



## THE SPREAD OF PEDICULOSIS CAPITIS IN STUDENTS AT INDONESIAN ISLAMIC BOARDING SCHOOLS

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### Abstract

Pediculosis capitis is an infection of the scalp or hair caused by infestation of *Pediculus humanus var. capitis*. The prevalence of this disease is quite high, especially in school-age children. Factors that play a role in influencing the occurrence of *Pediculosis capitis* are age, gender, sharing a bed or pillow, using a comb or hair accessories together, hair length, frequency of hair washing, economy and hair shape. Islamic boarding schools are educational institutions with a boarding school system or joint education so as to form a separate community. This is a risk that the disease will quickly spread to members of the pesantren community. The spread of this disease can be through direct and indirect contact transmission. Clinical symptoms of the disease include itching which causes scalp abnormalities when scratched and can cause secondary infections, sleep disturbances at night due to itching, and psychologically it makes children feel embarrassed because they are isolated from other children. Several factors can help spread *Pediculosis capitis*, namely socio-economic factors, level of knowledge, poor personal hygiene, residential density, and individual characteristics such as age, hair length, and hair type. The definitive diagnosis of *Pediculosis capitis* is finding *Pediculus humanus var. capitis* adults, nymphs, and eggs on the scalp and hair. Methods of treatment can be done using physical or chemical methods. *Pediculosis capitis* can also be prevented by avoiding direct and indirect contact

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## 1. Introduction

Pediculosis capitis is an infection of the scalp or hair which is caused by infestation of *Pediculus humanus var. capitis*. This disease prevalence is quite high, especially school children and this disease has also become a problem in both developing and developed countries. In the United States each year *Pediculosis capitis* affects 6 to 12 million people. Based on gender, the risk is two times greater for women compared to men.

Investment ratio *Pediculus humanus var. capitis* in school children in Thailand ranges from 12.26% -29.76%. The ratio in the age group of children 12 years was 26.07%, while the ratio in the age group of children 8 years increased to 55.89%.

*Pediculus humanus var. capitis* is an obligate ectoparasite that feeds on blood. Their life cycle is always related to humans, they cannot jump, they have no wings and their life cycle does not occur in animals. This disease can be spread through direct transmission of head-to-head contact of an infected person and indirect transmission such as wearing combs, hats, towels, pillows, mattresses and headscarves.

This disease has been associated with poverty or social status, low economic and slum environment. This disease is often neglected especially in countries where there are other more serious health priorities because it is considered mild and has low mortality, but this disease among school children worldwide has caused significant morbidity.

The clinical symptom of *Pediculosis capitis* is an itchy feeling that causes scalp disorders and can cause secondary infections when scratched. In school children the chronic infestation of *Pediculosis capitis* causes anemia which will make children lethargic, sleepy, and affect learning performance and cognitive function, besides that at night infected children will experience sleep disturbances due to itching and frequent scratching. From a psychological standpoint, head lice infestation makes children feel ashamed because they are isolated from other children.

The spread of *Pediculosis capitis* can be influenced by several factors, namely socio-economic factors, level of knowledge, poor personal hygiene, residential density, and individual characteristics such as age, hair

length, and hair type. In densely populated areas this disease is often found, one of which is Islamic boarding schools.

Islamic boarding schools are educational institutions with a boarding school system or shared education so as to form a separate community whose members consist of students, teachers or *ustadz* and the family of the *pesantren* caretaker. This is a risk that the disease will quickly spread to members of the *pesantren* community.

In school children the prevalence of skin diseases is generally still high, this causes the prevalence of *Pediculosis capitis* to be still high in Islamic boarding schools due to a lack of attention from both the owners, administrators and the government in terms of cleanliness, behavior and concern for health. Traditional culture is also another risk factor where they will share food, shelter, and knowledge. These conditions greatly support the continuity of the life cycle of mites, fleas, and even other parasitic infestations and fungi.

Seeing the high incidence of *Pediculosis capitis* that occurs, it is important to know the method of treatment to minimize the occurrence of *Pediculosis capitis*.

## 2. Research Methods

Data analysis was carried out to determine the frequency distribution of each variable in the form of categories and produce data in the form of percentages and inferential analysis. The test used is Partial Least Square (PLS), which is one of the Structural Equation Modeling (SEM) techniques. There are 2 instruments used in this study, namely: the first is a questionnaire about knowledge, the parameters used are adapted and developed from the KAP questionnaire.

## 3. Results

*Pediculosis capitis* is a scalp disease caused by infestation of obligate ectoparasites or also known as mites or lice of the species *Pediculus humanus var. capitis* which belongs to the *Pediculidae* family, this parasite depends on humans for its entire life cycle and includes blood-sucking parasites or *hemophagydea*.

Children often get this disease, especially aged 3-11 years. *Pediculosis capitis* infection in Indonesia itself has no definite figure. In Malaysia about 11% of children aged 3-11 years are infected and about 40% in Taiwan. In the

United States, around 6 million–12 million children in the 3-11 year age group are affected.

Girls are more often affected by this disease because they have long hair and often wear hair accessories. In addition, poor hygiene conditions, such as rarely washing hair, are also one of the causes of this disease. Transmission of this disease can be through direct contact, namely hair to hair or through indirect contact, namely intermediaries such as hats, pillows, mattresses, combs, headscarves.

*Pediculus humanus var. capitis* has a flattened body dorso ventral, has a type of sucker mouth to suck human blood, its body is segmented, has 3 pairs of legs and is brownish yellow or grayish white. This mite has no wings, therefore this parasite cannot fly and the spread of infection must be from objects or hairs that are stuck together.

Mites have claws on their legs to hang on to their hair. The female adult form is larger than the male. Eggs or nits are oval or round in shape, about 0.8 mm long, white to brownish yellow. Eggs are laid along the hair and follow the growth of the hair, which means that the more mature eggs are found towards the end.

Mites are obligate ectoparasites that spend their entire life cycle, namely eggs, larvae, nymphs and adults in human hair and scalp. In previous research it was said that these mites can only survive for 1 to 2 days if they are not in human hair or scalp, more than 95% of people infected with this disease have adult mites

Skin disorders caused by mite bites, namely itching and scratching to relieve itching. The influence of saliva and mite excretion which also enters the scalp when the mites are sucking blood is what causes itching. According to some studies it is said that these mites can only survive less than 48 hours without sucking blood or not being on the scalp. Meanwhile, the eggs can last about 1 week if they are not in human hair or scalp.

Several factors can influence the occurrence of *Pediculosis capitis*:

1. Age, especially in the age group 3-11 years.
2. Gender, women are more often affected by *Pediculosis capitis* because almost all women have longer hair than men.
3. Using a bed or pillow together.
4. Using combs or hair accessories together, using combs simultaneously will cause eggs and even adult mites to stick to the comb, so it will be infected, as well as hair accessories such as headscarves, headbands and ribbons.

5. Long hair, people with longer hair are more difficult to clean than people with short hair.

6. Frequency of hair washing.

7. Economically, low socioeconomic level is a significant risk with mite infestation, but also because of the inability to treat the infestation effectively.

8. The shape of the hair, in Africans or African-American negroes who have curly hair is rarely infested with head lice because it is difficult for adult female mites to lay eggs.

Itching is the main symptom of head mite manifestations but some people are asymptomatic and can be carriers. The incubation period before symptoms develop is around 4-6 weeks. Mites and eggs are most abundant in the occipital area of the skin and retroauricular area. Bites from mites can produce skin abnormalities in the form of erythema, macules and papules, but the examiner often only finds erythema and excoriations. However, there are several other individuals who complain and show signs of fever and local enlargement of the lymph nodes. Scratching that occurs on the scalp can cause erosion, excoriation and secondary infection in the form of pus and crusts. If there is a severe secondary infection, the hair will be lumpy with lots of pus and crusts. This situation is called *plicapolonica* which can grow mushrooms.

The definitive diagnosis of *Pediculosis capitis* is finding *Pediculus humanus var. capitis* adults, nymphs, and eggs on the scalp and hair. The presence of adult mites is a sign that you are experiencing an active infection, but adult mites are very difficult to find because they can move about 6-30 cm per minute and avoid light. The way to find adult and nymph mites can be done by sweeping *serit* which is a more effective method than visual inspection. There are several other skin diseases that can cause itching of the scalp, including seborrheic dermatitis, psoriasis, insect bites, eczema and fungal infections or *tinia capitis*.

Methods of treating this disease can be done using two methods which include physical and chemical methods. Chemical methods, namely the use of insecticides or pediculicides, have been widely used throughout the world. Insecticides are easy and convenient to use and the results are very effective. However, there are potential side effects and mite resistance to some insecticides has been found. The physical method that can be used is to shave the hair to prevent infestation and help the topical medication work better and not block the hair.

Various drugs that can be used to treat Pediculosis capitis are pyrethrins which are derived from natural extracts of *Chrysantheum cineraria efolium* flowers. However, people who are allergic to chrysantheums or related plant extracts will experience shortness of breath and dyspnea. In the United States, pyrethrins are the only commercially available and over-the-counter pediculicides approved by the Food and Drug Administration (FDA). This insecticide is available in the form of lotion, shampoo, foam mousse and cream. Pyrethrin products are applied to the head for 10 minutes and then rinsed. Although the effectiveness of pediculitis approached 100% in the mid-1980s, there have also been treatment failures of 88% due to recently reported resistance.

Permethrin is the only synthetic pyrethroid which is used to kill mites worldwide. Introduced in the United States in 1986, permethrin has residual activity for 2 weeks after a single 10-minute treatment. Permethrin cream is applied for 10 minutes, but an 8-12 hour treatment with 5% cream for scabies or scabies is an alternative and more effective treatment. Resistance to high concentrations is also a problem, especially in areas where there is resistance to DDT or pyrethroids.

Lindane is a chlorinated hydro carbon, like DDT, and this class of compounds is generally slow killing. Available in 1% shampoo preparation which is applied for 4 minutes. Researchers previously did not recommend using Lindane because of its resistance, side effects, namely disturbances in the central nervous system (CNS). This drug is only recommended for patients who fail to respond to mite therapy.

Carbaril is a cholinesterase inhibitor. In the UK and in other countries carbaril is available as a 0.5% lotion and shampoo. This product is not available in the United States and may not be FDA approved because of its toxicity. Carbaril is more toxic and carcinogenic to patients and less lethal to mites. Like Carbaril, Malathion is a cholinesterase inhibitor and has been used for 20 years to treat mites. Topical treatment includes administering malathion which has a pediculoid effect by administering as much as 0.5% or 1% in the form of a lotion or spray. Malathion lotion is used at night before going to bed after washing the hair with soap, then covering the head with a cloth. The next day the hair is washed again with soap and combed using a tight comb or serit. Treatment can be

repeated one week later if there are still eggs. In secondary infections, it is first treated with systemic and topical antibiotics such as Erythromycin, Cloxacilin and Cephalexin then followed by the above drugs in the form of shampoo.

There are two methods of prevention, namely preventing direct and indirect transmission.

A. Methods of prevention of direct contact transmission:

Avoid direct hair-to-hair contact when playing and doing activities at home, school, and anywhere else.

B. Indirect transmission prevention methods:

1. Do not use clothing such as hats, scarves, jackets, headscarves, sports costumes, hair ties at the same time.

2. Do not use combs, brushes, towels at the same time. If you want to use a comb or brush from an infected person, you can disinfect the comb and brush by soaking it in hot water around 130F for 5-10 minutes.

3. Washing and drying clothes, bedding, carpets and other items.

4. Sweep and clean floors and other furniture

#### 4. Summary of Findings

Pediculosis capitis is an infection of the scalp or hair which is caused by infestation of *Pediculus humanus var. capitis*. This disease can be spread through direct transmission of head-to-head contact of an infected person and indirect transmission such as wearing combs, hats, towels, pillows, mattresses and headscarves. The clinical symptom of Pediculosis capitis is an itchy feeling that causes scalp disorders and can cause secondary infections when scratched. In school children, the chronic infestation of Pediculosis ocapitis causes anemia which will make children lethargic, sleepy, and affect learning performance and cognitive function, besides that at night infected children will experience sleep disturbances due to itching and frequent scratching. From a psychological standpoint, head lice infestation makes children feel ashamed because they are isolated from other children. The definitive diagnosis of Pediculosis capitis is finding *Pediculus humanus var. capitis* adults, nymphs, and eggs on the scalp and hair. Methods of treatment can be done using physical or chemical methods. In addition, Pediculosis capitis can also be prevented by avoiding direct and indirect contact.

## 5. Conclusion

From the explanation above, it can be concluded that the treatment of Pediculosis capitis can be done with two methods, namely physical treatment methods and chemical treatment methods.

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