

# Comparison of topical 5% Permethrin with topical 10% Sulphur in the treatment of Scabies

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## Abstract

**Objective:** To compare the efficacy of topical 5% Permethrin and topical 10% Sulphur in the treatment of Scabies.

**Patients and methods:** This Randomized controlled trial. study was conducted at the Department of Dermatology, Combined Military Hospital, Abbottabad, Pakistan, from March 2022 to September 2022. A total of 60 patients coming to outpatient department and diagnosed with scabies mites were randomized into two equal groups of 30 patients. Diagnosed patients on odd serial number were allocated to group A, treated with application of topical 5% Permethrin cream twice with one week interval, while patients reporting on even serial number were allocated to group B, treated with 10% Sulphur ointment and were told to apply this for two or three weeks. All patients were followed up at the intervals of 1, 2 and 4 weeks. Primary outcome was the comparison of efficacy of 5% Permethrin cream and 10% Sulphur ointment for the treatment of Scabies.

**Results:** At the first follow-up after 1 week, the efficacy of Permethrin was significantly higher (63.33%) compared to Sulphur group where no patient was cured ( $p < 0.001$ ), while at 2nd follow-up after 2 weeks, the efficacy of Permethrin was 100%, while it was 43.33% in sulfur group ( $p < 0.001$ ). However, at the end of 3rd follow-up after 4 weeks, efficacy of both treatments was 100%.

**Conclusion:** The topical application of 5% Permethrin and 10% Sulphur was equally effective in 4 week time, however Permethrin cream showed faster cure in the treatment of Scabies.

**Keywords:** Scabies, Permethrin, Sulphur ointment

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## Introduction

The mite named as *Sarcoptes Scabiei* is responsible for a skin infection called Scabies. This parasite is a tiny mite that is commonly not visible without a microscope and is present at stratum corneum level in the skin. It burrows in the patient's skin and causes this contagious infection. The development process starts from egg to larva. Larva progresses to protonymph, tritonymph and then development of adult mite occurs. The average number of mites is  $10^{15}$  at the skin of infected patient and  $2^3$  eggs are laid by each pregnant female per day. Incubation time is 3 to 6 weeks and it ultimately leads to start of skin itching which is worsened in the night.<sup>1</sup>

The major symptoms appear in the form of superficial

burrows and complaints of intense itching by the patients.<sup>2,4</sup> There are closely placed mosquito-like bites appearing adjacent to linear tracks of burrows that helps to reach the diagnosis.<sup>5</sup> Allergic reactions to mite protein cause these symptoms. The feces of mites deposited in the burrows also contains these proteins and leads to these symptoms.<sup>6,7</sup> The classical places for these mites on skin are webs of patients' fingers, wrists, axilla, areola, buttocks and genitals.<sup>3</sup> This all leads to the typical sign of scabies, that is the burrows, made by the mites within the skin.<sup>8, 9</sup> This is also important to keep in mind that even after the eradication/killing of mites, new lesions and symptoms may appear up to few days or weeks.<sup>10, 11</sup>

Diagnosis of scabies is done on the basis of history and examination but confirmation can be made by use of

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microscope which helps to identify mites, their eggs and fecal matter that can be easily extruded. During clinical examination, scratch marks, nodules and papules are visible. Nodular, crusted and bullous scabies are easily visible during this observation. During dermoscopy, a mite is visible in the shape of a triangular dark brown colored structure and easy to extract. Burrow ink test and video dermoscopy also help in the diagnosis. Utilization of polymerase chain reaction/enzyme-linked immunosorbent assay (PCR/ELISA) and specific IgE is also fruitful for the diagnosis of major mite components.<sup>12, 13</sup>

Scabies is now considered as a global health concern as shown by the data collected from different studies around the globe. The prevalence of scabies was estimated to be 2% in Europe while number of patients globally in 2019 was about 200 million.<sup>14</sup> People of all ages, genders and races are affected by scabies. Poverty, malnutrition, homelessness, poor hygiene and dementia are considered major risk factors.<sup>15</sup>

Besides the correct diagnosis, treatment is the next important issue in dermatology. Many topical and some oral medications are available for killing these mites which include Permethrin, Dulfur, Ivermectin, Crotamiton, Lindane, Benzyl Benzoate and some others.<sup>16</sup> Efficacy of medicines in scabies is studied at different ratios in different studies. An ideal scabicide must be effective against mites and their eggs, easy to use, non-irritating and economical for the patients. The search for an ideal scabicide is still needed. Another important aspect of treatment is method and duration of application as treatment failure and recurrence is still seen with these therapeutic options. It is also an important point to remember that entire household persons must be involved to eradicate the scabies from their environment.<sup>17-19</sup>

Permethrin is an insecticide that kills the mites and Permethrin 5% cream is among the commonly used drugs for scabies.<sup>20</sup> It is most widely used and taken as drug of choice because of its efficacy, safety and patient's compliance.<sup>21</sup> European guidelines for the management of scabies recommend 5% Permethrin cream to be applied from head to toe for 8-12 hours before washing it off and treatment to be repeated after 7 to 14 days.<sup>17</sup> Sulphur 6-33%, as cream, ointment or lotion, is recommended by the European guidelines as an effective alternative treatment and is among the

oldest treatments used for scabies. It is recommended to be applied for 3 consecutive days.<sup>22</sup> Topical Sulphur 5-10% ointment (precipitated sulfur) is among the safe and cost effective treatment options for scabies. The toxicity of Sulphur ointment is low and therefore can be used in pregnancy and in children. Efficacy ratio although not very clear from previous data now shows that it cures scabies especially the type called Norwegian scabies. It is recommended to be applied on whole body for 3 successive days.<sup>17, 18, 20, 23, 24</sup>

A lot of therapeutic options have been used to treat Scabies but still there is a need to study those drugs for their efficacy and duration of treatment to eradicate the Scabies completely from the patients and their environment. In a study done in 1994, when the use of Permethrin was not very common, there were reports of killing the mites within one hour in vitro but in year 2000, it was reported that 35% mites were still alive even after 3 hours.<sup>20</sup> Both Permethrin and Sulphur have been shown in previous studies<sup>18, 22, 25, 26</sup> to be superior to other scabicide drugs in terms of efficacy. Two studies<sup>25,26</sup> showed that permethrin was more efficacious than sulfur, whereas a single study showed otherwise.<sup>27</sup>

Therefore, only a few studies are available to find a direct comparison of the efficacy of topical 5% Permethrin and topical 10% Sulphur in the treatment of scabies and none of them have been carried out in Pakistan. The objective of the study was to compare the efficacy of topical 5% Permethrin cream and Sulphur 10% ointment in the treatment of Scabies. The hypothesis of the study was that there is a significant difference in efficacies of 5% Permethrin cream and 10% Sulphur ointment in the treatment of scabies. The study will help the dermatologists to develop better drug treatment strategies for their patients, and will also assist in curbing the spread of this disease to the community hence reducing its burden.

## Material and Methods

The study was randomized controlled trial conducted at the Department of Dermatology, Combined Military Hospital, Abbottabad, Pakistan, from 1st March 2022 to 30th September 2022. Ethical approval for conducting the study was taken from ethical review committee of Combined Military Hospital, Abbottabad, Pakistan. (Ref: CMHAtD-ETH-31-Derma-22)

Sample size was calculated with EPI info sample size calculator 28 taking 80% power and 5% alpha risk (one-sided)

using efficacy of topical 5% Permethrin by 100% as compared to 38.9% with topical 10% Sulphur in the treatment of Scabies.<sup>26</sup> The calculated sample size was 16 but 60 (30 in each group) was used because the minimum sample size should be more than 50 in experimental studies to get a significant result. The sampling technique was non-random convenience sampling. The inclusion criteria was patients aged 18 years or above, from either of the genders, coming to outpatient department (OPD) of dermatology and diagnosed with scabies mites. Exclusion criteria was history of allergy to any drug, pregnancy, lactation and history of severe systemic disorders.

Observations and diagnosis was made by a dermatologist for each patient. An informed written consent was taken from the patients. Diagnosis of scabies was done on clinical symptoms and patients' history. Infestation of mites was checked by the presence of mites, their eggs, larvae or the fecal material by using light microscope. Photographs before the inclusion of patients were taken for record. The same was done at the end of study to confirm the efficacy of the treatments. The patient recruitment was made on the basis of demonstration of classical burrows, typical scabies lesions present at the sites, nocturnal pruritus and report of family history of scabies infestations. Single blinding was done. Patients were divided into two equal groups of 30 patients. Patients diagnosed with scabies mites on odd serial number were allocated to group A, treated with application of topical 5% Permethrin cream twice with one week interval, while patients reporting on even serial

number were allocated to group B, treated with 10% Sulphur ointment and were told to apply this for two or three weeks. All patients were followed up at the intervals of 1, 2 and 4 weeks. The primary outcome was the comparison of efficacy of 5% permethrin cream and 10% Sulphur ointment for the treatment of scabies. The efficacy was confirmed with the clinical improvement of lesions, absence of any new skin lesion and improvement in pruritus assessed by using the visual analogue scale.

## Result

The mean age of patients in the study was 33.716±10.13 years with a range of 18-55 years. The mean duration of the disease was 3.266±1.36 months with a range of 1-6 months. (Table I)

Variable	Group-A Mean±SD	Group-B Mean±SD
Age (years)	33.366±9.81	33.766±10.61
Duration of Disease (months)	3.1±1.39	3.433±1.33

There were 31 (51.66%) females and 29 (48.33%) males in the study. (Table-II)

Gender	Group-A n (%)	Group-B n (%)
Male	12 (40%)	17 (56.66%)
Female	18 (60%)	13 (43.33%)
Total	30 (100%)	30 (100%)

At the first follow-up after 1 week, the efficacy of permethrin was significantly higher (63.33%) compared to sulfur group where no patient was cured (p=0.000), while at 2nd follow-up after 2 weeks, the efficacy of Permethrin was 96.66%, while it was 43.33% in Sulphur group (p=0.000) which remained significant. However at the end of 3rd follow-up after 4 weeks, the efficacy of both the treatments was recorded as 100%. (Table III)

There was good cosmetic acceptability with both of these topical applications and both showed good tolerability. There was no allergic reaction with any of the treatment. Two of the patients in the Sulphur group however experienced dryness of skin but it was mild and had no effect on compliance.

	1 week		2 week		4 week	
	N	(%)	N	(%)	N	(%)
Group-A n=30	19	63.33	30	100%	30	100
Group-B n=30	0	0.00	13	43.33	30	100
p value	0.000		0.000		1	

## Discussion

Scabies is parasitic dermatoses that is very contagious. Efficacy, safety and ease of administration are the key points for selecting anti-scabietic medicine. This ease of compliance will help the patient as well as family members to comply with the usage instructions.

In this study at the 1st follow-up visit after one week, 5% Permethrin cream was significantly more effective in the treatment of scabies as 19 patients were cured (63.33%) while no patient was cured with 10% Sulphur ointment. At the 2nd follow-up visit as well, Permethrin was significantly more effective than Sulphur as it cured all 30 patients (100%) and no patient included in Permethrin group had severe itching and skin lesions, while 13 patients (43.33%) in the 10% Sulphur group were cured after 2 weeks. In the last follow-up visit at the end of 4th week, all the patients in both groups were cured by both drugs showing that both treatments are effective, however Permethrin cream provides more rapid results within 2 weeks of treatment. Acceptability and tolerability was also good in both groups and no patients faced any adverse event that can lead to withdrawal from treatment.

Goldust and Rezaee in their study in 2013 reported that the efficacy of Sulphur 8% ointment at 2 week follow-up was 44.7% which was similar to our study, while it was reported to be to be 60.5% after 4 weeks when the treatment was repeated in patients who did not respond to treatment in the first follow-up visit which was unlike our study.<sup>18</sup>

Alipour and Goldust in their study with Sulphur 10% ointment published in 2015 shared the results that the efficacy was observed in 45.2% of patients at the follow-up of 2 weeks which was similar to our study. This efficacy increased up to 59.5% at the follow-up after 4 weeks when the treatment was repeated which was unlike our study.<sup>22</sup>

Abdel-Raheem et al., in a study published in 2016 compared four treatments commonly under use for Scabies for their efficacy, acceptability and cost effectiveness including Permethrin 2.5%–5% lotion and 5–10% Sulphur ointment. Topical treatments among these were asked to apply for five consecutive nights. At the end of for 1st week follow-up efficacy of Permethrin was noted as 60% which was similar to our study while in two weeks follow-up Permethrin was most effective with 88% results with an excellent acceptability ratio which was less than the cure rate in our study. With Sulphur group, at the 1 week follow-up no patient in was cured which was similar to our study. However, at the end of 2 week follow-up the efficacy was reported as 52% which was more than the cure rate in our study.<sup>25</sup>

In a study by Mila-Kierzenkowska et al., published in 2017, efficacies of Permethrin, Crothamiton and Sulphur in the treatment of Scabies were compared. At one week follow-up the efficacy in Permethrin group was significantly higher (61.1%) compared to Sulphur group (0%) and Crothamiton group (0%) and these results were similar to our study. At the two weeks follow-up, the efficacy was 100% in Permethrin group which was similar to our study, 38.9% in Sulphur group which was less than in our study, and 66.7% in Crothamiton group. At the final follow-up at 4 weeks, all the 3 treatments were effective in all patients which was similar to our study.

These researchers concluded that topical Permethrin, Sulphur and Crothamiton were equally effective at the 4 weeks study period. However, Permethrin provided faster improvement as compared to other drugs similar to our study. Acceptability and tolerability was also good in both groups and no patients faced any adverse event that can lead to withdrawal from treatment which was similar to our study. Sulphur is on the other hand was recommended as a cheaper treatment choice for low income patients and also as a safe choice for infants and in pregnant women.<sup>26</sup>

In a recent study published in 2022 by Ertugrul and Aktas, comparison of efficacies were studied between Sulphur ointment and Permethrin cream. The results of the study reported that the efficacy of 10% Sulphur was significantly

higher than 5% Permethrin. This was in contrast to our study. The authors recommended Sulphur ointment as a safe and effective treatment for the Scabies. The increasing resistance to the most widely used 5% Permethrin cream was considered responsible for its lower efficacy in this study compared to Sulphur.<sup>27</sup>

The strengths of this study was that being a randomized controlled trial it provided the best evidence for the association and blinding was also done.

## Conclusion

The topical application of 5% Permethrin and 10% Sulphur was equally effective in one month. However, Permethrin cream showed a faster cure rate in the treatment of Scabies. There were no side effects observed with either of the treatment that affects the compliance. Although Permethrin was found to provide faster efficacy in the treatment of Scabies, Sulphur has the advantage of lower cost. Further studies can explore comparisons with other scabicial medications and gathering better evidence by doing systematic reviews and meta-analyses.

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