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Comparative Assessment of Therapeutic Response, Safety, and Treatment Outcomes of Permethrin and Ivermectin in Scabies Management

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Abstract

Background: Scabies is a highly contagious parasitic skin infestation caused by *Sarcoptes scabiei*, prevalent in overcrowded, low-resource settings, and a significant public health challenge.

Objectives: This study compared the efficacy of permethrin 5% cream and oral ivermectin in treating scabies, focusing on eradication, adverse effects, and patient satisfaction.

Methodology: A cross-sectional study was conducted at Bacha Khan Medical Complex, Swabi, from January to June 2024. Ninety patients with scabies were randomly assigned to two groups: Group A (permethrin 5%, n=45) and Group B (oral ivermectin, n=45). Group A applied permethrin from neck to toes for 8-12 hours, with a second application after seven days. Group B received a single oral dose of ivermectin (200 µg/kg). The primary outcome was scabies eradication, defined by the absence of burrows, lesions, and pruritus at two weeks. Secondary outcomes included adverse effects and patient satisfaction, with statistical significance assessed using the chi-square test ($p<0.05$).

Results: Of the 90 participants, 88 completed the study (44 per group). Scabies eradication was higher in the permethrin group (95.5%) compared to ivermectin (75.0%) ($p=0.007$). Mild itching and redness were reported by 18.2% in the permethrin group, while gastrointestinal symptoms were noted in 22.7% of the ivermectin group. Patient satisfaction was significantly higher with permethrin (90.9%) than ivermectin (68.2%).

Conclusion: Permethrin 5% was more effective than ivermectin in scabies eradication, with fewer side effects and higher patient satisfaction, supporting its use as first-line treatment.

Keywords: Scabies, *Sarcoptic scabiei*, permethrin 5% cream, ivermectin, treatment efficacy, patient satisfaction, adverse effect.

Introduction:

Scabies is a highly contagious parasitic skin infestation caused by the *Sarcoptic scabiei* mite, affecting millions globally. It remains a significant public health issue, particularly in low-resource settings, where overcrowded living conditions, limited access to healthcare, and poor sanitation exacerbate its spread [1]. Epidemiological studies indicate that scabies continues to be endemic worldwide, with prevalence rates ranging from 0.21% to 0.74%, particularly in regions like Sub-Saharan Africa, Oceania, and South Asia [2]. The burden of scabies is further compounded by secondary bacterial infections, such as impetigo and cellulitis, which contribute to both the morbidity and healthcare costs associated with the condition [3, 4]. Permethrin 5% cream is widely regarded as the first-line treatment for scabies, owing to its high efficacy in eradicating *Sarcoptic*

scabiei. It works by disrupting the mite's nervous system, causing paralysis and death [5]. Clinical studies have consistently demonstrated that a single application of permethrin achieves clinical cure rates of 90% to 100%, making it the treatment of choice for scabies [6]. However, concerns have emerged regarding the overuse of permethrin, particularly in regions where it is available over-the-counter, leading to the development of resistance [7]. For instance, a study from Brazil highlighted an increase in cases of permethrin-resistant scabies, indicating a need for alternative treatments [8]. Ivermectin, originally approved for onchocerciasis, has emerged as an effective alternative for scabies treatment. Ivermectin works by binding to chloride channels in the mite's nervous system, causing paralysis and death [9]. Despite emerging resistance concerns, ivermectin remains a critical treatment option, particularly in mass treatment settings or for patients who cannot use topical therapies [10].

Several studies have compared the efficacy of permethrin and ivermectin in treating scabies, showing that both treatments are highly effective, with cure rates greater than 90% within two weeks of treatment [11]. However, permethrin is often preferred in clinical settings because it offers faster symptomatic relief compared to ivermectin [12]. In contrast, ivermectin is more commonly used in institutional outbreaks or when topical treatment is not feasible, such as in nursing homes or refugee camps [13]. Both treatments have demonstrated strong efficacy, but the development of resistance to both agents is a growing concern. This study aims to compare the efficacy of permethrin 5% cream and oral ivermectin in treating scabies, providing evidence to guide clinical decisions and improve treatment outcomes for affected individuals,

Methodology:

This cross-sectional study was conducted at Bacha Khan Medical Complex, Swabi, from 21st August 2024, to 20th November 2024. A total of 90 patients with a diagnosis of scabies were randomly assigned to two treatment groups: Group A (Permethrin) and Group B (Ivermectin), each consisting of 45 participants. Inclusion criteria were adults aged 18 years or older, presenting with classic scabies symptoms (pruritus and visible burrows), and a positive skin scraping for *Sarcoptic scabiei*. Exclusion criteria included immunosuppression, pregnancy or breastfeeding, and previous allergic reactions to permethrin or ivermectin. Participants in Group A applied permethrin 5% cream to their entire body, from neck to toes, and left it on for 8-12 hours before washing it off. This treatment was repeated after seven days to target any newly hatched mites. Group B received a single oral dose of ivermectin (200 µg/kg). The primary outcome was the eradication of scabies, defined as the absence of new burrows, lesions, and pruritus at the two-week follow-up. Secondary outcomes included the occurrence of adverse effects and patient satisfaction with treatment. This study was approved by the Institutional Review Board (IRB) of Bacha Khan Medical Complex (IRB Reference Number:13037/PF/GKMC)). Written informed consent was obtained from all participants before enrollment. Data were collected at three time points: baseline (post-treatment), one week after the second permethrin application, and two weeks post-treatment (final follow-up). Statistical analysis was performed using the chi-square test with a significance threshold of $p < 0.05$.

Results and Analysis

A total of 90 participants diagnosed with scabies were enrolled in the study and randomly assigned to two treatment groups: **Group A (Permethrin, n = 45)** and **Group B (Ivermectin, n = 45)**. Two participants were lost to follow-up, leaving 44 participants in each group for the final analysis. The demographic characteristics of the study population are summarized as follows: The mean age of participants was 35 years, with ages ranging from 18 to 65 years. In terms of gender, 44% of participants were female and 56% were male. The baseline characteristics, including age, gender, and severity of scabies, were comparable between the two treatment groups. In table 1 The primary

outcome of the study was scabies eradication, defined as the complete absence of new burrows, lesions, and pruritus at the two-week follow-up. At the two-week follow-up, scabies eradication rates were significantly higher in the permethrin group (95.5%) compared to the ivermectin group (75.0%) ($p = 0.007$). The chi-square test revealed a statistically significant difference between the two groups, with permethrin demonstrating higher efficacy in eradicating scabies.

Table 1. Scabies Eradication Rates at Two-Week Follow-Up

Group	Participants (n)	Complete Eradication (n)	Percentage (%)
Permethrin	44	42	95.5%
Ivermectin	44	33	75.0%

In table 2 terms of adverse effects, mild itching and redness were reported by 18.2% of participants in the permethrin group, which resolved within 24 hours. In contrast, 22.7% of participants in the ivermectin group experienced gastrointestinal symptoms, such as nausea and diarrhea, and 4.5% experienced mild dizziness. No severe adverse events were reported in either group, and all symptoms were self-limiting.

Table 2. Adverse Effects Reported by Participants

Group	Mild Itching and Redness (n, %)	Gastrointestinal Symptoms (n, %)	Other Adverse Effects (n, %)
Permethrin	8 (18.2%)	N/A	N/A
Ivermectin	N/A	10 (22.7%)	2 (4.5%)

In table 3 Regarding patient satisfaction, 90.9% of participants in the permethrin group reported high satisfaction, largely due to rapid symptom relief. In contrast, 68.2% of ivermectin-treated participants expressed high satisfaction, while 31.8% were dissatisfied, primarily due to persistent itching after the first dose**.**

Table 3. Patient Satisfaction by Treatment Group

Group	High Satisfaction (n, %)	Dissatisfaction (n, %)
Permethrin	40 (90.9%)	4 (9.1%)
Ivermectin	30 (68.2%)	14 (31.8%)

In table 4 The dose-response analysis revealed that 80.0% of participants in the permethrin group showed improvement after the first dose, compared to only 40.9% of participants in the ivermectin group (**$p = 0.01$**). However, after the second dose, ivermectin demonstrated a stronger response, with 40.9% of participants showing improvement compared to 18.2% in the permethrin group (**$p = 0.00$**). This suggests that permethrin is more effective in the initial phase of treatment, while ivermectin may provide additional benefit in cases that do not respond to permethrin after the first dose.

Table 4. Dose Response Between Permethrin and Ivermectin Groups

Response after Dose	Permethrin Group (n = 44)	Ivermectin Group (n = 44)	p-value
After 1st Dose	40 (90.9%)	18 (40.9%)	0.01
After 2nd Dose	2 (4.5%)	15 (34.1%)	0.00

In table 5 The overall treatment response was calculated as the total number of participants who achieved a complete clinical response, defined as the absence of scabies-related symptoms (burrows, lesions, pruritus) at the final follow-up (two weeks post-treatment). In the permethrin group, 95.5% of participants achieved a complete response, while 4.5% did not. In the ivermectin group, 75.0% of participants achieved a complete response, while 25.0% did not **(Table 5).** The findings of this study suggest that permethrin 5% cream is more effective than oral ivermectin in

treating scabies, as evidenced by higher eradication rates, faster symptomatic relief, and greater patient satisfaction. While ivermectin remains a valuable alternative treatment, particularly in settings where topical therapy is impractical, the potential for resistance to both treatments remain a concern.

Table 5. Overall Treatment Response

Group	Total Response (n, %)	No Response (n, %)
Permethrin	42 (95.5%)	2 (4.5%)
Ivermectin	33 (75.0%)	11 (25.0%)

Discussion:

The findings of this study demonstrate that permethrin 5% cream is more effective than oral ivermectin in the treatment of scabies, with significantly higher eradication rates at the two-week follow-up (95.5% vs. 75.0%). These results align with the study, who also reported that permethrin achieved superior cure rates in the initial treatment phase compared to ivermectin, reinforcing permethrin's status as the gold standard in scabies treatment [14]. The higher eradication rates observed in our study highlight the efficacy of permethrin, particularly in achieving faster resolution of scabies lesions and pruritus, key factors in improving patient outcomes. Furthermore, our study found that permethrin provided quicker symptomatic relief, with 90.9% of participants reporting high satisfaction due to rapid alleviation of symptoms. In contrast, 68.2% of ivermectin-treated participants expressed high satisfaction, with 31.8% expressing dissatisfaction primarily due to persistent itching after the first dose. These findings are consistent with previous research, which suggests that permethrin is often preferred for its faster effect on symptoms, a crucial factor for patients seeking immediate relief [15]. The fast onset of action is particularly important in scabies management, where pruritus and discomfort can significantly impact quality of life. In terms of side effects, permethrin demonstrated a more favorable safety profile. Only 18.2% of participants in the permethrin group reported mild itching and redness, which resolved within 24 hours.

This is in contrast to the ivermectin group, where 22.7% of participants experienced gastrointestinal symptoms, including nausea and diarrhea, and 4.5% reported mild dizziness. These findings are in line with previous studies, who found that permethrin is associated with fewer systemic side effects compared to ivermectin, which is more likely to cause gastrointestinal issues [16]. The low incidence of adverse effects with permethrin supports its continued use as the preferred treatment option in most clinical settings. The dose-response analysis revealed an interesting pattern: 80.0% of participants in the permethrin group showed improvement after the first dose, compared to only 40.9% in the ivermectin group. This suggests that permethrin may be more effective in the initial phase of treatment, providing quicker relief. However, ivermectin demonstrated a stronger response after the second dose, with 40.9% of participants showing improvement compared to just 18.2% in the permethrin group. This observation suggests that ivermectin may be more beneficial for patients who do not respond adequately to permethrin after the first dose. These findings are consistent with another study who suggested that ivermectin may offer a viable alternative for individuals with scabies that is more persistent or resistant to topical treatments [17].

The concern about resistance to scabicides is increasingly relevant. Both permethrin and ivermectin have demonstrated high efficacy in treating scabies, but the emergence of resistance in some regions calls for careful monitoring and judicious use. Studies have highlighted the growing issue of resistance to these treatments in areas with endemic scabies, emphasizing the need for ongoing surveillance and the rational use of scabicides to prevent the development of resistance [18, 19]. Additionally, study discussed how the overuse of these treatments in certain regions has contributed to resistance patterns, underlining the importance of appropriate treatment protocols to

maintain the long-term effectiveness of available therapies [20].

Conclusion

This study demonstrates that permethrin 5% cream is more effective than oral ivermectin in achieving scabies eradication two weeks after treatment, with higher eradication rates, fewer side effects, and greater patient satisfaction. These findings support the continued use of permethrin as the first-line treatment for scabies. However, ivermectin remains a valuable alternative for patients who do not respond to permethrin, particularly in cases of resistance or when topical treatments are not feasible. As scabies continues to be a significant public health concern globally, especially in overcrowded and low-resource settings, the potential for both permethrin and ivermectin to face resistance poses a serious challenge. This study emphasizes the importance of monitoring long-term resistance patterns and highlights the need for more research into combination therapies that may help mitigate resistance and improve treatment outcomes. Clinicians should continue to assess the most appropriate treatment options based on individual patient needs, regional resistance trends, and the safety profiles of available therapies. The rising prevalence of scabies, coupled with the emerging threat of resistance, underscores the need for ongoing vigilance in scabies management. Further research into the long-term efficacy and safety of both permethrin and ivermectin, as well as alternative treatment options, is warranted to ensure that scabies remains a treatable condition, even in the face of growing challenges. By refining treatment strategies and monitoring resistance, we can continue to provide effective and accessible care to individuals affected by scabies worldwide.

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