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Analysis of Personal Hygiene and Characteristics of Living Environment in Elementary Student with Pediculosis Capitis

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ABSTRACT

Background: Pediculosis capitis is one of the parasitic infections that can cause pruritus and allergic reactions. The prevalence of Pediculosis capitis is relatively high and can occur both in developed and developing countries regardless of socioeconomic status. The occurrence of Pediculosis capitis can be caused by poor personal hygiene factors and living environmental conditions, which can also increase the incidence of this ectoparasitic infection. **Purpose:** To analyze the correlation between personal hygiene and characteristics of the living environment, and the incidence of Pediculosis capitis. **Methods:** This study is quantitative research with a correlational analysis method and a cross-sectional study approach. **Result:** The examination of the correlation between poor personal hygiene and the incidence rate of Pediculosis capitis showed a result of 0.000 ($p<0.05$). Similarly, the examination of the correlation between the characteristics of the living environment and the incidence rate of Pediculosis capitis also showed a figure of 0.000 ($p<0.05$), indicating that there is a correlation between personal hygiene, and the characteristics of the living environment, and the incidence rate of Pediculosis capitis. **Conclusion:** There is a significant correlation between personal hygiene, and the characteristics of the living environment, and the incidence of Pediculosis capitis.

Keywords*:* Pediculosis capitis, personal hygiene, residential characteristics.

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BACKGROUND

Pediculosis capitis infestation is a head lice infection in humans that causes pruritus and often occurs in children aged 3-11 years because they are more likely to interact with each other, especially at school.[1,2]The prevalence of infection is higher in girls than boys because girls have longer hair and often have close contact.[3]

The incidence of Pediculosis capitis is still high in both developing and developed countries.[4] For example, the incidence of Pediculosis capitis in orphanages in Northwest Ethiopia reached 65.7% in 2019.[5] Meanwhile, in Indonesia, several cities that reported Pediculosis capitis infestations were in Palembang, reaching 5.7%[6] and in Muhammadiyah 1 Elementary School of Medan City, reaching 29.3% in 2020.[7]

Pediculosis capitis is transmitted through direct or indirect contact with objects such as combs, brushes, clothes, hats, and scarves.[3] The incidence of infection itself is also closely related to poor personal hygiene patterns, such as rarely washing hair, exchanging objects, as mentioned previously, and the cleanliness of the residence.[8,9] Based on research conducted at one of the Islamic boarding schools in Bandar Lampung, there is a significant correlation between poor personal hygiene and the incidence of Pediculosis capitis infection.[10]

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A person with *Pediculus humanus capitis* will experience itching and scalp irritation, which tend to be dominant in the occipital and temporal areas and spread to the entire head. The appearance of these symptoms affects learning concentration and lack of self-confidence, especially in children.[10]

Pediculosis capitis may cause peer criticism, isolation, parental anxiety, bullying, social embarrassment, and unnecessary absenteeism. This study aimed to analyze the correlation between personal hygiene, and characteristics of the living environment, and the incidence of Pediculosis capitis among students of SDN 107396 Paluh Merbau, Percut Sei Tuan, Deli Serdang, North Sumatra. The novelty of this study is the larger sample size compared to previous reports in Indonesia. Then this study also examined in more depth the effect of air humidity in each participant's residence as measured by a hygrometer on the incidence of pediculus capitis in schools.

METHODS

The study used a correlation analysis methods and a cross-sectional approach, which means the dependent and independent variables are measured simultaneously. The population in this study was 368 students at SD Negeri 107396 Paluh Merbau, Percut Sei Tuan, Deli Serdang, North Sumatra. With probability sample calculations, 192 students met the inclusion criteria such as experiencing pruritus or itching on the head and living in a dense residence (≥ 2 people in one bedroom).

This research used primary data obtained from questionnaires, observations, and direct examination methods during September-November 2023. In the initial stage, researchers obtained informed consent, followed by the distributions of questionnaires regarding personal hygiene, and residential characteristics. A direct examination of students was carried out after they filled out the questionnaire. The examination was carried out in the form of combing their hair and checking for eggs, nymphs, and adult lice. Finally, the researcher visited the respondent's residence and set up a hygrometer (humidity measurement) in each room. All procedures for this research have been approved by the Research Ethics Commission of the Faculty of Medicine, Muhammadiyah University of North Sumatra (No.1082/KEPK/FKUMSU/2023).

Based on data collection, Pediculosis capitis was an extoparasitic infestation caused by *Pediculus humanus capitis.* The measurement results were considered positive when eggs or adult lice were found and negative when there were no eggs or lice. Personal hygiene was defined as an effort to maintain personal hygiene, including clean hair. In this study, the personal hygiene score was considered good when it was in the range of 6-10, and poor when it was only 1-5. For the residential aspect, it was divided into two aspects, namely the number of occupants, which is divided into dense (>2 people) and not dense (<2 people), while the other aspect was the humidity level, which was divided into non-humid when the hygrometer results were in the range of 40 -70% and was considered humid when the hygrometer score was >70%.

Survey result data was tabulated, configured, and analyzed using SPSS software. The analysis was carried out using the chi-square test, with the p-value considered significant being 0.05, so if the p-value <0.05, then the hypothesis was accepted.

RESULT

Figure 1. describes the demographic characteristics of the students who participated in the study. The research participants, consisted of 41.1% male students and 58.9% female students. The majority of participants were students in the 6-8 year age group (41.6%), followed by students in the 9-10 year age group (30.7%), and students aged 11-12 years (27.6%).

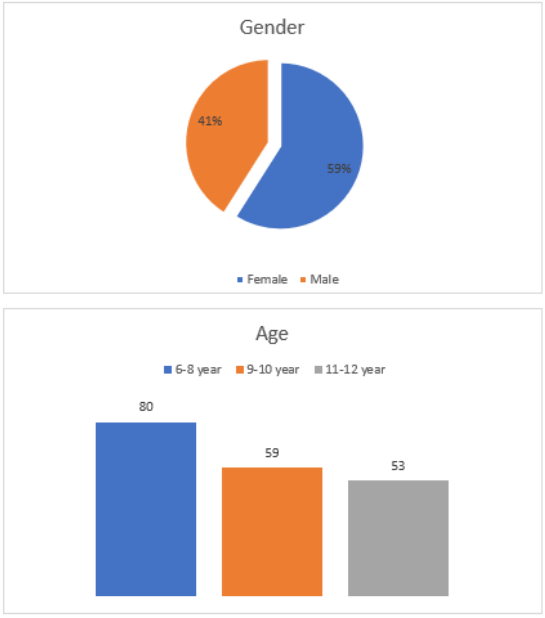

Figure 1. Demographic characteristics of the participants.

A total of 103 respondents (53.6%) had poor personal hygiene habits, and the majority of

respondents (53.6%) also lived in dense residences. Apart from that, 102 respondents (53.1%) had residences with humid characteristics, and only 90 respondents (46.9%) lived in non-humid residences. Data on personal hygiene characteristics and participant residence are attached in Figure 2.

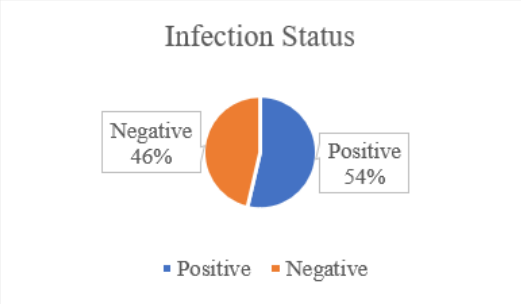

Figure 2. Distribution of the incidence of Pediculosis capitis.

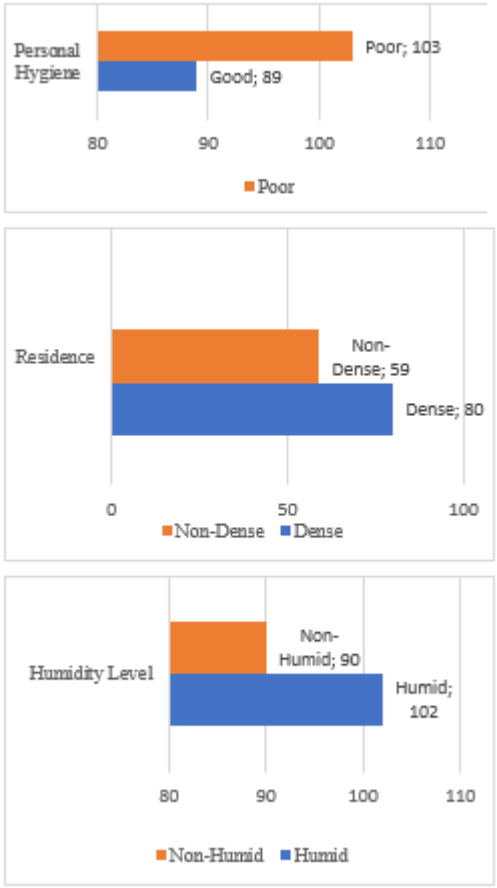

Figure 3. Characteristics of personal hygiene, residence, and humidity levels.

Figure 3 shows the incidence of Pediculosis capitis infection. Based on the results, it is known that more of the respondents were infested with *Pediculus humanus capitis*, specifically 103 respondents (53.6%).

Table 1 displays the correlation between personal hygiene and Pediculosis capitis. From the 103 respondents who were positive for infestation there were only 20 students (19.4%) who had good personal hygiene, while 83 respondents (80.6%) had poor personal hygiene. Then, of the 89 respondents (46.4%) who had negative infestation,77 respondents (86.5%) had good personal hygiene, and 12 other respondents (13.5%) had poor personal hygiene.

Testing with the Chi-Square Test produces a significant level of 0.000 ($p<0.05$). The OR value (95%) of 0.038 (0.017-0.082) be concluded that there is a correlation between poor personal hygiene and the incidence of Pediculosis capitis. This indicates that greater risk with poor personal hygiene have a 0.038 times greater of developing Pediculosis capitis compared to respondents who have good personal hygiene.

Table 1. Correlation between Personal Hygiene and Pediculosis capitis

Infection Status	Personal Hygiene		Total n (%)	P	OR (95% CI)
	Good n (%)	Poor n (%)			
Positif	20 (19.4)	83 (80.6)	103 (100.0)		0.038
Negative	77 (86.5)	89 (100.0)	89 (100.0)	0.000	(0.017-0.082)

Note: CI (Confidence Interval); OR (Odds Ratio)

Table 1 show the correlation between residence characteristics and Pediculosis capitis. Table 1 demosntrates that of the 103 respondents who were positively infested with *Pediculus humanus capitis*, there were 66 respondents (64.1%) who lived in densely populated areas, and 37 respondents (35.9%) who lived in non-dense areas. Meanwhile, of the 89 respondents who had negative infestation status, only 19 respondents (21.3%) lived in densely populated areas.

Testing with the Chi-Square Test produces a significant level of 0.000 ($p<0.05$). This suggested that there is a correlation between the number of dense residences and the incidence of Pediculosis capitis. With an OR (95%) of 6.572 (3.440-12.556), it indicates that people who have a high density of residents in their homes have a 6.572 times higher risk of Pediculosis capitis compared to those who do not have a dense number of residents.

Table 2. Correlation between the Number of Occupants and Pediculosis Capitis Infection

Infection Status	Occupants		Total n (%)	P	OR (95% CI)
	Dense n (%)	Non-dense n (%)			
Positif	66 (64.1)	37 (35.9)	103 (100.0)		6.572
Negative	19 (21.3)	70 (78.7)	89 (100.0)	0.000	(3.440-12.556)

Note: CI (Confidence Interval); OR (Odds Ratio)

Table 2 shows that the 103 respondents who were positive for Pediculosis capitis, 81 respondents (78.6%) lived in humid residences, and 22 respondents (21.4%) lived in non-humid residences. Meanwhile, of the 89 respondents who were negative for Pediculosis capitis, there were 68 respondents (76.4%) lived in humid residences and 21 other respondents (23.6%) lived in non-humid residences.

Testing with the Chi-Square Test produces a significant level of 0.000 ($p<0.05$). This suggested that there is a correlation between humidity and the incidence of Pediculosis capitis. With an OR (95%) of

0.084 (0.043-0.165), it indicates that people who live in humid areas have a 0.084 times greater risk of being infested with *Pediculus humanus capitis.*

Table 3. Correlation between Humidity and Pediculosis Capitis

Infection Status	Humidity Levels		Total n (%)	P	OR (95% CI)
	Humid n (%)	Non-Humid n (%)			
Positif	81 (78.6)	32 (21.4)	103 (100.0)	0.000	0.084 (0.043-0.165)
Negative	21 (23.6)	68 (76.4)	89 (100.0)		

Note: CI (Confidence Interval); OR (Odds Ratio)

DISCUSSION

The results show that Pediculosis capitis infected girls more often than boys (58.9% vs 41.1%). The reason is that girls play more often in close contact (head-to-head), have longer hair which is one of the media for lice reproduction, and wear lots of hair accessories.[11] This is in line with research conducted on 8122 students in Turkey aged 5-16 years, which showed that the prevalence of Pediculus capitis in girls was 40 times higher than in boys.[12]

The results also show that there is a significant correlation between personal hygiene, the characteristics of the residence, and the incidence of Pediculosis capitis. These findings are in line with previous research, in which 24 of the 27 samples with poor personal hygiene, exhibited a Pediculosis capitis.[13] The studies that have been carried out are novel in terms of sample size and make the research results more accurate. Another study conducted at an orphanage in the city of Palembang in 2015 showed that cases of Pediculosis capitis were quite high, reaching 62%. This is caused by poor personal hygiene patterns in orphanages, such as the habit of sharing items.[14] Apart from that, poor hair hygiene, such as rarely drying hair after shampooing and rarely changing bed sheets, are also factors that cause high cases of infestation.[15] Personal hygiene management is very important for children, including the ability to look after themselves and maintain physical health.

Students living in densely populated areas are 6,752 times more likely to be infested with Pediculosis capitis. This is supported by previous research conducted by Hudayah (2019), which stated that out of 99 samples with a dense number of family members, 73 samples experienced Pediculosis capitis.[16] This condition often occurs in refugee camps, shelters for homeless people, or prisons, orphanages, or families with a large number of members.[17] This is because a dense home environment will result in a high frequency of direct contact, both during activities and when resting or sleeping. Pillow sharing is one of the factors contributing to the high transmission rate of Pediculosis capitis. The density of residents in the house allows for the habit of sleeping together in one bed and sharing items such as combs, clothes, towels, and other items.[16]

The research results also show that students who live in homes with high humidity are at risk of experiencing Pediculosis capitis by 0.084 times. This is supported by previous research conducted of 43 samples who lived in rooms with humidity of 70% - 90%; 37 samples were positive for Pediculosis capitis.[14] This demonstrates that the more occupants in a room, the easier it is for the infection to spread because the distance between individuals is limited and the humidity of the room facilitates microbial growth and reproduction. The optimal air temperature or humidity for the survival of Pediculosis capitis ranges between 70% and 90%. With such humidity, there is a greater chance of contracting Pediculosis capitisis.[14]

There are ways to prevent Pediculosis capitis in the living environment, such as reducing direct head-to-head contact, and avoiding sleeping together with family members. Another advice is to avoid exchanging personal items, which can become a medium for transmitting *Pediculus humanus capitis.* In addition, it is highly recommended to disinfect bedding and personal equipment.[18] Combs should be soaked in hot water or treated with pediculicides.[19] Linen, pillowcases, clothes and towels used by infected people must be washed immediately in hot water (≥50°C) for 30 minutes.[20] Children should be advised not to share personal items with friends.[18] If infected, hair treatments can include removing the lice or applying a pediculicide (topical lice removal medication). However, when using this drug, parents must pay attention to the dosage to avoid resistance and neurotoxic effects.[21]

The strengths of this study, based on findings, are that it not only looks at personal hygiene factors but also the characteristics of the residence, including humidity levels and their influence on the incidence of Pediculosis capitis, where not many studies have discussed environmental factors. Furthermore, this study had quite a large number of participants, reaching 192 respondents. Personal hygiene and environmental characteristics have significant influence on the incidence of Pediculosis capitis, according to the findings, of the study. However, this study has limitations, such as the lack of demographic characteristics discussed and the fact that it only looks at aspects of age and gender.

The study found that personal hygiene and student residence characteristics were correlated with the incidence of Pediculosis capitis. Students of SDN 107396 Paluh Merbau had poor knowledge of personal hygiene and home management which contributed to the high incidence of Pediculosis capitis. If this problem is overlooked, the students' physical and psychological well-being may suffer as a result of being teased by other students, causing stress for parents.

Therefore, the author recommends that teachers collaborate with health workers in primary health services to conduct routine screening of children's health conditions, including hair health, at least once every 6 months.

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