Community Research

Effectiveness of permethrin standard and modified methods in scabies treatment

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Abstrak

Latar belakang: *Permetrin adalah obat pilihan untuk terapi skabies tetapi memiliki efek samping eritema, nyeri, gatal dan rasa menusuk. Pengobatan standar dengan mengoleskan permetrin ke seluruh tubuh menimbulkan ketidaknyamanan sehingga timbul pemikiran memodifikasi metode pengobatan skabies dengan cara mengoleskan permetrin di lesi saja diikuti mandi dua kali sehari memakai sabun. Tujuan penelitian ini untuk mengetahui efektivitas permetrin metode standar dibandingkan dengan metode modifikasi dalam pengobatan skabies.*

Metode: *Penelitian eksperimental ini dilakukan di sebuah pesantren, Jakarta Timur dan pengambilan data dilakukan pada bulan Mei-Juli 2012. Diagnosis skabies ditetapkan dengan anamnesis dan pemeriksaan kulit. Subyek positif skabies dibagi menjadi tiga kelompok: satu kelompok metode standar (permetrin dioleskan ke seluruh tubuh) dan dua kelompok modifikasi (permetrin hanya dioleskan di lesi diikuti mandi memakai sabun biasa dan sabun antiseptik). Ketiga kelompok dievaluasi setiap minggu selama tiga minggu berturut-turut. Data diolah dengan SPSS versi 20 dan dianalisis dengan uji Kruskal-Wallis.*

Hasil: *Sebanyak 94 subyek positif skabies (prevalensi 50%) tetapi hanya 69 subyek yang dipilih secara random untuk dianalisis. Angka kesembuhan pada minggu III kelompok metode standar adalah 95,7%, kelompok modifikasi+sabun biasa 91,3%, dan kelompok modifikasi+sabun antiseptik adalah 78,3% (p = 0,163). Rekurensi skabies pada kelompok metode standar adalah 8,7%, modifikasi+sabun adalah 13,0% dan modifikasi+sabun antiseptik adalah 26,1% (p = 0,250).*

Kesimpulan: *Pengobatan skabies menggunakan permetrin metode standar sama efektifnya dengan metode modifikasi.*

Abstract

Background: Permethrin is the drug of choice for scabies with side effects such as erythema, pain, itching and prickling sensation. Whole-body (standard) topical application of permethrin causes discomfort; thus, modified application of permethrin to the lesion only, followed with baths twice daily using soap was proposed. The objective of the study is to know the effectiveness of standard against lesion-only application of permethrin in scabies treatment.

Methods: An experimental study was conducted in *pesantren* in East Jakarta and data was collected in May-July 2012. Diagnosis of scabies was made through anamnesis and skin examination. Subjects positive for scabies were divided into three groups: one standard method group (whole-body topical application) and two modified groups (lesion-only application followed by the use of regular soap and antiseptic soap group). The three groups were evaluated weekly for three consecutive weeks. Data was processed using SPSS 20 and analyzed by Kruskal-Wallis test.

Results: Total of 94 subjects was scabies positive (prevalence 50%) but only 69 subjects were randomly picked to be analyzed. The cure rate at the end of week III of the standard method group was 95.7%, modified treatment followed by the use of regular soap was 91.3%, and modified treatment followed by the use of antiseptic soap was 78.3% (p = 0.163). The recurrence rate of standard treatment was 8.7%, modified treatment followed by the use of regular soap was 13% and modified treatment followed by the use of antiseptic soap was 26.1% (p = 0.250).

Conclusion: The standard scabies treatment was as effective as the modified scabies treatment.

Keywords: bath, permethrin, scabies, soap

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Scabies is a skin disease caused by infection of *Sarcoptes scabiei*, which is transmitted mostly by person-to-person contact such as sleeping together in a crowded bedroom. In boarding schools the prevalence of scabies is high. In 2010 the prevalence of scabies in a *pesantren* (Islamic boarding school) in Malang[1] was 89.9%, in Aceh[2] was 40.78%, and in a *pesantren* in East Jakarta[3] was 51.6%.

Students who are infected by scabies are disturbed because of its symptoms, such as itching and skin eruption manifesting as papules, vesicles, or pustules with inter-digital space as the main predilection. The most prominent clinical symptom is nocturnal pruritus or itching during sweating, causing patients to scratch which then leads to susceptible excoriation against bacterial infection. These complaints cause disturbance in daily life; the nocturnal pruritus disrupts resting time, which causes difficulties in focusing during the day and lowers the student's attendance in school as well as academic performance. In Aceh, 15.5% of students infected by scabies have their mark declining.[2]

For the treatment of scabies, the drug of choice is permethrin 5%, applied thoroughly throughout the body starting from behind the ears and neck down to the toe, then removed 10-12 hours later with soap and water. The standard treatment is effective; however, problems still arise such as the inconvenience of the side effects, namely burning sensation, irritation, ticklish sensation, allergic reaction and contact dermatitis.[4] The cure rate of lesion-only permethrin treatment followed by the use of soap and antiseptic soap is unknown. Antiseptic soap is expected to give a better cure rate because the infestation is often accompanied by secondary bacterial infection.

A study is needed to investigate the cure rate and recurrence of scabies after lesion-only treatment compared to standard treatment. Therefore, we proposed a modified treatment for scabies by applying permethrin confined to the lesion followed by the use of regular soap or antiseptic soap during baths twice daily to eradicate *S. scabiei* present on the surface of the skin. The objective of the study was to know the effectiveness of standard against lesion-only application of permethrin (modified treatment) in scabies treatment.

METHODS

This experimental study was conducted in a *pesantren* in East Jakarta which has high prevalence of scabies. Data was taken from May to July 2012. Inclusion criteria included all scabies patients that were willing to participate in the study and exclusion criteria was scabies patients with severe secondary bacterial infection.

Subjects were classified into scabies positive if at least 2 out of 4 cardinal signs were present i.e. nocturnal pruritus, tunnels or burrows, papules or pustules, and most members of the groups shared the same symptoms. Subjects were stated to be negative if there was no scabies lesion found. Minimum sample size was calculated using the following formula for three independent groups:

$$n_1 = n_2 = n_3 = Z^2_{(1-\alpha)/2} [P_1Q_1 + P_2Q_2 + P_3Q_3]/d^2$$

$Z^2_{(1-\alpha)/2}$ is 1.96 for 95% confidence
P_1 = expected cure rate using standard treatment = 94%
P_2 = expected cure rate using lesion only followed by soap treatment = 90%
P_3 = expected cure rate using lesion only followed by antiseptic soap treatment = 90%
Q = 1-P
d = confidence interval
Thus, $n_1 = n_2 = n_3 = 23$
Minimum sample size: 23 x 3 = 69

Subjects were divided into three groups: one standard treatment group and two modification groups. Standard treatment group was given a whole body (from neck to toe) application of permethrin cream 5% and instructed to leave it dry for at least 10 hours. After that, they are instructed to shower twice daily using regular soap. The modification groups were given permethrin cream 5% to cover the lesion plus 2 cm surrounding it and instructed not to remove the cream for 10 hours. The modification groups were divided into two, in which one received regular soap, while the other one received antiseptic soap for shower twice daily. The antiseptic soap contained ingredients namely sodium C12-18 alkyl sulphate, triclocarban, pentasodium penetrate, ethane hydroxyl diphosphoric acid, methylchloro-isothiazolinone and methylisothiazolinone. Negative-scabies subjects were given standard treatment in week 0 to ensure that they did not have any subclinical infestation. Permethrin cream was applied by the researchers to make sure that treatment was correctly applied. However, since the application was performed in the morning, cream in several parts of the body was removed by ablution as many as four times. Thus, subjects were asked to re-apply the cream to the removed parts by themselves after each ablution due to the limitation of research workers.

The lesions were observed on weekly basis and the lesion distribution was counted and noted based on their location and number of lesions. The treatment result of weekly evaluation was determined by the improvement of lesions compared to the previous week and whether new lesions were found. Severity was determined by number of sites with scabies lesion; 1-3 lesions is considered as mild, 4-6 as moderate, and more than 6 as severe.

On the second week, the treatment was repeated for all subjects and on the third week subjects who were still positively diagnosed with scabies were given standard treatment to ensure that they were cured. One month after the last treatment, subjects were examined for scabies recurrences. If the subjects were positive, they were then treated with standard treatment to ensure cure. The data were processed using SPSS version 20 and Kruskal-Wallis test was used as the statistical test.

Alongside treatment, healthy and hygienic lifestyle were ensured to prevent the recurrence of scabies infestation. All mattresses were replaced with new ones while the rooms were cleaned and arranged so that the rooms were more spacious and the sunlight could penetrate into the rooms. Towels which were used after showers were exposed under direct sunlight for several hours everyday. Clothes and sarongs were washed, dried under sunlight, and ironed everyday. Bed linens and towels were washed once a week. These activities were carried out by all subjects in groups of five, each led by the head of a group called health cadres and supervised by the teachers.

RESULTS

Of the 205 students in the *pesantren*, only 188 students were involved in this study because 17 of them were not present on the day of the data collection. As many as 94 students were infested with scabies; therefore, the prevalence of scabies in the *pesantren* was 50%. However, only 69 subjects were included into the study because the rest of the subjects showed severe bacterial secondary infection.

Table 1 shows that the prevalence of scabies in males (55%) was higher than in females (42%). However, the difference was not significant (chi-square test, p = 0.076) meaning that the prevalence of scabies was not associated with gender.

Table 1. The prevalence of scabies in students at Pesantren X Jakarta Timur based on gender

Gender	Scabies (-) n (%)	Scabies (+) n (%)
Male	49 (45)	61 (55)
Female	45 (58)	33 (42)

Table 2 shows the distribution of lesion based on gender. The areas with the highest number of lesion in both males and females were buttocks, interdigital space of the hands, and legs. There were other areas more specific on the male subjects that did not appear on female subjects, namely armpits, breast, back, and interdigital space of the foot.

Table 2. Distribution of scabies lesions in students at Pesantren X Jakarta Timur based on gender

Lesion location	Male n (%)	Female n (%)
Interdigital space of the hand	35 (57.4)	19 (57.6)
Hands	15 (24.6)	1 (3)
Wrist	22 (36.1)	9 (27.3)
Arm	14 (23)	9 (27.3)
Elbow	25 (41)	2 (6.1)
Armpits	12 (19.7)	0 (0)
Leg	37 (60.7)	15 (45.5)
Abdomen	23 (37.7)	13 (39.4)
Breast	7 (11.5)	0 (0)
Back	11 (18)	0(0)
Buttocks	36 (59)	24 (72.7)
Genital area	36 (59)	2 (6.1)
Inguinal region	17 (27.9)	1 (3)
Interdigital space of the foot	15 (24.6)	0 (0)
Total	61	33

In table 3, it can be seen that the cure rate of the three different treatments in week I and III did not show significant differences, statistically. In week II, on the other hand, a significant difference was seen with standard treatment having higher cure rate than the rest. The cure rate of the standard method group in week III was 95.7%, the group with modified method combined with regular soap was 91.3%, and the group with modified method combined with antiseptic soap was 78.3% (p = 0.163). Overall, there was no significant difference between the three treatments, thus the cure rate was not affected by the types of treatment.

Table 3. The cure rate of scabies treatment in students at Pesantren X Jakarta Timur

Week	Cured n (%)	Not Cured n (%)	p
Week I			
Standard	1 (4.3)	22 (95.7)	0.198
Lesion only + soap	4 (17.4)	19 (82.6)	
Lesion only + antiseptic soap	1 (4.3)	22 (95.7)	
Week II			
Standard	18 (78.3)	5 (21.7)	0.012
Lesion only + soap	12 (52.2)	11 (47.8)	
Lesion only + antiseptic soap	8 (34.8)	15 (65.2)	
Week III			
Standard	22 (95.7)	1 (4.3)	0.163
Lesion only + Soap	21 (91.3)	2 (8.7)	
Lesion only + antiseptic soap	18 (78.3)	5 (21.7)	

Table 4 shows that the recurrence rate of the lesion-only treatment combined with antiseptic soap was higher (26.1%) than lesion-only treatment combined with regular soap (13%) and standard treatment (8.7%). However, using Kruskal-Wallis test, there was no significant difference between the recurrence rate of the treatments (p = 0.250), meaning that recurrence was not influenced by the type of treatment. In general, the recurrence of scabies without considering the treatment was 11 patients (15.9%).

Table 4. Recurrence of scabies in students at Pesantren X Jakarta Timur based on treatment method

Treatment method	Recurrence (-) n (%)	Recurrence (+) n (%)
Standard	21 (91.3)	2 (8.7)
Lesion-only + soap	20 (87)	3 (13)
Lesion-only + antiseptic soap	17 (73.9)	6 (26.1)

DISCUSSION

As a generally crowded environment, most *pesantren* generally have low hygiene, therefore presenting many risk factors for scabies infestation. In high-density *pesantren* with low hygiene, the prevalence of scabies was found to be around 60-90%.[5]

Scabies may manifest in lesions such as papules, vesicles, pustules, and secondary lesions such as excoriations, hyperpigmentation and also hypopigmentation. In this study, we found that the areas with the highest number of lesion in both male and female subjects were buttocks, interdigital space of the hands, and also legs. Hilmy[3] found similar results in a *pesantren* in Jakarta Timur. Interdigital space was the area most frequently infested in males and females; this is due to thin stratum corneum that is easily penetrated by the mites. There were also other areas in which male subjects had scabies lesions that did not show in the female subjects, namely armpits, breast, back, and interdigital space of the feet.

Permethrin 5% is used as the first line treatment for scabies due to its high cure rate and low toxicity. Usha, et al[6] reported that the cure rate of scabies treatment using a single dose of topical permethrin was 97.8% and found to be better than any single-dose application of alternative treatment (ivermectin). Follow up with the second dose of ivermectin in 2-week interval showed comparable cure rate to a single dose of topical permethrin. Chhaiya, et al[7] found that single application of permethrin showed 74.8% cure rate while the second application with one week interval increased the cure rate to 99%. The third application increased the cure rate to 100%. High cure rate (98%) was also seen in the study by Yonkosky.[8] However, permethrin demonstrated side effects that included burning sensation, irritation, tingling and itch. Other side effects were allergic reaction and contact dermatitis. In tropical areas with high rate of perspiration, full body application often caused discomfort and stickiness.

To reduce the side effects, we conducted a study comparing standard therapy and lesion-only application of permethrin. Antiseptic soap was expected to reduce the secondary infection that may hamper the course of treatment by reducing drug penetration of permethrin. Showers and soap helps in the removal of *S. scabiei* crawling on the skin surface. Showers also help to remove the eggs.[9] Our study showed that the cure rate of scabies was high and not influenced by the types of treatment. Thus, for the treatment of scabies, application of permethrin to the lesion-only can be proposed. However, since this is a preliminary study, further study with bigger samples is needed to generalize the result.

Though the cure rate of scabies treatment using permethrin was high, the recurrence rate was also high. One study involving long-term care hospital for

the elderly showed that 148 patients suffered from scabies.[10] They were treated with permethrin and the cure rate was 100%. Unfortunately, after being cured, 50 patients (34%) experienced recurrence of scabies. A study of 20 crusted scabies patients revealed that the recurrence for scabies infestation was as high as 50%.[11] The high recurrence of scabies among the crusted patients showed that more severe infestation would result in higher recurrence rate of scabies. Another study in a boarding school in Jakarta showed that 10 weeks after treatment the recurrence was 2.4%.[5]

Transmissions from close contacts remains a major contributor to scabies re-infestation, especially in overcrowded population.[12] Sungkar[13] reported that mites could be found on furniture, bed linens and chairs and were able to survive for 2-3 days after removed from their host, suggesting hygiene environment was necessary for complete eradication.[14]

This study revealed that amongst the 69 subjects treated, 11 patients (15.9%) experienced recurrence of scabies. The overall recurrence rate for scabies in this study was lower compared to other studies.[5,10,11]

The application of the cream done by the researchers to ensure that it was properly applied was the reason for the low scabies recurrence. The treatment was also done simultaneously to all subjects to ensure eradication of scabies. Besides that, the subjects were given information regarding hygiene and healthy lifestyle related to scabies. Living environment of the students was also modified in various ways such as changing their entire mattress and washing their bed linen, clothes and towels and put them under sunlight. Furthermore, their rooms were rearranged in such a way that sunlight could penetrate into the room. These activities were carried out by students under the supervision of student leaders and teachers. Students were also instructed to shower twice daily using soap provided by the *pesantren*.

In conclusion, the prevalence of scabies in *Pesantren* X was 50%; the prevalence of male subjects was 55% and of female subjects was 42%. The cure rate of the standard method group in week III was 95.7%, in the group with modified method combined with regular soap cure rate was 91.3%, and in the group with modified method combined with antiseptic soap it was 78.3%. The recurrence rate of standard treatment was 8.7%, modified treatment followed by the use of regular soap was 13% and modified treatment followed by the use of antiseptic soap was 26.1% ($p = 0.250$). Thus, cure rate of scabies treatment using permethrin was not influenced by the method of treatment. To generalize the result obtained in this preliminary research, further studies with bigger samples are needed.

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Conflict of interest

The authors hereby affirm that there is no conflict of interest in this study.

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