

IDENTIFICATION OF PARASITES MORPHOLOGY CAUSES OF PEDICULOSISCAPITIS AND RISK FACTORS IN ORPHANS (CASE STUDY IN GORONTALO CITY)

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ABSTRACT

Pediculosis capitis is an infection of the scalp or hair in humans caused by parasites belonging to the Anoplura order. The aim of the study was to identify the parasite morphology that causes Pediculosis capitis and risk factors in an orphanage. This type of research is descriptive quantitative design.

The study population was all foster children in the orphanage in Gorontalo City with a sample size of 27 people. Sampling was cluster random sampling using univariate data analysis techniques.

The results of the research on the morphology of parasites that cause Pediculosis capitis are parasites belonging to the Anoplura order. 22 respondents (81.5%) suffered from the parasite that causes Pediculosis capitis, 5 (18.5%) did not suffer from Pediculosis capitis. The description of risk factors based on the most age 15-17 years was 11 people (40.7%), based on using a shared bed with 9 people (33.3%), based on the use of a shared pillow, namely 15 people who did not use a pillow together (55, 6%), based on the use of a shared hair comb as many as 12 people (44.4%), based on the use of the most hair accessories, namely sometimes using accessories as many as 10 people (37.0%), based on the frequency of washing hair, 3 times a week as many as 9 people (33.3%). The parasite that causes Pediculosis capitis in the orphanage in Gorontalo City is a parasite belonging to the order Anoplura (suction fleas). The conclusion is that Pediculosis capitis is a health problem in the orphanage. Suggestions for the need to maintain personal hygiene to reduce the incidence of Pediculosis capitis.

Keywords: parasites, *pediculosis capitis*, risk factors

INTRODUCTION

Pediculosis capitis one of the classifications of pediculosis, namely an infection of the scalp or hair in humans caused by an infestation of the head called Parasites *Pediculus humanus capitis*. *Pediculus humanus capitis* belongs to the family *pediculidae*, this parasite throughout its life cycle depends on humans and is a suction parasite (hemophagydea) that lives on the human scalp which is parasitic (harmful) [21].

The taxonomy of *Pediculus Humanus Capitis* is as follows:
Kingdom : Animalia
Phylum : Arthropoda
Class : Insect
Order : Phthiraptera / Anoplura
Family : Pediculidae
Genus : *Pediculus*
Species : *Pediculus humanus capitis* [8].

Pediculosis capitis cases have been around since the 1970s, reports of the incidence of *Pediculosis capitis* have continued to increase, starting from

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hundreds to millions of cases worldwide [6]. The prevalence of this disease is quite high and varies. Pediculosis capitis cases have become a problem in both developing and developed countries [12].

Head lice in Indonesia are often referred to as tuma or mites, the incidence of pediculosis capitis in Indonesia is estimated that 15% have infestation of pediculosis capitis [9]. Cases in Indonesia based on research conducted around the city of Yogyakarta found that children suffering from *Pediculus humanus capitis* were 19.6% [18]. A study conducted in East Langowan sub-district showed that out of 112 children, 88 children (78.57%) were positively infected with *Pediculus humanus capitis* [20].

Several studies on *Pediculus humanus capitis* have been carried out in orphanages. Research that has been carried out in the orphanage of the West Sumatra Da'wah league obtained from 69 respondents, found that 40 respondents had *Pediculus capitis* (58.0%) [4]. Research conducted by an orphanage in the city of Pekanbaru from 127 respondents found that 73 respondents experienced *Pediculus capitis* (57.5%) in foster children [19]. A study conducted at ten orphanages in North Sulawesi province found that *Pediculus capitis* infestations were higher in girls with an incidence of 106 children (18.66%) infected with *Pediculus capitis* [29].

Factors that can influence the occurrence of parasites that cause *Pediculosis capitis* include age, gender, race, and socioeconomic conditions. *Pediculosis capitis* is most often found in densely populated areas such as dormitories or orphanages. Factors that facilitate the breeding of the parasites that cause *Pediculosis capitis* are mostly transmitted directly by sufferers (hair with hair) or through intermediaries (combs, pillows, clothes, mattresses, headscarves, hats, mukena, towels) due to unhealthy

habits such as wearing personal objects. alternately, lack of personal hygiene and environmental hygiene that are not properly maintained, these things can facilitate or become a major factor in the transmission of parasites that cause *Pediculosis capitis* [21].

Pediculosis capitis occurs 41 times more often in girls than boys and is most commonly seen in children aged 9-16 years. *Pediculosis capitis* can cause various problems ranging from reduced self-confidence, negative social views, lack of quality sleep, and learning disorders [13].

The parasites that cause *Pediculosis capitis* can cause various problems for school children. Problems that often arise include itching due to the influence of flea saliva that sucks blood by biting the surface of the skin, the itching will cause people to scratch their heads, intensive scratching habits can cause wound irritation and can even lead to the possibility of secondary infection [3].

In school children or children living in *Pediculosis* orphanages this *capitis* causes anemia which will make children lethargic, sleepy, and affect learning performance and cognitive function, besides that at night the infected children will experience sleep disturbances because of feeling itching and frequent scratching [31].

There are two methods of preventing parasites that cause *Pediculosis capitis*, namely:

1. The method of preventing direct transmission is to avoid direct contact between hair and hair while on the move or playing at school, at home, in dorms, and anywhere else [15].
2. The methods of preventing indirect transmission are:
 - a. Do not use hats, jackets, clothes, headscarves, hair accessories such as headbands and hair ties at the same time.

- b. Do not use brush, comb and towel at the same time. If you want to use a comb from an infected person, you should disinfect it by soaking in hot water around 130F for 5-10 minutes.
- c. Cleaning, drying clothes, bedding, carpets and other items [15].

Based on the above background, the authors are interested in conducting a study to see whether the parasite that causes Pediculosis capitis is present in an orphanage in Gorontalo City, for that the author takes the research title "Identification of Parasite Morphology Cause of Pediculosis Capitis and Risk Factors (Case Study) At the Gorontalo City Orphanage)".

RESEARCH METHODOLOGY

This type of research used in this research is descriptive with a quantitative research design. The location of the research was carried out at the X orphanage, Y orphanage and Z orphanage in Gorontalo City. This research was conducted on 29 August - 07 September 2020.

The population of this study were all foster children in the orphanage in Gorontalo City. The sample size in this study used a known population estimation formula [24]. The sample sizes obtained are:

Formula:

$$n = \frac{N Z_{2(1-\alpha/2)}^2 P (1-P)}{(N-1) d^2 + Z_{2(1-\alpha/2)}^2 P (1-P)}$$

$$n = \frac{446. 1,642. 0.57 (1 -0.57)}{(446-1). 0.152 + 1.642. 0.57 (1 -0.57)}$$

$$n = \frac{446. 1,642. 0.57 (0.43)}{(445) 0.152 + 1.642. 0.56 (0.43)}$$

$$n = \frac{294.01}{10.01 + 0.65}$$

$$n = \frac{294.01}{10.66}$$

$$n = 27$$

Information:

- N = Total Population
 n = Number of samples
 $Z_{2(1-\alpha/2)}$ = Degree of significance (90% = 1.64)
 P = The proportion of a particular case to the population (57% = 0.57)
 d = Degree of deviation from population (15% = 0.15)

So the sample size used as a study of 27 samples.

The sampling technique in this research is cluster random sampling which is a random sampling technique where the technique is used to determine the sample if the object under study or the data source is very broad [30]. After the cluster random sampling was carried out the sampling was carried out at the X Orphanage, Y Orphanage and Z.

The data collection technique in the form of a questionnaire was used to determine age, using a base or bed and pillow together and personal hygiene.

Inspection procedures for parasites that cause Pediculosis capitis:

1. Pre Analytic.

a. Preparation Tools:

The tools used in this study are a serit comb (flea comb), white paper, a sample container (a container made of glass or plastic that has a tight lid or that can be tightly closed & a clean and dry container), labels, microscopes. trinocular, glass object, camera, and observation sheet.

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b. Material Preparation:

The materials used in this study were chloroform and head lice.

c. Sample Preparation:

- 1) The sample was taken by combing it with a lice, then put it in a dry and clean container and then closed tightly.
- 2) The container containing the sample is labeled with the name, gender, age of the patient and then taken to the laboratory for examination.

2. Analytics.

- a. Take a sample then put it in a chloroform solution to be sedated / numbed.
- b. Take a sample that has been anesthetized and then place it on a dry and clean glass object.
- c. Examine it under a trinocular microscope with a camera lens magnification of 150x [1].

3) Post-Analytic.

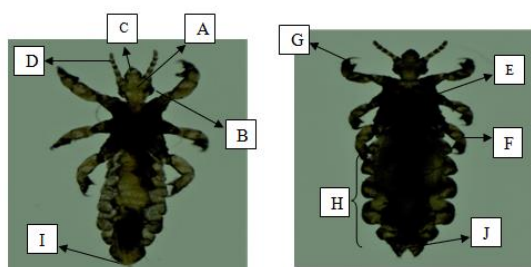
- a. Positive: found the parasite that causes *Pediculus capitis*.
- b. Negative: no parasites found that cause *Pediculus capitis*.

The data analysis technique in this study used univariate data analysis techniques where the researcher would describe or describe each research variable [14].

RESEARCH FINDINGS

The following data is the research data on the identification of the parasite morphology that causes *Pediculus capitis* and risk factors in an orphanage (a case study in Gorontalo City) which describes the incidence of *Pediculus capitis* and risk factors based on age, use of bedding, use of pillows and personal hygiene. hair comb, hair accessories, hair washing frequency).

1. Morphological Examination Results



Male

Female

Data source: primary 2020

Picture 1 The morphology of parasites that cause pediculosis capitis is classified in the order Anoplura.

Based on the picture of the results of the examination of the parasites that cause *Pediculus capitis*, namely parasites belonging to the Anoplura order with the morphology (a) Head (b) Eyes (c) Mouth (d) Antenna (e) Thoracic (f) Tarsi (g) Tarsus nails (h) Abdomen (i) sex of male fleas (j) sex of female fleas.

2. Univariate Analysis

Table 1. Incidence of *Pediculus capitis*.

<i>Pediculus capitis</i>	amount	%
Positive	22	81.5
Negative	5	18.5
amount	27	100

Source data: 2020 primary data

Table 2. Based on the duration of exposure to the parasite that causes *Pediculus capitis*.

Characteristics	amount	%
± 1 year	10	37.0
2-3 years	6	22.2
More than 3 years	6	22.2
Not infected	5	18.5
Amount	27	100

Source data: 2020 primary data

Table 3. Based on the Respondents age.

Characteristics	amount	%
9-11 years	4	14.8
12-14 years	10	37.0
15-17 years	11	40.7
18-20 years	2	7.4
amount	27	100

Source data: 2020 primary data

Table 4. Based on the use of a shared bed.

Characteristics	amount	%
Often	9	33.3

Sometimes	3	11.1
Ever	8	29.6
Not	7	25.9
amount	27	100

Source data: 2020 primary data

Table 5. Based on shared pillows.

Characteristics	amount	%
Often	2	7.4
Sometimes	3	11.1
Ever	7	25.9
Not	15	55.6
amount	27	100

Source data: 2020 primary data

Table 6. Based on the use of a shared hair comb.

Characteristics	amount	%
Often	12	44.4
Sometimes	6	22.2
Ever	7	25.9
Not	2	7.4
amount	27	100

Source data: 2020 primary data

Table 7. Based on the Use of Hair Accessories.

Characteristics	amount	%
Often	4	14.8
Sometimes	10	37.0
Ever	7	25.9
Not	6	22.2
amount	27	100

Source data: 2020 primary data

Table 8. Based on the frequency of washing hair.

Characteristics	amount	%
1x in one week	5	18.5
2x in one week	8	29.6
3x in one week	9	33.3
≥ 3 times in one week	5	18.5
amount	27	100

Source: 2020 primary data

DISCUSSION

Respondents in this study were 27 people who were taken from 3 orphanages in Gorontalo City, all respondents in this study were female in each of the respondents' orphanages amounting to 9 people. This is in

accordance with a previous study conducted by [26] in the results of the study which stated that the female gender was more often affected by Pediculosis capitis because almost all of them had longer hair than men.

Based on the results of the research on the existence of parasites that cause pediculosis capitis, from 27 people, 22 people were exposed to the parasites that cause pediculosis capitis. The morphological examination of the parasite that causes pediculosis capitis was carried out using a trinocular microscope with a magnification of 150x and using a solution of chloroform to anesthetize the parasite that causes pediculosis capitis.

After morphological examinations were carried out on 22 samples who were positive for the parasite that causes pediculosis capitis, it was found that the parasite that caused pediculosis capitis was a parasite belonging to the order Anoplura (sucking fleas). Based on previous research conducted by [31] a parasite belonging to the anoplura order is pediculus humanus capitis, this parasite is a hemophagydea (blood-sucking) parasite found in human hair and its entire life cycle depends on humans. The spread of pediculus humanus capitis can occur rapidly, pediculus humanus capitis can spread through direct or indirect contact.

The parasites that cause pediculosis capitis obtained in this study are seen based on the identification key [11] with the morphology of having no wings so that head lice cannot fly, it's just that head lice move very fast, the abdomen has more than 6 segments that help the respiratory process regulate and support body shape. , the difference between male and female abdomen is that the male abdomen is slimmer, the female abdomen is bigger, has eyes and antennae on the head that are shaped like a filiform consisting of 5 segments that function to detect touch, temperature movements, vibrations, have a mouth apparatus suitable for piercing and sucking, has

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three pairs of strong legs, has a tarsi of less than 5 internodes, The last tarsi segment is equipped with one or two tarsus nails which are shaped like claws which have the function of grasping the hair shaft, the shape is like a louse, the sucking beak is not clear.

[32] The morphology of adult head lice has 2 eyes and 3 pairs of legs, is grayish brown and becomes reddish when it has sucked blood, has 2 sexes, namely male and female, larger female and smaller male, to live an adult louse must suck blood several times a day, head lice can only survive for 1-2 days without sucking blood. The results of this study are in line with previous research conducted by [22] where head lice have parts consisting of the head, thorax and abdomen, have antennae on the head, have three pairs of legs, and the tip of the tarsus is shaped like a claw.

Based on the results of the research on the distribution of the incidence of *Pediculosis capitis* in foster children at the Gorontalo City orphanage, it showed that from 27 samples who were willing to become respondents, 22 people (81.5%) were positive for the parasite that causes *Pediculosis capitis* and as many as 5 people (18.5%) negative parasites that cause *Pediculosis capitis*. The results of this study indicate that the incidence of parasites that cause *Pediculosis capitis* is a health problem in the orphanage in Gorontalo City.

Based on the results of research that has been conducted by researchers, it shows that most respondents have long and thick hair, which will make it easier for the parasite that causes *Pediculosis capitis* to breed. According to [2] long and thick hair can make it easier to breed the parasite that causes *Pediculosis capitis* on the scalp, especially if they get together and one of their friends experiences the parasite that causes *Pediculosis capitis*, the transmission occurs very easily and

quickly. The results of this study are in line with research conducted by [4] out of 69 respondents, it was found that 40 people (58.0%) had the parasite that caused *Pediculosis capitis* and 29 people (42.0%) did not experience the parasite that caused *Pediculosis capitis*.

Based on the results of research on the distribution of the duration of exposure to the parasite that causes *Pediculosis capitis* in foster children, the duration of being infected with head lice is divided into 4 categories, namely 1 month - 1 year, 2 years - 3 years, more than 3 years and not infected. The characteristics of the duration of contracting head lice 1 month-1 year were 10 people (37.0%), 2 years-3 years as many as 6 people (22.2%), more than 3 years as many as 6 people (22.2%). The results of these four categories showed as many as 22 people who had been exposed to lice for a long time and the rest were respondents who were not affected by head lice so that they did not have long exposure to head lice. Based on the results of interviews with respondents, they were exposed to head lice since living in an orphanage and those who had been infected with head lice for 2 - \geq 3 years were respondents who had head lice before they lived in the orphanage. The results of this study are in line with research conducted by [10] the majority of respondents for a long time having had head lice, namely \pm 1 year as many as 23 respondents (38.3%), \pm 2 and \geq 3 years as many as 13 respondents (18.3%).

Infestation of *Pediculus humanus capitis* can cause symptoms of itching on the scalp which will result in people scratching their heads. The habit of frequently scratching the head can cause irritation and can lead to injury [21]. If the parasite infestation that causes *Pediculosis capitis* is not treated immediately, it can cause secondary infections such as pus (pus) and crusts that come from inflamed bite wounds, this can lead to clumping of

the hair strands with one another will stick and harden, this condition is called the plica palonica [14].

Based on the results of the research on the age distribution of respondents in foster children, in this study the ages were divided into 3 categories, namely 9-11 years, 12-16 years and 17-20 years. Most respondents were affected by parasites that cause pediculosis capitis, namely 12-16 years as many as 16 people (59.3%) followed by 17-20 years as many as 7 people (25.9%) and 9-11 years as many as 4 people (14.8%). From this study, it was found that the positive respondents of parasites that cause Pediculosis capitis were 15 years and under to 17 years of age. The results of this study are not in line with a study conducted by [19] which found that the most age group experienced *Pediculus humanus capitis* infestation, aged 13-18 years, as many as 79 children (62.2%). The results of this study are supported by previous research conducted by [5] which stated that the infestation of the parasite that causes Pediculosis capitis is most susceptible to occur in children aged 15 years and under, this is because children aged 15 years and under do not understand how to maintain personal hygiene. But it does not rule out the possibility that people > 15 years old are still attacked by the parasite that causes Pediculosis capitis even though that age is not included in the age category that is susceptible to Pediculosis capitis, this incidence of Pediculosis capitis infestation can happen to anyone, this Pediculosis capitis infestation is due to the interaction other people and are still in that environment.

Based on the results of the research on the distribution of the use of a mat / bed, the results of the research that have been carried out are that the most respondents are those who often use a base / bed together as many as 9 people (33.3%), followed by those who have used a bed

together as many as 8 respondents (29.6%), who do not use a base / bed together as many as 7 people (25.9%), and who sometimes use a bed together as many as 3 people (11.1%). From the results of this study, it was found that the average respondent was positive for the parasite that causes Pediculosis capitis, namely often and had used a bed / bed together. The results of this study are in line with research conducted by [17], it was found that the most subjects always used a shared bed by 50%, 17% shared bed frequently, 13% shared bedtime frequently, 10% shared less frequently and 10% did not share shared bedding. The use of a bed / bed simultaneously can facilitate the occurrence of Pediculosis capitis infestation because it facilitates the process of direct transmission through direct contact between heads [27].

Based on the results of research on the distribution of pillow use, from the research that has been conducted, it was found that more respondents did not use pillows simultaneously as many as 15 people (55.6%), followed by those who had used pillows together as many as 7 people (25.9%), sometimes using pillows together as many as 3 people (11.1%), and those who often use pillows together are 2 people (7.4%). Of the 27 people who used a pillow together, 22 were positive for the parasite that causes Pediculosis capitis. The results of this study are in line with research conducted by [16] out of 229 respondents who used a shared pillow / bed, it was found that 185 respondents (80.8%) were positively infected with pediculosis capitis.

Based on the results of the researchers' observations, it was found that the three orphanages in Gorontalo City had different behaviors, at the X orphanage there was a bed using two bunk mattresses and sleeping together on the floor using a personal pillow and sometimes using another respondent's

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pillow, at the Y orphanage there was a bed and pillows that are arranged close together without distance and some are arranged not close together in this orphanage, there are respondents who use personal pillows and sometimes share pillows with other respondents, and orphanage Z respondents use one bed together in 1 bed used by 4- 5 respondents but have their own pillow.

The use of pillows together is one of the parasitic infestation factors that cause *Pediculosis capitis*, this is because sleeping on one pillow can facilitate the process of head lice transmission due to direct contact between hair and hair, especially when using a pillow together with a patient with parasites that cause *Pediculosis capitis* [28].

Based on the results of the research on the distribution of personal hygiene using hair combs and the use of accessories, from the results of the research conducted, it was found that the most respondents who often used hair combs together were 12 people (44.4%), followed by those who had used hair combs together as many as 7 people (25.9%), sometimes using a comb together with 6 people (22.2%). 10 people (37.0%) used shared hair accessories, followed by 7 people (25.9%) who did not use hair accessories (22.2%). and those who frequently used hair accessories were 4 people (14.8%). From the results of this study, it is suspected that the influencing factor in the transmission of parasites that cause *Pediculosis capitis* in an orphanage in Gorontalo City is the use of combs / hair accessories together. Based on the observations of researchers, the habit of borrowing personal items such as combs, headscarves, mukena and other hair accessories is still common in the orphanage environment. This is one of the main factors that can facilitate the transmission process and can cause parasite infestations that cause *Pediculosis capitis* to increase. The results of this

study are in line with research conducted by [17]. This study found the results of using common items, namely combs, hats, headbands, headscarves, and other hair accessories. Often share items (33%),

The results of this study are in line with the theory put forward by [23] which states that using combs / hair accessories together will make eggs and even adult lice stick to the comb so that transmission will be easy. Likewise with hair accessories such as headbands, headscarves, prayer gowns, hats and ribbons. Based on the theory, the parasite transmission that causes *pediculosis capitis* can occur through direct contact from head to head and can occur through indirect contact such as combs, hair accessories, pillows, hats, headscarves and other head coverings.

Based on the results of the research on the distribution of personal hygiene hair washing frequency, the frequency of washing hair was divided into 4 categories, namely 1 time a week, 2 times a week, 3 times a week and ≥ 3 times a week. From the results of the research that has been done, it was found that the frequency of shampooing 1 time a week was 5 people (18.5%), 2 times a week as many as 8 people (29.6%), the frequency of shampooing 3 times a week was 9 people (33.3 %) and the frequency of shampooing ≥ 3 times a week was 5 people (18.5%).

All respondents who were exposed to parasites that cause *pediculosis capitis* were shampooed 1-2 times a week, while others had a frequency of washing 3 times - ≥ 3 times a week. Respondents with a frequency of washing their hair 3 times a week include those affected by head lice, based on the results of interviews conducted with respondents, this is also related to how to clean their heads, there are some who say respondents wash their hair less clean because sometimes respondents wash their hair without using

shampoo. This will make it easier for parasites that cause pediculosis capitis to grow and reproduce because the host's head is dirty [2].

This study is in line with the research conducted by [10], there were 6.7% of respondents affected by head lice having a frequency of shampooing 0-1x a week, all of whom were included in the category of respondents who had head lice and 93.3% of other respondents had a frequency of washing 2- 3 times a week. [25] A good frequency of shampooing is 2-3 times a week to get rid of dirt on the scalp. Dirt and saliva produced by head lice can trigger an itchy sensation which causes a person to scratch the head, excessive scratching of the head can cause wound irritation [7].

CONCLUSION

After conducting research on the identification of parasite morphology that causes pediculosis capitis and risk factors in an orphanage (a case study in Gorontalo City), it can be concluded:

1. The parasite that causes Pediculosis capitis in an orphanage in the city of Gorontalo is a parasite belonging to the Anoplura order.
2. There were 22 foster children who experienced the parasite that causes pediculosis capitis and 5 people did not experience the parasite that caused pediculosis capitis.
3. An overview of the risk factors for parasites that cause pediculosis capitis in an orphanage in Gorontalo City, it is assumed that based on age, the most common parasites that cause pediculosis capitis are 16 people aged 12-16 years (59.3%), based on the use of combs that often use combs together, namely 12 people (44.4%), based on the use of hair accessories sometimes 10 people (37.0%), based on the use of bed sheets often as many as 9 people (33.3%), based on the use

of pillows that did not use shared pillows as many as 15 people (55.6%), based on the most frequent hair washing, namely 3 times a week as many as 9 people (33.3%).

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