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Original Article

Pediculosis capitis in Elementary School Children in Kupang Regency

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ABSTRACT

Pediculosis capitis is a parasitic infestation caused by the head louse, *Pediculus humanus capitis* (PHC). These lice feed on human blood on the head. Head lice infestations most commonly occur among preschool and primary school children, as well as household members and caregivers. This study was conducted to provide an overview of the evidence regarding the prevalence of *Pediculosis capitis* among primary school students in Kupang Regency, East Nusa Tenggara. This study aimed to determine the prevalence of *Pediculosis capitis* and identify risk factors influencing its occurrence among primary school students in Kupang Regency. The study was conducted in primary schools in Kupang Regency during the 2023-2024 academic year. To identify cases of *pediculosis*, the presence of eggs/nymphs/adult *Pediculus humanus capitis* was detected using a lice comb. Clinical symptoms and signs were collected through interviews using a questionnaire and direct observation of clinical signs. A total of 278 children participated in the study, consisting of 164 boys (59%) and 114 girls (41%). *Pediculosis* cases were found in 151 children (54,3%). Characteristics of children influencing the occurrence of *pediculosis* include hair length and the number of family members living in the same household. Reported symptoms associated with *pediculosis* cases included dandruff, scalp itching, redness, difficulty sleeping, and poor concentration. Behaviours of primary school children related to the transmission of *pediculosis* include sleeping with an infected person, sharing hats, sharing combs at home, frequency of using a lice comb, and frequency of washing hair per week.

Introduction

The prevalence of *Pediculosis humanus capitis* (PHC) is widespread worldwide. Preschool and elementary school children are most commonly affected by this disease. The highest prevalence generally occurs in children aged between 3 and 12 years because they are more likely to interact with each other, especially at school (Ko & Elston, 2004). Epidemiological data on Pediculosis corporis and Pediculosis pubis in Indonesia remain limited. Some areas have been reported, such as Palangkaraya, where a prevalence of pediculosis of 50% was found (Merrary et al., 2024). The prevalence of Pediculosis humanus capitis in Bali was 34,04% (Malini & Song, 2024).

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The prevalence of PHC in Lawongan Timur is 78,57% (Massie, Wahongan, & Pijoh, 2020). Meanwhile, the report about Pediculosis humanus capitis has not been made in East Nusa Tenggara.

PHC is a scalp infection caused by infestation with the parasite named *Pediculus humanus capitis*. PHC is typically transmitted primarily through physical contact (Hardiyanti et al., 2015). The blood-feeding behavior of head lice can cause anemia, and scratching lesions may lead to secondary infections (Suwandi & Sari, 2017). PHC infestation generally presents with mild symptoms, such as the patient feeling an itching sensation on the scalp (Centers for Disease Control and Prevention, 2024). The itching is caused by the parasite's saliva and feces. Severe itching can disrupt sleep and concentration in school-aged children. The occurrence of PHC can be influenced by several factors, such as gender, sharing hair accessories, hair length, frequency of hair washing, knowledge level, and socioeconomic status (Frenanda, 2019).

Many studies have identified various risk factors for the transmission of pediculosis in children. A study in Iraq found a significant association between Pediculosis capitis infestation and the following factors: female gender, parental education level, maternal occupation, number of siblings, and previous infestation (Hama-Karim et al., 2022). Research in Brazil found that hair length and thickness increase the risk of pediculosis transmission (Valero et al., 2024). A study in Abidjan, Ivory Coast, reported that gender, family income, hair length, and scalp itching are risk factors for pediculosis (Djohan et al., 2020). A study in Peru confirmed that young age, female gender, large household size, living in wooden houses, and the presence of pets are the most important risk factors for Pediculosis capitis (Lesshafft et al., 2013). A study in Baturaja reported a significant association between age, education, shared pillow use, shared comb use, shared towel use, knowledge, attitudes, and behavior with the occurrence of Pediculosis capitis (Fadhillah, Anwar, & Liberty, 2021). A study in Lampung found that the most significant factor associated with the occurrence of Pediculosis capitis was hair length (Sukesi, Ikhsian, & Sulistyawati, 2024). The results obtained indicate that hair length and thickness increase the risk of infection (Valero et al., 2024). The study conducted in Kupang aimed to determine the number of pediculosis cases, identify risk factors for transmission, and identify the clinical symptoms experienced by patients. This differs from the previous studies.

Methods

This study employed an observational analytical design with a cross-sectional approach, conducted in three elementary schools located in Kupang Regency. Data collection was carried out at SD Takola Indah in Tanah Merah Village, Kupang Tengah District, involving 97 children; SD Asam Tiga Naibonat in Kupang Timur District, involving 77 children; and SD GMIT Tuatuka in Kupang Timur District, involving 104 children. Proportional stratified random sampling was employed as the sampling technique in this study. Cases of pediculosis were identified by combing the students' hair with a lice comb under adequate lighting and examining them with a magnifying glass. Identification was conducted by identifying eggs, nymphs, and adult Pediculosis humanus capitis. Clinical symptoms and signs were recorded through interviews using structured questionnaires and direct clinical observation. This study was conducted in 2023-2024. Data were collected and analyzed using SPSS 16 software, and data were processed using the chi-square test to identify factors associated with the transmission of pediculosis.

Results

This study was conducted to determine the prevalence of Pediculosis capitis and the risk factors that influence the transmission in elementary schools in Kupang Regency. Table 1 shows the distribution of pediculosis prevalence, risk factors related to child characteristics, and the impact of pediculosis infestation on those who were affected.

There were 278 children involved in this study; 164 (59%) were boys and 114 (41%) were girls. The prevalence of pediculosis was 54,3%, with 151 cases among 278 children across the three elementary schools. The prevalence rates at each elementary school were as follows: Takolah Indah Kupang Tengah Elementary School at 49,5%; Asam Tiga Kupang Timur Elementary School at 49,4%; and GMIT Tuatuka Kupang Timur Elementary School at 62,5%. A significantly high prevalence was found in the 4th to 6th grade group at 62,2%, a prevalence of 73,04% among children with long hair, and a prevalence of 66,4% among children with more than four family members in the household.

The chi-square test revealed grades 1-3 had the same tendency/risk as grades 4-6 for the occurrence of pediculosis (OR=0.5). Hair length was significantly associated with pediculosis incidence, with long hair conferring a 3,88-fold higher risk of infection compared to short hair (OR=3,88). Families with 1-4 members have a protective effect (OR=0.446) compared to families with more than 4 members.

The impact of pediculosis infestation on elementary school children manifests as complaints and clinical signs. Reported complaints included scalp itching, redness, sleep disturbances, and difficulty concentrating in class due to the sensation of something crawling on the scalp. Statistical analysis showed that itching on the scalp was 52 times more likely to be experienced by children with pediculosis compared to those not infested. Difficulty sleeping at night was 69 times more likely to occur in children with pediculosis. Redness of the skin was 7 times more likely to be experienced by children with pediculosis than those not infested. A particularly concerning complaint regarding the well-being of elementary school children is that difficulties in classroom learning activities are 61,8 times more likely to be experienced by children with pediculosis compared to those who are not infested.

Table 1. Characteristics of the sample of elementary school children in kupang regency

No.	Describtion	Examination Result		Prevalance (%)	*p* value	*OR*
		Number of examined	Number of infested			
1.	School Origin					
	SD Takolah Indah Kupang Tengah	97	48	49,5		
	SD Asam Tiga Kupang Timur	77	38	49,4		
	SD GMIT Tuatuka Kupang Timur	104	65	62,5		
	Total	278	151	54,3		
2.	Age Level					
	6-9 years	161	78	48,45	0,106	
	10-13 years	117	73	62,40		
3.	Elementary School Grade					
	Grade 1-3	159	77	48,43	0,023	0,571
	Grade 4-6	119	74	62,2		
4.	Gender					
	Boys	164	81	49,4	0,064	
	Girls	114	70	61,4		
5.	Parent's Occupation					
	Civil Servant/Soldier/Police	24	12	50	0,192	
	Private Employees	49	29	59,2		
	Enterpreneur	35	25	71,4		
	Farmer	137	68	49,6		
	Unemployed	33	17	51,5		
6.	Hair type					
	Straight	146	73	50	0,309	
	Wavy	99	59	39,1		
	Curly	33	19	57,6		
7.	Hair length					
	Long (>3 cm)	115	84	73,04	0,00	3,883
	Short (≤3 cm)	163	67	41,10		
8.	Family Member					
	1-4 members	171	80	46,8	0,001	0,446
	>4 members	107	71	66,4		
9.	Dandruff					
	Yes	92	82	89,1	0,000	13,904
	No	186	69	37,1		
10.	Itchy scalp					
	Yes	145	131	90,3	0,000	52,868
	No	133	20	15,03		
11.	Sleep Difficulties					
	Yes	136	127	93,4	0,000	69,38
	No	142	24	16,9		
12.	Learning Difficulties					
	Yes	140	129	92,1	0,000	61,8
	No	138	22	15,9		
13.	Skin Abnormalities					
	Yes	32	28	87,5	0,000	7,000
	No	246	123	50,0		

Table 2 below shows practices related to the transmission of pediculosis among elementary school children. The prevalence of pediculosis infestation was significantly higher (93,5%) among children who slept with an infected individual every day. Infestation was also significantly associated with children who shared hats with their

friends twice a week (93%) and occasionally shared combs with family members (79,3%). Pediculosis is also significantly associated with infrequent use of a lice comb (70,4%) and infrequent shampooing of the scalp (49,2%).

Table 2 also explains the results of the chi-square test examining each practice related to the transmission of pediculosis. The statistical test results found that students who never slept with an infected person were protected (OR=0,254) compared to children who had the habit of sleeping with an infected person. Children who share hats with their friends are associated with pediculosis transmission, while children who never share hats are protective (OR=0,139). The habit of not sharing combs is also protective (OR=0,129) compared to children who use shared combs daily. The habit of using a lice comb twice a week is also protective (OR=0,253) compared to children who rarely use a lice comb. The habit of rarely washing hair with shampoo is six times riskier (OR=6,365) compared to the habit of washing hair twice a week with shampoo.

Table 2. Characteristics of student behavior that affect the transmission of pediculosis

Behavior	Examinition Results		Prevelance (%)	*p* value	*OR*
	Number Of Examined	Number Of Infester			
Sleeping with infected person					
Every day	46	43	93,5	0,000	
Twice a week	53	38	71,7		0,045
Never	179	70	39,1		0,254
Wear a hat together					
>twice a week	57	53	93,0	0,000	
1-2 times a week	61	47	77,0		0,035
Never	160	51	31,9		0,139
Use a comb together					
Everyday	84	60	71,4	0,000	
Sometimes	58	46	79,3		0,198
Never	136	45	33,1		0,129
Change the sheets/ pillowcases/weeks					
2 times	35	18	51,4	0,420	
1 time	90	54	60,0		
Sometimes	153	79	51,6		
Airing out the pillows/weeks					
1 time	32	15	46,9	0,484	
Sometimes	130	75	57,7		
Never	116	61	52,6		
Using lice comb/weeks					
Sometimes	115	81(%)	70,4	0,000	
1 time	86	50(%)	58,1		0,147
2 times or even more	77	20(%)	26,0		0,253
Washing hairs/weeks					
Sometimes	130	64	49,2	0,000	
1 time	83	34	41,0		4,555
2 times	65	53	81,5		6,365

Discussion

Based on this study, cases of pediculosis were more prevalent among children aged 10-13 years (62,4%) than among those aged 6-9 years (48,45%). This is in line with the study by Hama-Karim et al. (2022), which the highest incidence of pediculosis occurs among children in grades 4-6. Children's social activity levels develop with age, progressing from simple interactions to the ability to participate in groups and resolve conflicts. This aligns with grade levels, where grades 4-6 had more cases than grades 1-3 of elementary school. This is contrary to the study of AlBashtawy & Hasna (2010), who found that pediculosis cases were most prevalent among children aged 6-7 years (40%).

Pediculosis capitis remains a significant public health issue among school-aged children worldwide. The global prevalence is estimated at 19% (Hatam-Nahavandi et al., 2020). Several studies conducted in Indonesia, such as at the Pondok Pesantren Jakarta Barat, reported a prevalence of 50,4% (Sutanto & Susanto, 2022), while the prevalence of pediculosis at an orphanage in Palangkaraya City was 52,6%. In this study, the prevalence of

pediculosis was 54,3%. Based on gender, the global prevalence of pediculosis capitis in boys was 7% (95% CI=0,05-0,10) compared to 19% (95% CI=0,15-0,4) in girls (Hatam Nahavandi et al., 2020). In this study, the highest incidence of pediculosis was found in girls (61,4%). The distribution of pediculosis cases based on parents' occupations was almost evenly distributed, but unemployed parents had a higher incidence (71,4%), and were not associated with the occurrence of pediculosis. The number of family members >4 people influenced the incidence of pediculosis with a prevalence of 66,4%, consistent with other studies where housing density is a risk factor for pediculosis (Hama-Karim et al., 2022). Hair type was not significantly associated with the incidence of pediculosis, whereas hair length showed a strong association (p=0,000). Other studies have shown that long and wavy hair is associated with pediculosis (Hama-Karim et al., 2022). A study conducted in West Jakarta found that 80,4% of cases occurred in children with long hair (Sutanto & Susanto, 2022).

Pediculosis infections generally do not show specific symptoms. The presence of symptoms usually includes an itching sensation due to movement within the hair, itching (an allergic reaction to lice saliva), and irritability (Centers for Disease Control and Prevention, 2024). In this study, complaints reported by some pediculosis patients included itching on the scalp, skin redness (irritation), excessive dandruff, difficulty sleeping at night, and difficulty concentrating at school. Itching on the head in pediculosis patients was reported 52,8 times more frequently (90,3%) compared to those without pediculosis. This complaint was also found in other studies worldwide (Hama-Karim et al., 2022; Owa, 2024; Sutanto & Susanto, 2022). Redness of the skin can be caused by an allergic reaction to the saliva of head lice (Bragg & Wills, 2023). There are 89,1% of pediculosis sufferers complain of dandruff on their heads. In a study conducted by Gholami, Dayer, & Azarm (2024), it was found that dandruff actually acts as an anti-lice agent, which is the opposite of the findings in this study. The itching sensation on the head of children with pediculosis is felt during school, disrupting their ability to learn. This itching also persists into the evening, making it difficult to sleep or study at night.

One of the risk factors in disease transmission is inappropriate behavior related to disease prevention. In this study, behaviors closely related to pediculosis were sleeping with an infected person, sharing hats with friends, sharing combs with family members, using lice combs/week, and washing hair/week. In another study, the frequency of hair washing, sharing combs or hair accessories, and sharing bedding or sleeping surfaces were identified (Lukman, Armiyanti, & Agustina, 2018). In Bali, behaviors associated with pediculosis incidence include hair washing frequency and sleeping together (Cahyarini, Swastika, & Sudarmaja, 2021).

Conclusions

Based on the findings, the prevalence of Pediculosis capitis infestation among elementary school children in Kupang Regency was 54,3%. Cases of pediculosis were more commonly found among elementary school students in grades 4-6 than in grades 1-3. There were no significant differences in the number of cases found based on gender, parents' occupation, or hair type. Factors influencing the occurrence of pediculosis include hair length and the number of family members living in the same household. Complaints reported in association with pediculosis cases include dandruff on the hair, itching on the scalp, skin abnormalities such as redness, difficulty sleeping at night, and difficulty concentrating. Behaviors of elementary school children related to the transmission of pediculosis include sleeping with an infected person, sharing hats, sharing combs at home, frequency of using a lice comb, and frequency of washing hair per week. Teachers and parents should be aware of the high prevalence of pediculosis to enable effective preventive measures at both school and home.

Author contributions

MBB, LVP, and MW contributed to the study's concept and design. NRH assisted with experimental studies and data acquisition. AA managed the literature search, data analysis, and statistical analysis. All authors participated in manuscript preparation, with MBB responsible for editing and review. All authors have read and agreed to the published version of the manuscript.

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Ethical approval statement

This research activity was approved by the Ethics Committee of the Kupang Health Polytechnic (Poltekkes Kemenkes Kupang) no. LB.02.03/1/0015/2023 and permitted by the local government of both NTT Province and Kupang District no. 074/65/DPM-PTSP/XII 2023.

Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Supplementary materials

No supplementary material available.

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