

Scabies infection and nutritional status profile on pediatric patients' general hospital Dr. Soetomo Surabaya

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Abstract

The parasitic infection caused by mite *Sarcoptes scabiei*, scabies, is widely known as one of the world's highest morbidity of skin infections. WHO classified scabies as one of the Neglected-Tropical-Disease. Scabies has several risk factors, and one of them is malnutrition. This study aimed to know the scabies infection profile and the nutritional status of patients in pediatric dermatology division, general hospital Dr. Soetomo Surabaya.

This is a retrospective study from secondary data collected by evaluating medical records from pediatric patient aged 0 – 60 months. The data were analyzed using the descriptive methodology to measure the frequency and percentage of each variable. The results showed that most of the patients are male, below 1 year old, and had good nutritional status (31.6%) measured using the weight-height index from WHO. Furthermore, most of the samples had upper extremity as the common region with scabies lesion, and papule is the most common lesion found on patients.

Keywords: Scabies; Nutritional Status; lesion; Body Region; Skin Infection; Children

1. Introduction

Scabies is a skin infection caused by *Sarcoptes scabiei* mite and being transmitted through direct skin-to-skin contact or indirect contact such as common things being used together [1]. Scabies occurs when female mites dig the epidermal layer of the skin by secreting saliva that makes epidermal layer cells lysis and forms the burrow. In the next step, female mites will layer the eggs, the mites will proliferate on the epidermal layer of the skin, and the new female mites will forms burrow again on another area of the skin [2].

The most common infection sites of *Sarcoptes scabiei* on the human body are inside the fold areas, such as the wrist, between fingers, behind ears, and genitalia [3]. For infants and younger children, the infected areas can usually reach the soles, palms, scalp, and face. This location determination is thought to be because the lipid composition in this area differs from other areas of the body [4].

Clinical manifestations usually appear 2 – 5 weeks after the infestation. The most common scabies lesion that appears in the beginning is erythematous papules caused by type IV hypersensitivity (delayed), mediated through T cells that can lead to inflammatory reaction [5]. Another type of lesion may also appear, especially in children, such as nodule, excoriation, and plaques [6]. Pruritus Nocturna, or itching that the intensity increase at night, usually also appear at the

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beginning of infestation [7]. Prolonged infection and immunocompromised condition of an individual can also lead to a secondary infection that is often caused by *Staphylococcus aureus* Group A and *Streptococcus pyogenes*. Those bacteria may penetrate the skin through scratching sites [8].

Scabies has several risk factors such as overpopulation in the same area, sharing the same bed, low level of hygiene, and malnutrition. All of those risk factors could increase the probability of scabies infection in an individual [9]. Malnutrition is the incapability of body to maintain nutrition intake [10]. Malnutrition conditions in the community could be one of the predisposition factors for infection and reinfection of scabies [11]. Malnutrition can lead to a lower immune system and increase an individual's susceptibility to getting infected. Low immunity or immunocompromised condition also can cause crusted or Norwegian scabies, which is the higher stage of scabies infection with heavier clinical manifestation that can lead to several complications and low quality of life [12]. Nutritional status in children can be measured with an anthropometric index Weight-Height Z-Scores (WAZ), often used to examine nutritional status with the WHO growth chart. Several types of research are already being conducted to investigate the role of nutritional status for scabies infection.

2. Material and methods

This research is a retrospective study using secondary data from medical records of pediatric patients with aged 0 – 60 months and were diagnosed with scabies infection within 2018 – 2019. The input data were demographic data such as age and gender, diagnosis, location of the lesion, type of scabies lesion, weight and height. The weight and height data are later used to determine nutritional status in samples using the Weight-Height Z-score (WAZ) from the WHO growth chart.

Furthermore, the data were analyzed using SPSS version 24 with the descriptive method to determine the frequency, percentage, maximum, and minimum values of each variable studied to evaluate profile of scabies infection and nutritional status as one of the risk factors.

3. Results

This research got 95 samples that met the inclusion criteria, consist of 54 samples from 2018 and 41 samples from 2019. There was a decrease in the number of samples by 13 people or as much as 24.07% between 2018 and 2019. The data obtained were then entered into a table and analyzed descriptively to evaluate the samples' scabies infection and nutritional status characteristics.

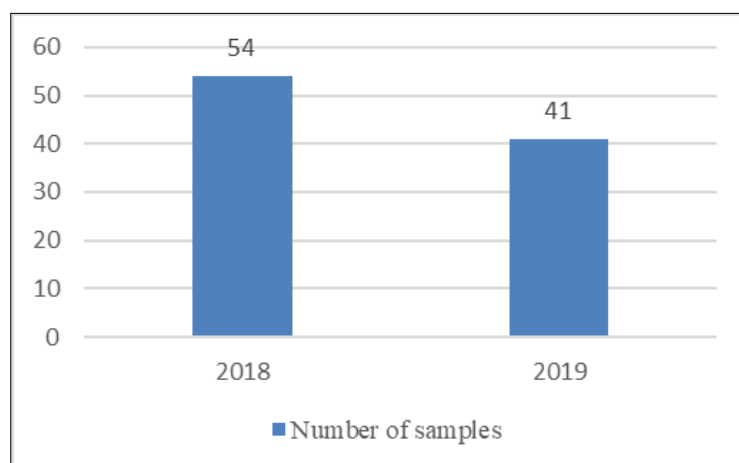


Figure 1 Distribution of total samples individuals the from year 2018 – 2019 (n= 95)

3.1. Demographic Data

3.1.1. Distribution of Age

In the results obtained from 229 samples of pediatric scabies patients, the samples' ages ranged from 0-5 years, where the youngest age was 3 months, and the oldest age was 5 years 0 months. The following table shows the age distribution of pediatric patients 0-60 months old with scabies infection in 2018 – 2019.

Table 1 Samples distribution based on age

Age	Year		Total (%)
	2018 (%)	2019 (%)	
0	17 (17.9)	13 (13.7)	30 (31.6)
1	13 (13.7)	7 (7.4)	20 (21.1)
2	10 (10.5)	4 (4.2)	14 (14.7)
3	7 (7.4)	11 (11.6)	18 (18.9)
4	6 (6.3)	6 (6.3)	12 (12.6)
5	1 (1.1)	0 (0.0)	1 (1.1)
Total (%)	54 (56.8)	41 (43.2)	95 (%)

Based on Table 1, most of the samples, or 31,6% of total samples, are infants below one-year-old. Other than that, there are 20 people or 21.1% with age 1, 18 people or 18.9%, people with age 3, 14 people or 14.7% with age 2, 12 people or 12.6% are four years old, and one person or 1.1% of total samples are five years old.

3.1.2. Distribution of Gender

Table 2 Samples distribution based on Gender

Gender	Year		Total (%)
	2018 (%)	2019 (%)	
Male	28 (29.5)	21(22.1)	49 (51.6)
Female	26 (27.4)	20 (21.1)	46 (48.4)
Total	54 (56.8)	41 (43.2)	95 (100)

This study showed that pediatric patients aged 0-60 months were dominated by male patients, with 49 people or 51.6% of the total sample.

3.2. Scabies Infection

The profile of scabies infection on samples consists of diagnosis that divided into two kinds of diagnosis which scabies only, or scabies with secundar infection, lesion area, and type of lesion.

3.2.1. Distribution of scabies diagnosis

Table 3 Samples distribution based on diagnosis

Diagnosis	Year		Total (%)
	2018 (%)	2019 (%)	
Scabies	36 (37,9)	36 (37,9)	72 (75,8)
Scabies + secondary infection	18 (18,9)	5 (5,3)	23 (24,2)
Total	54 (56,8)	41 (43,2)	95 (100)

The diagnosis of scabies was obtained from samples consisting of scabies only and scabies infection with secondary infection. Based on table 3, the results showed that most of the samples diagnosed with scabies infection were 72 people

or 75,8% of the total sample, while the samples diagnosed with scabies and secondary infection were 23 people or 24,2% of the total sample.

3.2.2. Lesion Location

Table 4 Samples distribution based on location of scabies lesion

Location	Year		Total
	2018	2019	
Upper extremity			
Hand	29	18	47
Between fingers	15	18	33
Axilla	4	12	16
Lower extremity			
Foot	11	7	18
Between toes	29	16	45
Legs	1	1	2
Thighs	1	0	1
Body			
Abdomen	11	19	30
Thorax	2	3	5
Without explanation	9	4	13
Other Regions			
Gluteus	6	3	9
Genitalia	10	9	19
Face	1	1	2
Neck	2	0	2
Inguinal	3	6	9
Whole body	8	8	16

Table 4 shows that the location with the most scabies lesions in the sample was the upper extremities, especially between fingers, with 47 people or 49.5% of total samples. The other lesion on the upper extremity was found in the hands of 29 people, or 30.5% of the whole samples. Lesions on the axillary were found in 16 people or 16.8% of the total samples. Lesions were also found in the lower extremity, especially between toes, with 45 people or 47.3% of whole samples. Followed by lesions on the foot that were found in 18 people or 18.94% of total samples, and the other lesions of the lower extremity were found in legs in 2 people or 2.1%, and one person or 1.1% of total samples had a lesion on thighs.

Moreover, there were lesions on the body consist of 30 people in the abdominal region and 5 in the thoracic region, but there were 13 people who had no further information. Samples that had genital lesions were 19 people or 20% of the total sample, nine people on gluteus or 9.5% of the total sample, and the rest were in the facial region that were found in two people, inguinal nine people, and the number of samples that had lesions all over the body was 16 people or 16.8%.

3.2.3. Types of lesions

Table 5 Samples distribution based types of scabies lesion

Types of lesions	Year		Total
	2018	2019	
Papule	52	36	88
Macule	6	14	20
Pustule	21	7	28
Vesicle	2	5	7
Crust	11	5	16
Erosion	34	13	47
Exudative lesion	5	0	5
Excoriation	0	6	6
Desquamation	1	4	5
Nodule	0	1	1

The types of scabies lesions were determined based on the skin lesion seen at the physical examination time and contained in the medical record data. Table 5 shows that the most common type of lesion was papules found on 88 samples or 92.63% of the total sample. Besides papules, there were also lesions in the form of macules found in 20 samples, or 21% of the total sample. Other results obtained were that pustules were found in 28 people or 29.47% of the total sample, seven people 7.3% of the total sample had the type of lesion in the form of vesicles, Sixteen people, or 16.8% of the total sample, had the type of lesion in the form of a crust.

Other secondary lesions that were found in the samples are erosion with 47 people, or 49.47% of the total sample, five people, or 5.2%, had exudative lesions, six people or 6.3% of the total sample had excoriation, desquamation was found in 5 people or 5.2% of the total sample, and the nodule was found in 1 person from whole samples.

3.3. Nutritional Status

Table 6 Samples distribution based on weight

	Year		Total
	2018	2019	
Average \pm SD	11.13 \pm 4.54	11.25 \pm 3.93	11.23 \pm 4.23
Min (Kg)	4.3	6	4.3
Max (Kg)	30.0	20.2	30

Table 7 Samples distribution based on height

	Year		Total
	2018	2019	
Average \pm SD	85.39 \pm 18.54	87.02 \pm 21.76	86.09 \pm 19.90
Min (cm)	51	40	40
Max (cm)	140	132	140

Table 6 shows the body weight data in the sample ranging from 4.3 Kg to 30 Kg, where the average body weight was 11.23 Kg with a Standard Deviation of 4.23. Table 7 shows that the minimum value for the sample's body length or height was 40 cm, and the maximum height was 140 cm. The average of the sample's body length or height was 86.09 cm with a standard deviation of 19.90.

Table 8 Samples distribution based on nutritional status

Year	Nutritional Status						Total
	Severely Wasted (%)	Wasted (%)	Normal (%)	Possible risk of overweight (%)	Overweight (%)	Obese (%)	
2018	9 (9.5)	7 (7.4)	19 (20.0)	7 (7.4)	6 (6.3)	6 (6.3)	54 (46.8)
2019	12 (12.6)	2 (2.1)	11 (11.6)	8 (8.4)	3 (3.2)	5 (5.3)	41(43.2)
Total	21 (22.1)	9 (9.5)	30 (31.6)	15 (15.8)	9 (9.5)	11 (11.6)	95 (100)

The nutritional status of children aged 0-60 months was determined using the Weight-Height Z-Score (WAZ) index based on the WHO growth chart. Furthermore, nutritional status is classified as severely wasted for Z-score < - 3, wasted for Z-Score - 3 until - 2, normal with Z-Score - 2 until - 1, and possible risk of overweight with Z-Score > + 1 until + 2, overweight with Z-Score > + 2 until + 3, and obese with Z-Score more than +3 based on the 2020 regulation of the Indonesian minister of health no. 2.

This study showed that most samples aged 0-60 months had good nutritional status, as many as 30 people or 31.6% of the total 95 samples. Other than that, there are 21 people or 22.1% of total samples are severely wasted, 15 people or 15.8% are possible risks of overweight, 11 people or 11.6% are obese, and the frequency of samples that have wasted, and overweight nutritional status on each category are nine people or 9.5% of total samples.

4. Discussion

The result shows that most of the samples were below one year old with 30 people, or 31.6% of total samples, dominated by male patients with 49 people, or 51.6% of total samples. The most common diagnosis of scabies infection in children aged 0 – 60 months was scabies that was not accompanied by secondary infection found in 72 people or 75.8% of total samples.

Previous research in the exact location with samples of children with scabies in 2012-2014 showed that the age range of 0-3 years had the highest prevalence, dominated by males, and most of them were diagnosed with scabies only [13]. However, research conducted at Dr. Soetomo Hospital in 2009 – 2011 showed that the 5 -14 year age group had a greater prevalence than pediatric patients under five years old, but with male samples, and scabies diagnosis has the highest frequency among samples [14]. Statistical tests conducted at an Islamic boarding school in Bogor found a significant relationship between gender and the incidence of scabies with males have higher frequency than females [15].

Hygiene habits can differ between females and males. A study conducted in Cameroon showed that boys tend to sleep more often, use soap less often, and do not cut their nails. Based on these factors, differences in prevalence between males and females on scabies infection may occur. Younger children tend to get less education about personal hygiene than older children. Research conducted in Cameroon showed that the level of education was more influential on the incidence of scabies than the child's age [16]. However, school age also has vulnerabilities due to high activity outside the home and meeting more people, so dissemination is more likely to occur. Research conducted in France showed that there was no significant relationship between the age group of infants, children, and adults with the incidence of scabies [17].

Secondary scabies infections are generally caused by bacteria, especially *Staphylococcus aureus* Group A and *Streptococcus pyogenes* [18]. These bacteria usually enter through the patient's scratching and can be found on scabies, scibala, or burrows created by mites infestation. Secondary infections are more common in immunocompromised people because they are more susceptible to infection, and the late diagnoses in scabies patients could also make the condition worse, including the probability of secondary infection [19]. Therefore, the prevalence of people affected by this secondary infection tends to be less than that of ordinary scabies. a population.

Most scabies lesions were found in the upper extremity, especially between fingers, with 47 people or 49.5% of total samples for the scabies infection characteristic. Moreover, the most frequent scabies lesions are papules found in 88 people or 92.63% of whole samples. In general, the predilection areas of scabies are in the body's folds, such as between the fingers, hands, elbows, axillary, genital, inguinal, and foot. In infants, lesions are generally also often found on the face, scalp, abdomen, and thorax, so in infants, lesions are more common than in adults [20]. Lesions in infants are also commonly found throughout the body [21]. Research conducted in France shows that the location of the head and neck are mostly only in children under 15 years of age [17].

In this study, all the lesions were found in multiple forms and discretely distributed. Types of scabies can be divided into primary lesions in the form of papules and macules. In addition, there are additional secondary lesions, including erosions, pustules, crusts, exudative lesions, excoriations, scales, vesicles, papules, and nodules, accompanying the primary lesions. A person suffering from scabies can simultaneously have primary and secondary lesions [22].

Erosion and pustules can signify secondary infection, nodules caused by long-term infestations, excoriations due to scratching, and long-term self-medication. The difference in the appearance of lesions between ordinary scabies and crusted scabies is the host's cellular and humoral immune response. In crusted scabies, it is usually dominated by hyperkeratosis and crusting over a large area [23], while the common scabies lesions are erythematous papules, usually caused by a type IV hypersensitivity reaction [24].

Papules in scabies can occur from a type IV hypersensitivity reaction mediated by a cellular immune response, namely T cells, that trigger an inflammatory reaction [25]. The cells themselves can be affected by a person's nutritional status, whereas in conditions of poor nutritional status, overall immune cells will decrease so that they can make a person more susceptible to infection. Likewise, with obesity conditions where CD4 and CD8 levels will increase but T cell regulation levels decrease. Thus, the existing CD4 and CD8 produce the IFN- γ cytokine, a pro-inflammatory cytokine [26].

5. Conclusion

The scabies on pediatric patient with aged 0 – 60 months are dominated by infants that below 1 year old, male, and most of them are being diagnosed by scabies without secondary infection. Most of scabies lesions were found in papules form with upper extremity as the common lesions region. Meanwhile, normal nutritional status has highest frequency among samples.

Compliance with ethical standards

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statement of Conflict of interest

The authors have no conflict of interest to be declared.

Statement of ethical approval

This research has been done under ethical approval from ethical commission of general hospital Dr. Soetomo Surabaya.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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