



ORIGINAL RESEARCH

USE OF BEDS IN THE EVENT OF A SCABIES INFECTION IN BOARDING SCHOOLS

Penggunaan Tempat Tidur Pada Kejadian Penyakit Skabies di Sekolah Berasrama

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ABSTRACT

Background: Research on scabies in boarding schools has been widely carried out, however, the nature of transmission has not yet been analyzed. The transmission can occur due to the risk of direct contact when using shared beds. **Purpose:** This study aims to analyze the risk of bed usage in the event of a scabies infection in boarding schools. **Methods:** This study adopted a case-control design method. The independent variable was the use of beds, including using a shared bed and using one's own bed. The dependent variable was scabies, which was determined on the basis of the diagnostic criteria set for scabies. The sample size was 60 students, who had lived for at least four weeks in boarding schools. The sample comprised two groups: the group that used a shared bed (30 students) and the group that used their own beds (30 students). A non-probability sampling method was employed to record data. The data was collected by using a scabies checklist. Direct examinations and interviews were conducted at the Fathul Huda Demak and the Selamat Kendal boarding schools in February 2020. Statistical tests were carried out using chi-square analysis. **Results:** This study revealed the risk of developing scabies when a shared bed was used, with $p=0.00$ ($p<0.05$); $OR=7.67$; and $95\%CI= 2.42-24.25$. **Conclusion:** Students who used a shared bed in boarding schools were at 7.67 times the risk of developing scabies compared to students who used their own beds.

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ABSTRAK

Latar Belakang: Penelitian tentang Skabies di Sekolah berasrama telah banyak dilakukan, namun esensi penularan yang terjadi belum dianalisis, yaitu yang berhubungan dengan risiko penularan kontak langsung menggunakan tempat tidur bersama. **Tujuan:** Penelitian ini

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bertujuan untuk menganalisis risiko penggunaan tempat tidur pada kejadian penyakit Skabies di Sekolah berasrama. Metode: Penelitian ini menggunakan rancangan case control, Variabel bebas adalah penggunaan tempat tidur meliputi menggunakan tempat tidur bersama dan yang menggunakan tempat tidur sendiri. Variabel terikatnya adalah penyakit Skabies, yang ditetapkan berdasarkan kriteria diagnosis Skabies. Besar sampel 60 siswa yang sudah bertempat tinggal minimal empat minggu. Sampel dibagi menjadi 2 kelompok; kelompok yang menggunakan tempat tidur bersama sebanyak 30 orang dan kelompok yang menggunakan tempat tidur sendiri sebanyak 30 orang yang diambil menggunakan metode non probabilitas sampling. Data diambil menggunakan check-list scabies. Pemeriksaan langsung dan wawancara dilakukan di sekolah berasrama Fathul Huda Demak dan Sekolah berasrama Selamat Kendal pada bulan Februari 2020. Uji statistik yang digunakan adalah analisis chi-square. **Hasil:** Penelitian ini menunjukkan adanya risiko menggunakan tempat tidur bersama memiliki risiko terjadinya penyakit Skabies dengan $p=0,00$ ($p<0,05$), dan $OR = 7,67$; $95\%CI = 2,42-24,25$. **Kesimpulan:** Siswa yang menggunakan tempat tidur bersama di sekolah berasrama memiliki risiko 7,67 kali lebih besar terjadinya penyakit Skabies dibanding yang menggunakan tempat tidur sendiri.

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INTRODUCTION

Scabies is a disease that is caused by skin infestation and sensitization by the sarcoptes scabiei mites and their products. Scabies is a contagious skin infection caused by the sarcoptes scabiei variety hominis, which belongs to the arachnid class. Scabies is transmitted in two ways: direct and indirect contact. Direct contact is when contact is made with the skin of patients (e.g., shaking hands, sleeping together, and maintaining sexual relations). Meanwhile, indirect contact is when contact occurs through objects that have been worn by sufferers, e.g., clothes, towels, pillows, etc (Indonesian Medical Association, 2017; Sungkar, 2016). Most of the children in the Special Child Development Institute in Blitar tested positive for scabies (58.80%). With the individuals' hygiene habits followed, there was a high risk of getting scabies. For instance, the children had the habit of sharing the same towel and the habit of borrowing clothes (Ariningtyas, 2019). The most common method of scabies transmission occurs when individuals are in direct contact and when mites are walking on the surface of the skin (Sungkar, 2016).

Scabies is often ignored because it is not a life-threatening disease. Thus, the handling priority is low, however, this disease can become

chronic and severe and can result in dangerous complications. Lesions from scabies can cause discomfort because the infected area can become very itchy. The patients often scratch the infected area, which can result secondary infections. These secondary infections are especially caused by the group A bacteria *streptococcus* and the *staphylococcus aureus* (Mutiara & Syailindra, 2016). This can cause pyoderma due to bacterial infections that can become widespread, invasive, and even fatal. Lymphangitis, lymphadenitis, cellulitis, and even sepsis can occur. Secondary infections can trigger severe systemic complications (e.g., kidney diseases and rheumatic heart disease). About 50% of the cases of acute glomerulonephritis, after streptococcus sp. infection, are caused by skin infections. Outbreaks of acute glomerulonephritis, after streptococcus sp. infection, usually occur together with an outbreak of scabies. As a result, people with scabies will experience symptoms that can worsen with the passage of time. As a result, their quality of life can get disrupted, which can also decrease productivity and academic performance (Sungkar, 2016).

In Pakistan, in the skin diseases section in hospitals, scabies contributes to about 38.15% of the total number of skin diseases, with more men infected compared to women (Chaudhry et al.,

2018). The prevalence of scabies in health centers throughout Indonesia in 2008 was 5.60%–12.90%. In 2008, surveys conducted in various slums, such as in landfills and flats, in Jakarta, indicated a prevalence of scabies of 6.20%. Additionally, the prevalence of scabies in Boyolali was 7.40%, 8.20% in Pasuruan, and 5.80% in Semarang (Sungkar, 2016). The prevalence of scabies was high in densely populated areas. The results of a research conducted in Brazil indicated that the prevalence of scabies was twice as high in densely populated urban slums than in fishing communities, where people were more spread out over larger areas. High prevalence of scabies was generally noticed in environments with high occupant densities and in places with interpersonal contact, e.g., prisons, orphanages, and boarding schools (Indonesian Medical Association, 2017). The boarding school is an educational institution organized by a community. A boarding school may provide religious education. They are well-organized schools and usually integrate other types of education (Ministry of Religion RI, 2020).

It was observed that 60.30% of the students in boarding schools in Jember experienced scabies (Nuraini & Wijayanti, 2016). Eradication and scabies control measures remain a challenge due to delays faced in diagnosing the disease. Difficulties are also faced in maintaining prevention and surveillance measures (Ong & Vasanwala, 2018).

In a study conducted on rabbits, the prevalence of scabies was found to be 17.27% (Laksono et al., 2018). There is a relationship between environmental sanitation practices and the incidence of scabies (Mayrona, Subchan, & Widodo, 2018). Other factors that can cause scabies are environmental sanitation, personal hygiene habits, and contact with scabies sufferers (Arifuddin, Kurniawan, & Fitriani, 2016; Desmawati, Dewi, & Hasanah, 2015; Parman, Hamdani, Rachman, & Pratama, 2017; Saputra, Rahayu, & Putri, 2019; Tarigan, Subchan, & Widodo, 2018). Factors related to the incidence of scabies include age, personal hygiene, skin hygiene, bed cleanliness, and knowledge about the disease (Imartha, Wulan, & Saftarina, 2017).

The level of knowledge and education about scabies influences the incidence of scabies (Naftassa & Putri, 2018). Knowledge of personal hygiene can prevent the occurrence of scabies (Wijayanti & Ainiyah, 2019). The most influential factor is the density of the occupants in student rooms (Ibadurrahmi, Veronica, & Nugrohowati, 2017), the availability of facilities, and the personal hygiene infrastructure (Zakiudin &

Shaluhiyah, 2016). The interaction of people (based on their behavior) with the environment can spread a disease. The emergence of a disease is rooted in the ecosystem and the culture of a place and is the result of the interactive relationship between humans (and their habits and behavior) with the environmental components (Achmadi, 2009). Based on the environmental paradigm, the occurrence of a disease is the result of an interaction between humans and the surrounding environmental components that have the potential for causing a disease. By performing a comprehensive or systematic study, the occurrence of a disease in a society can be observed by locating the source of the cause, by examining the environmental components that are loaded with disease agents, and by investigating the causative agent of the disease to examine how and why people at risk have contracted the disease (Alamsyah & Muliawati, 2013). Bed and bedding hygiene is the highest risk variable for the incidence of scabies (Parman, Hamdani, Rachman, & Pratama, 2017).

From the various findings established above, it can be observed that scabies can transmit because of environmental components loaded with disease agents, however, the reasons for people to be at risk after having contracted the disease has not yet been studied. These factors are aspects of bed use, which, according to Indonesian Medical Association (2017), can cause the transmission of scabies due to direct and indirect contact. Indirect contact includes aspects of sleeping together. This study aims to analyze the risk of bed usage in the event of a scabies infection in boarding schools.

METHODS

This research employed an analytical observational study, using a case-control research design approach. The target population was students in boarding schools: a sizeable population of Fathul Huda Demak and Slamet Kendal boarding schools. The inclusion criteria for students was that they should have stayed for at least four weeks in the boarding schools. The exclusion criteria was students who did not want to participate in the research, and students with other skin diseases (e.g., dermatitis, prurigo, and corporate pediculosis). The sample size was 60 students. Sampling was carried out with a non-probability sampling technique on February 2020. The independent variable was the use of beds, which included using a shared bed and using one's own bed. The dependent variable was scabies, a

positive diagnosis based on the invention of at least two of the four cardinal marks, i.e., papules or vesicles, and the tendency to itch at night between the fingers (or wrists) of the volar (or outer elbow / underarm folding / areola mammae) (female). With males, the tendency to itch at the umbilicus (or buttocks / external genitalia). Independent and dependent variables used nominal scale data.

Data was collected by conducting direct examinations and by conducting structured interviews with students using a checklist. Chi-square tests were performed to analyze the risk of bed usage in the event of a scabies infection. Additionally, an analysis of the relationship of age and length of stay at the boarding schools was conducted using a contingency coefficient test.

This study has obtained ethical clearance from the Ethics Commission of Medicine, Faculty of Medicine (FK) at the Universitas Islam Sultan Agung Semarang, with the certificate number 082/III/2020/Komisi Bioetik

RESULTS

Fathul Huda Demak is a boarding school located in the district of Demak and has 637 students. Students in Fathul Huda Demak sleep together in a single room with the same mattress, containing 7–8 students per room. Selamat Kendal is a boarding school located in the Kendal district and has 5,100 students. Students in Selamat Kendal sleep separately because each student has a bed. A single room consists of four beds and four students.

The results of this research revealed that 32 students (53.30%) had scabies, while 28 students (46.688%) did not have scabies. Based on the age description of the students, the number of students who experienced the highest incidence of scabies was 19 (31.67%). These students were aged between 13 and 16 years. The lowest incidence was observed in the age group between 21 and 24 years. A single student had scabies (1.67%). The number of students who stayed for a length of 13–24 months was 29 students (48.33%). There were 20 students (33.33%) who stayed between 1 and 12 months. Only one student (1.67%) stayed for over 36 months. The results of the analysis that determined the relationship between the age and the incidence of scabies using the contingency coefficient were as follows: $C=0.20$ with $p=0.45$

($p>0.05$). This revealed that there was no relationship between age and the incidence of scabies in the boarding schools. The results of the analysis conducted that established the relationship between the length of stay and the incidence of scabies using the contingency coefficient were as follows: $C=0.48$ with $p=0.00$ ($p<0.05$), which revealed a significant relationship between the length of stay and the incidence of scabies in the boarding schools (Table 1).

The results of the analysis indicated that out of the 60 students, the number of students who suffered from scabies, with the risk of using a shared bed, was 23 students (38.33%), while the number of students who suffered from scabies, with the risk of using their own bed, was nine students (15.00%). The number of students suffering from scabies was 32 students (53.33%). The number of students who did not suffer from scabies, with the risk of using a shared bed, was seven students (11.67%), while the number of students who did not suffer from scabies, with the risk of using their own bed, was 21 students (35%). Out of the 60 students, the number of students who did not suffer from scabies was 28 students (46.67%). The analysis of bed usage, with the occurrence of scabies, using the chi-square test revealed a p value of 0.00, which indicated that, in terms of getting scabies, there was a significant difference between students who used a shared bed and those who used their own beds. The results of the risk factor analysis for bed usage with scabies, using the OR analysis, revealed a value of 7.67, with 95% CI (2.42–24.25), which meant that students who shared beds were 7.67 times at risk of getting infected compared to those who used their own beds in the event of a scabies infection (Table 2).

DISCUSSION

Scabies is a contagious skin infection caused by the *Sarcoptes scabiei* variety *hominis*, which belongs to the arachnid class. This disease is mostly prevalent in tropical countries that are endemic to scabies (Parman et al., 2017). Scabies can be found throughout the world with varying prevalence. In Indonesia, scabies is called scurvy, buduk, or simply scabies. Generally, this disease can be found in tropical and subtropical regions (Sungkar, 2016).

Table 1

The Correlation between Age and Length of Stay with Scabies Cases

Variable	Control		Case		Total		C	p
	n	%	n	%	n	%		
Age (Years)								
8-12	2	3.33	6	10.00	8	13.33	0.21	0.45
13-16	16	26.67	19	31.67	35	58.34		
17-20	8	13.33	6	10.00	14	23.33		
21-24	2	3.33	1	1.67	3	5.00		
Length of Stay (Month)								
1-12	2	3.33	18	30.00	20	33.33	0.48	0.00
13-24	18	30.00	11	18.33	29	48.33		
25-36	2	3.33	2	3.33	4	6.67		
37-48	0	0.00	0	0.00	0	0.00		
49-60	6	10.00	1	1.67	7	11.67		
Total	28	46.67	32	53.33	60	100.00		

Table 2

The Risk of Using A Bed in The Event of a Scabies Infection

Use of Bed	Case		Control		Total		p	OR	95% CI
	n	%	n	%	n	%			
Shared bed	23	38.33	7	11.67	30	50.00	0.00	7.67	2.42 – 24.25
Own bed	9	15.00	21	35.00	30	50.00			
Total	32	53.33	28	46.67	60	100.00			

In this study, in the Fathul Huda Demak and the Selamat Kendal boarding schools, the prevalence of scabies was 32 out of the 60 cases (or 53.33%). This finding was lower than the prevalence in developing countries, which, according to Sungkar (2016), can reach 80%. The difference in scabies prevalence between this study and previous studies could be due to the differences in environmental sanitation, individual hygiene practices of each student, low socioeconomic status, and the room ventilation area (Afriani, 2017; Desmawati, Dewi, & Hasanah, 2015; Mayrona, Subchan, & Widodo, 2018; Yunita, Gustia, & Anas, 2018).

Scabies has a close relationship with personal hygiene and neighborhood proximity. Thus, it often occurs in people who live together in densely populated areas (Sungkar, 2016). Population factors, such as population density, can affect the process of transmission or the transfer of scabies from one person to another (Achmadi, 2009). The most frequent method of transmission of scabies occurs through direct contact between individuals when mites are walking on the surface of the skin (Mutiarra & Syailindra, 2016). Scabies is characterized by itching complaints, especially at night, and is transmitted through direct or indirect contact through bedding and clothing. This mite investment spreads easily from person to person

through physical contact and often attacks all residents in one house. Female mites tunnel under the top layer of the skin and store their eggs in holes. A few days later, these eggs hatch to produce young mites (larvae). Infection from scabies can cause severe itching, which is an allergic reaction to mites (Mading & Indriaty, 2015). Mites live in the epidermis, are resistant to water and soap, and remain alive even after bathing with hot water every time (Indonesian Medical Association, 2017).

The results obtained from the calculation of the contingency coefficient indicated a significant relationship between the length of stay and the incidence of scabies in both the boarding schools. A boarding school is a densely populated environment. Students also stay long enough in such environments, so scabies is very likely to transmit (Sungkar, 2016). Students in Islamic boarding schools generally get scabies from their friends when they interact with each other (Mading & Indriaty, 2015). Scabies sufferers are a source of disease. The source of disease is a point that constantly emits a disease or emits disease agents that are environmental components and can cause disease disorders through direct contact or through intermediary media, which are also environmental components. The transmission medium will not have the potential to transmit a

disease if it does not contain germs or disease agents. The source of an infectious disease is the sufferer of the infectious disease itself, or it can be a process or activity through which infections occurs (Achmadi, 2009).

The *Sarcoptes scabiei* undergoes a complete metamorphosis in its life cycle—from eggs to larvae to nymphs and finally growing into adult mites. The process of infection begins when gravid female mites jump from scabies infected people to healthy people. Adult female mites walk on the surface of the skin at a speed of 2.50 cm per minute to find a place to dig tunnels. After finding a suitable location, the mite uses an ambulacral to attach itself to the surface of the skin and then makes a hole in the skin by biting it. Furthermore, the mites enter the skin and create a narrow tunnel with a slightly raised surface of the skin. Usually, female mites dig up the stratum corneum within 30 minutes of the first contact by secreting saliva that can dissolve the skin. Mite tunnels are usually located in the folds of the skin, such as the wrist and in between the fingers. Other areas include the elbows, armpits, buttocks, stomach, genitalia, and breasts. In infants, the predilection sites are different from that of adults and include special sites, such as the palms, soles of the feet, head, and the neck (Sungkar, 2016).

There are two clinical symptoms of scabies: pruritus nocturna, which is severe itching, especially at night, or when the patient sweats. The second symptom is characterized by the growth of lesions in the thin stratum (e.g., in between the fingers, wrists, feet, axillae, umbilicus, mammary areola, and under the breasts (in women) as well as the external genitalia (in men). There are four demographic groups that can be classified as high-risk category groups for getting scabies, which are people who live in crowded groups (e.g., people living in dormitories or boarding schools); people who practice poor hygiene; people from a low socioeconomic status (e.g., children in orphanages); and people who are sexually promiscuous. Clinical diagnosis is based on checking the history of the patient and conducting a physical examination. There are four cardinal signs for diagnosing scabies: pruritus nocturna; diseases that attack humans in groups; the existence of tunnels (cuniculus) at predilection sites, which are either white or grayish, straight or winding (with an average length of 1 cm), with the condition that papules or vesicles can be located at the end of the tunnel; and the discovery of mites by microscopic examination. The diagnosis is

made by finding two of the four aforementioned signs (Achmadi, 2009).

The OR test revealed that students who used a shared bed were 7.67 at risk of being infected with scabies compared to those who used their own beds. The interactive relationship between environmental components and the population (by following the behavior of the population) can be measured through a concept called exposure behavior: the amount of contact between humans and environmental components dictates the potential danger signs of a disease or a germ (Achmadi, 2009). The results of this study were consistent with the opinion that scabies is contagious through direct contact, i.e., contact with the skin of the patient. For instance, shaking hands, sleeping together, and having sexual relations. In general, scabies is transmitted in two ways: direct and indirect contact. In the case of indirect contact, contact can occur through objects that have been used by patients (e.g., clothes, towels, pillows, including other objects (Indonesian Medical Association, 2017). According to Sungkar (2016), direct contact is a long-term, skin-to-skin contact (e.g., sleeping together).

The causes of higher incidence of scabies through direct contact is due to the sarcoptes scabiei mites that can jump directly from patients to healthy people through skin contact, when the contact takes place for a relatively long period of time. For example, when scabies sufferers sleep together, skin contact occurs for a long duration of time (Sungkar, 2016). According to Mading & Indriaty (2015), direct (physical) contact between individuals makes it easier for scabies mites to move (enabling transmission). This initial infestation from mites spreads easily from person through physical contact and often attacks all residents in one house. Female mites tunnel under the top layer of the skin and store their eggs in holes. A few days later, these eggs hatch into young mites (larvae). Infection causes severe itching, an allergic reaction to mites. A scabies outbreak is often found in a densely populated environment, with close and prolonged skin contact (e.g., in daycare centers, orphanages, nursing centers for parents, prisons, refugees, boarding schools, and even in hospitals).

In everyday life, humans always interact with their environment. With this perspective, the environment can be grouped into various categories: living things and inanimate objects. Environmental factors usually contain or have the potential for causing a disease. A certain

population will have various variables, such as culture, density, population behavior, hobbies, age structure, gender, and education. These variables determine the health or risk factors. These factors play a role in the emergence of a disease. Disease occurrence process is the method through which a disease spreads in a population over a specified period of time. One of the ways through which a disease can spread is through interactive relationships between humans and the environmental components, which have the potential for causing a disease. The disease occurrence process can be described by the source of the disease component, the environmental component (which acts as the medium of disease transmission), the population component, with various population variables (e.g., education, behavior, density, gender, and population components) that include people living in a healthy or sick condition after having interacted with the environmental components that contain diseases or are the disease agents (Achmadi, 2009).

The source of a disease is the point that stores and/or multiplies the disease agent. The source of a disease can be in the form of an infectious disease sufferer, vectors and/or reservoirs of a disease, and certain activities that contribute to the transmission of a disease. Disease transmission media are environmental components that can move disease agents. These include air, water, soil, food, animals, and humans (through direct contact). Disease media will not have the potential for transmitting a disease if they do not contain disease agents. Exposure behavior is an interactive relationship between the environmental component and the community and its behavior, i.e., the amount of human contact with the environmental components that contain potential disease hazards. The disease event is the result of an interactive relationship between the community and its environment that has the potential danger of causing health problems. Supra-system variables include variables outside the system that can influence the incidence of a disease, e.g., a certain policy drafted by legislators (Alamsyah & Muliawati, 2013).

Research Limitation

This study has its limitations. There are still risk factors in scabies that have not yet been studied thoroughly, especially indirect contact factors (through objects), which, according to (Indonesian Medical Association, 2017), include among others using shared bedding, mutual

borrowing of clothes, towels and other personal belongings. This can occur when people do not have their personal items and will have to share items with friends.

CONCLUSION

The study revealed that, in the event of a scabies infection in Fathul Huda Demak and the Selamat Kendal boarding schools, the number of students suffering from scabies was larger when they used shared beds compared to those who used their own beds. Additionally, a significant relationship was established between the length of stay of students in the boarding schools with the incidence of scabies.

When analyzing the bed usage relationship in the Fathul Huda Demak and the Selamat Kendal boarding schools (which had scabies sufferers), there was a significant difference between using a shared bed and using own's own bed in the event of a scabies infection. Students who used a shared bed at higher risk of getting scabies compared to those who used their own beds in the event of a scabies infection. This can happen because skin contact with students sleeping in a shared bed can occur directly (i.e., direct contact with the skin of the sufferer when the mites walk on the surface of the skin) because it is understood that boarding schools are residential environments that are crowded. There is a high chance of interaction between students. Students also stay long enough in a boarding school, so there is a high chance that a student will get scabies because physical contact between students sleeping in shared bed facilitates can lead to the transmission of mange mites. The results of the study also revealed that the length of stay of the students in boarding schools were positively and significantly correlated with the incidence of scabies.

CONFLICT OF INTEREST

This research was conducted in boarding schools that were located in different regions in Indonesia. Based on data obtained from the Ministry of Religion in 2019, there were 107 boarding schools in the Demak district and 119 boarding schools in the Kendal district. Based on the ownership, each of these boarding schools had their own characteristics (Ministry of Religion RI, 2020). A shared understanding is required so that scabies eradication efforts can involve all parties. If the infection spreads among students in a boarding school, openness, and cooperation from

the boarding school manager is required. The results of this study may cause discomfort for boarding school caretakers, who own boarding schools that have characteristics similar to this model, i.e., if their boarding school also uses shared beds.

AUTHOR CONTRIBUTION

This research is a contribution of the author's thoughts. The aim of this study is to change the pattern of how boarding schools manage their resources. The intention is for boarding schools to focus more on the health aspects and improve the living conditions for students, especially in tackling infectious diseases, which can, in turn, provide a positive image and help eliminate the common notion that students in boarding schools must invariably be subjected to scabies. The first author contributed towards the theoretical development aspect of public health and worked on the research methodology. The second author contributed to the theoretical development of the dermatological and diagnostic aspects. The third author contributed to the field operational aspect. The results of this study will be monitored and will be pursued with the relevant health education agency in boarding schools located in Central Java.

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