among female students at the Nurul Islam Islamic Boarding School. By focusing on this specific population, the research seeks to elucidate how knowledge deficits contribute to infestation rates within a high-risk, communal environment (Chen et al., 2025). The findings of this study are expected to provide evidence-based insights that will contribute to the development of targeted health education programs and preventive measures (Gul et al., 2024). Ultimately, tailoring interventions to the specific needs of Islamic boarding school communities may enhance the effectiveness of pediculosis control efforts and improve the overall health outcomes of adolescent students in similar settings (Anindita et al., 2024).

METHOD

Research Design

This study employed an observational analytic approach with a cross-sectional design to examine the relationship between hair hygiene knowledge and Pediculus humanus var. capitis infestation. The cross-sectional method enabled the simultaneous collection of data on the independent variable (hair hygiene knowledge) and the dependent variable (head lice infestation). The research was conducted at the Nurul Islam Islamic Boarding School, located in Bugul Kidul, Pasuruan City, Indonesia. Data collection took place over four months, from March to June 2025.

Participant

The study population comprised female students enrolled in grades VII, VIII, and XI (MTs classes I, II, and III) residing at the boarding school. Purposive sampling, a non-probability technique, was utilized to select participants based on specific inclusion and exclusion criteria relevant to the research objectives. Inclusion criteria required participants to be female students aged 12–15 years, to have resided at the boarding school for at least 2 weeks, and to provide signed informed consent. Exclusion criteria included incomplete questionnaire responses or students residing alone in private rooms. The total population consisted of 51 individuals. Using the Slovin formula with a 5% margin of error (0.05), the minimum required sample size was calculated to be 45 respondents. Consequently, 45 participants were selected to ensure the data accurately represented the target population.

Data Collection

Primary data were gathered using two primary instruments. First, a structured questionnaire was administered to assess respondents' sociodemographic characteristics and levels of hair hygiene knowledge. Second, physical examinations were conducted to detect Pediculus humanus var. capitis infestation. These examinations utilized an observation checklist and specific tools, including a lice comb, magnifying glass, flashlight, gloves, and a white cloth. This combination of self-reported data and direct observation ensured a comprehensive assessment of both knowledge and infestation status.

Data Analysis

Data processing involved editing, coding, and tabulation prior to statistical analysis in SPSS. Univariate analysis was performed to describe the distributions of sociodemographic characteristics, hair hygiene knowledge levels, and infestation prevalence. Bivariate analysis was conducted using the chi-square test to assess the association between hair hygiene knowledge and head lice infestation. This test was selected because both the independent and dependent variables were categorical.

Ethical Clearance

The study adhered to strict ethical standards for research involving human participants and received approval from the Research Ethics Committee of the Faculty of Dentistry, University of Jember (Approval Number: 3137/UN25.8/KEPK/DL/2025). Written informed consent was obtained from all participants or their guardians prior to data collection. Participants were assured of confidentiality regarding their personal information and data, and their right to withdraw from the study at any stage was guaranteed throughout the research process.

RESULT

The data were analyzed descriptively to present the characteristics of independent variables (hair washing frequency, hair drying, sharing of towels, combs, and hair accessories, head coverings) and the dependent variable (Pediculosis capitis infestation).

Table 1. Characteristics of respondents

Characteristics	Frequency	Percentage
Age (years)		
13	10	19.6
14	24	47.0
15	17	33.3
Hair wash frequency		
Adequate (≥3times/week)	21	41.1
Inadequate (<3times/week)	30	58.8
Hair drying		
Yes	18	35.2
No	33	64.7
Sharing towels with others		
Yes	26	50.9
No	25	49.0
Sharing a comb with others		
Yes	30	60.7
No	21	39.2
Sharing a head cover with others		
Yes	31	58.8
No	20	41.2
Total	51	100.00

Table 1 presents the demographic characteristics and hygiene-related behaviors of the respondents. A total of 51 participants were included in this study. Most respondents were aged 14 (47.0%), followed by 15 (33.3%) and 13 (19.6%).

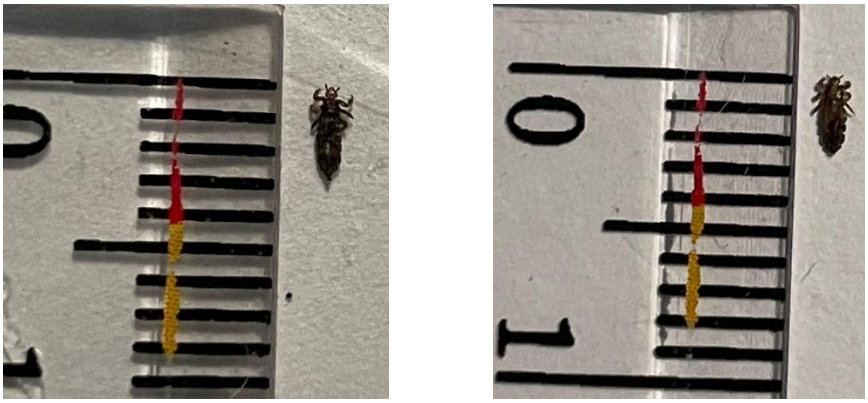
Regarding hair hygiene practices, more than half of respondents (58.8%) reported inadequate hair-washing frequency (<3 times per week), while 41.1% reported washing their hair at least 3 times per week. Regarding hair-drying behavior, most respondents (64.7%) did not dry their hair after washing, whereas only 35.2% reported drying it.

Behavioral factors associated with potential head lice transmission were also observed. Approximately half of the respondents reported sharing towels with others (50.9%). A higher proportion reported sharing combs (60.7%) and head coverings (58.8%), while 39.2% and 41.2% of respondents reported not sharing combs and head coverings, respectively.

Table 2. Pediculosis capitis infestation

Pediculosis Capitis Infestation	Frequency	Percentage
Positif	37	72.5
Negatif	14	27.5
Total	51	100.00

Table 2 shows the prevalence of pediculosis capitis among the respondents. Of the 51 participants examined, 37 (72.5%) were found to be positive for head lice, while 14 (27.5%) were negative. These findings indicate that pediculosis capitis infestation was relatively high among the study population.



a. Female lice b. Male lice

Figure 1. Lice appearance

Figure 1 illustrates the morphological appearance of head lice observed during the examination. The figure shows both female and male lice specimens. The female lice appear larger and more elongated, consistent with their reproductive role of laying eggs (nits) on human hair shafts. In contrast, male lice are generally smaller and slimmer. The scale shown in the figure indicates that the body length of the lice specimens is approximately within the typical range of 1–3 mm for head lice.

DISCUSSION

This study reveals a notably high prevalence of Pediculosis capitis among female students at the Nurul Islam Islamic Boarding School, with 72.5% of respondents found to be infested. This rate exceeds many prevalence figures reported in general school populations, aligning instead with data from other high-density residential settings. The findings corroborate established epidemiological trends indicating that adolescents aged 12–15 years are at peak risk for infestation (Padzik et al., 2024). This vulnerability is likely multifactorial, stemming from increased social interaction during puberty and specific developmental factors (Banafshi & Khatony, 2024). The concentration of cases within this age group, particularly among 14-year-olds, suggests that younger adolescents may have lower levels of self-awareness about personal hygiene and lack the cognitive maturity to adopt preventive practices consistently without guidance (Toghroli et al., 2022).

The elevated infestation rate must be interpreted within the unique environmental context of the Islamic boarding school (Mus et al., 2022). The communal lifestyle, characterized by shared dormitories and close interpersonal contact, creates an ideal ecosystem for lice transmission (Petri et al., 2024). Morphological examination in this study confirmed the presence of Pediculus humanus capitis, distinguished from the closely related Pediculus humanus corporis by specific anatomical features, including body size, coloration, and claw adaptation for grasping hair shafts rather than fabric fibers. This diagnostic confirmation is critical, as it validates that the transmission route is primarily head-to-head or via hair-related fomites, rather than through clothing. The presence of adult lice with distinct sexual dimorphism further confirms an active, reproducing population within the school environment, underscoring the persistence of the infestation cycle in this communal setting (Delie et al., 2024).

Hair hygiene practices emerged as significant determinants of infestation risk in this population. Students who washed their hair at least three times per week demonstrated a

significantly lower risk, suggesting that regular cleansing helps reduce excess sebum and debris that facilitate lice attachment and survival (Leung et al., 2022). Furthermore, hair-drying practices were strongly associated with infestation status; failure to dry hair after washing creates a warm, damp environment that accelerates the lice life cycle (Riskayanti & Febrianti, 2025). The study also highlighted the role of indirect transmission through the sharing of personal items such as combs, towels, and headscarves (Ali et al., 2025). Given that lice can remain viable off the host for limited periods, the frequent sharing of these fomites in a boarding school setting likely serves as a sustained reservoir for re-infestation, complicating control efforts (Sukesi et al., 2024).

Beyond physical hygiene, this study established a clear correlation between knowledge of hair hygiene and infestation outcomes. Limited awareness of the symptoms, transmission routes, and treatment of Pediculosis capitis was associated with higher infestation rates, supporting the health belief model, which posits that knowledge influences health behavior (Naseri et al., 2025). Inadequate understanding perpetuates vulnerability, as students who cannot identify early signs of infestation are less likely to seek treatment or modify risky behaviors (Enechukwu, 2025). This knowledge gap is particularly pronounced in younger students, reinforcing the need for age-tailored health education. The data suggest that poor hygiene behaviors in this cohort are not merely matters of convenience but reflect a deficit in health literacy that leaves the population susceptible to persistent infestation (Neuberg et al., 2022).

Collectively, these findings emphasize that mitigating Pediculosis capitis in boarding schools requires a multifaceted approach combining curative and preventive strategies. While proper hair care practices can reduce risk, they are insufficient as standalone interventions in high-prevalence environments (Bartosik et al., 2023). Structured health promotion programs are urgently needed to improve health literacy regarding lice transmission and hygiene (Najjari et al., 2022). Collaborative efforts involving Islamic Boarding School administrators, healthcare professionals, and public health authorities are essential to implement regular screening, enforce policies against sharing personal items, and ensure access to pediculicides for affected students and their close contacts (Strahan et al., 2024). By addressing both the behavioral and environmental determinants identified in this study, stakeholders can significantly reduce the burden of head lice infestation among Indonesian boarding school students (Sutrisno & Febriani, 2025).

CONCLUSION

This study demonstrates a significant association between hair hygiene knowledge and Pediculus humanus var. capitis infestation among female students in an Islamic boarding school. The high prevalence of infestation observed reflects inadequate health literacy and hygiene practices, exacerbated by communal living conditions that facilitate parasite transmission. These findings underscore that knowledge deficits contribute directly to risky behaviors—such as infrequent hair washing, inadequate drying, and sharing personal items—that sustain infestation cycles. Therefore, effective control requires more than curative treatment; it demands targeted health education to promote preventive hygiene behaviors. A collaborative approach involving school administrators, health professionals, and public health authorities is essential to implement routine screening, enforce policies on personal item sharing, and deliver sustainable health promotion. Strengthening hair hygiene knowledge remains a critical strategy for reducing the burden of pediculosis capitis and safeguarding student health in communal educational settings.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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