ORIGINAL RESEARCH

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# Comparative Effectiveness of Ivermectin and Permethrin in the Treatment of Scabies Diagnosed in the Emergency Department

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## Abstract

**Objective:** We aimed to compare the effectiveness of systemic oral ivermectin and topical permethrin in the treatment of scabies in emergency departments (ED).

**Materials and Methods:** In this prospective, observational, cross-sectional single-center study, patients who presented to the ED with pruritus and were diagnosed with scabies received either topical permethrin or oral ivermectin, based on the clinician's preference. After treatment, the patients were scheduled for follow-up examinations one and two weeks later to assess the treatment effectiveness.

**Results:** A total of 177 patients were included in this study, comprising 106 (59.9%) men and 71 (40.1%) women. No statistically significant difference was found in terms of treatment effectiveness between patients using topical permethrin and those using oral ivermectin at the 7- and 14-day follow-ups (p=0.656 and p=0.604, respectively). After two courses of treatment, 42 (23.7%) patients were considered to have an ineffective response and received alternative treatment.

**Conclusion:** Scabies are managed and treated by dermatologists and emergency medicine physicians in Türkiye. The effectiveness of topical permethrin and oral ivermectin, which are commonly used as first-line treatments for scabies, appears to be similar. The treatment efficacies of both drugs were lower than expected. Improvements in patient adherence and medication access, family member contributions to treatment, and patient education regarding home hygiene can improve treatment outcomes.

**Keywords:** Scabies, itching, sarcoptes scabiei, pruritus

## Introduction

Scabies, which affect more than 200 million people worldwide, are an ectoparasitic infestation caused by Sarcoptes scabiei [1]. It is one of the most common dermatological conditions, significantly contributing to the burden of skin diseases in developing countries [2]. In recent years, the incidence of scabies has increased in Türkiye, mirroring trends observed in many other regions [3]. Because of limited access to dermatologists, many patients in Türkiye seek the emergency department (ED). Consequently, scabies are frequently diagnosed in the ED, where patients often receive their full treatment prescriptions from emergency physicians.

The primary symptom of scabies is intense itching, which typically worsens at night (nocturnal pruritus) [3]. Burrows, also termed sialons, are pathognomonic for scabies. The typical sites of scabies infestation are the submammary region, hands, wrists, and genital area [3]. Diagnosis can be made using microscopy, dermoscopy, Wood's lamp examination, or skin scrapings. However, in emergency settings, treatment is generally initiated based on clinical evaluation alone [4].

Various agents are available for scabies treatment, and patient compliance is crucial for effective treatment. Both topical and systemic treatments can be used. Permethrin, a topical insecticide, is applied as a 5% concentration lotion. The cream

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should be thoroughly applied to the entire body from the neck down when the body is clean, dry, and cool, ensuring that no areas are missed. The lotion is kept on the skin for 8-12 h and then washed off. The success rate of the lotion is high when applied twice within a 1-week interval [3]. Ivermectin, an antiparasitic drug available in tablet form, is recommended at a dose of 200 µg/kg and taken twice with a 1-week interval. Due to resistance to topical treatments or ineffectiveness caused by improper use, systemic treatments have become more prominent. The World Health Organization (WHO) considers oral ivermectin an essential medicine for human health [1]. In this study, we aimed to compare the effectiveness of systemic oral ivermectin and topical permethrin in the treatment of scabies.

## Materials And Methods

### Study Design and Participants

After obtaining ethical approval for this prospective, observational, cross-sectional single-center study, we included adult patients who presented with itching complaints to our hospital's ED over a 6-month period, agreed to participate in the study, and provided written informed consent. Based on the emergency physician's examination and decision regarding the patient, all patients were administered topical permethrin or systemic/oral ivermectin. Due to the lack of Turkish Social Security Information (SSI) reimbursement for oral ivermectin when prescribed by the ED, the inclusion of topical permethrin under SSI reimbursement, and differences in application, the treatments were not randomized but were instead prescribed based on the physician's and patient's choice. Patients were informed about the treatments and were asked about similar symptoms in family members. Follow-up was scheduled for 1 week later. The effectiveness of the treatment was associated with a reduction in symptoms. If a reduction in symptoms occurred after the initial treatment, no additional treatment was provided; the effectiveness of the treatment was assessed and recorded. When symptoms persisted without improvement, the same treatment was re-prescribed; patients were followed up by examination 1 week later to reassess treatment efficacy. If symptoms decreased or disappeared after the second course of treatment, the treatment was considered effective. If the treatment remained ineffective, an alternative drug (not previously prescribed) was administered, and patients were advised to undergo follow-up with a dermatology clinic before discharge. Adult patients who did not consent to participate, those with liver or kidney failure, those who did not attend follow-up visits, pregnant patients, and pediatric patients were excluded from the study.

### Ethics

Ethical approval was obtained from the University of Health Science Türkiye, Haseki Training and Research Hospital Clinical Research Ethics Committee (decision number: 238-2023, date: 20.12.2023). Informed consent was obtained from all participants prior to their inclusion in the study.

### Statistical Analysis

Descriptive statistics for the data included means, standard deviations, medians, minima, maxima, frequencies, and percentages. The distributions of variables were evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The Mann-Whitney U test was used to analyze non-normally distributed quantitative independent data; the chi-square test was used to analyze categorical independent data. Statistical analyses were performed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA).

## Results

This study included 177 patients: 106 (59.9%) men and 71 (40.1%) women (mean age: 40.5±15.7 years) (Table 1). In total, 84 (47.5%) patients had family members who also required treatment. Patients were informed accordingly. Treatment was initiated with permethrin in 139 patients and ivermectin in 38 patients There were no significant differences in age or sex distribution between the groups receiving permethrin and ivermectin (p=0.069 and p=0.303, respectively; Table 2). Single-dose treatment was effective in 108 (61%) patients (Table 1).

Among the patients treated with permethrin, 61.9% responded to a single course of treatment, whereas 57.9% of those treated with ivermectin also responded to a single course. However, there was no statistically significant difference in the treatment efficacy between the two drugs at the 7-day follow-up (p=0.656; Table 2). Among the patients who did not respond to the initial treatment and required a second course, 27 (39.1%) showed improvement. Specifically, 37.7% of patients treated with permethrin and 43.8% of those treated with ivermectin benefited from a second course of treatment. Regarding the second course, there was no significant difference in the treatment efficacy between the two drugs at the 14-day follow-up (p=0.604; Table 2).

Among the 42 patients who required two courses of treatment and were subsequently switched to alternative therapy because of persistent symptoms, 23.7% of patients initially treated with permethrin and similarly 23.7% of those initially treated with ivermectin did not respond to treatment. Thus, another medication not previously used was prescribed (Table 2).

## Discussion

Scabies are parasitic infections that affect more than 200 million people worldwide at any given time [1]. In Türkiye, many patients with scabies seek treatment in the ED because

**Table 1. Demographic and clinical characteristics of the patients**

| Characteristic | | Min.-Max. | | | Median | Mean ± SD/n-% | | |
|---|---|---|---|---|---|---|---|---|
| Age | | 18.0 | - | 84.0 | 39.0 | 40.5 | ± | 15.7 |
| Gender | Male | | | | | 106 | | 59.9% |
| | Female | | | | | 71 | | 40.1% |
| Need for family treatment | No | | | | | 93 | | 52.5% |
| | Yes | | | | | 84 | | 47.5% |
| 7-Day follow-up treatment | Ineffective | | | | | 69 | | 39.0% |
| | Effective | | | | | 108 | | 61.0% |
| 14-Day follow-up treatment | Ineffective | | | | | 42 | | 60.9% |
| | Effective | | | | | 27 | | 39.1% |

Data are presented as numbers (n) and percentages (%),
SD: Standard deviation, Mean: Minimum, and maximum values

**Table 2. Comparison of demographic and clinical characteristics between the ivermectin and permethrin treatment groups**

| Characteristic | | Ivermectin | | | | Permethrin | | | | p | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mean ± SD/n-% | | | Median | Mean ± SD/n-% | | | Median | | |
| Age | | 44.6 | ± | 16.5 | 44.5 | 39.3 | ± | 15,4 | 37.0 | 0.069 | m |
| Gender | Male | 20 | | 52.6% | | 86 | | 61.9% | | 0.303 | $X^2$ |
| | Female | 18 | | 47.4% | | 53 | | 38.1% | | | |
| Need for family treatment | No | 21 | | 55.3% | | 72 | | 51.8% | | 0.705 | $X^2$ |
| | Yes | 17 | | 44.7% | | 67 | | 48.2% | | | |
| 7-Day follow-up treatment | Ineffective | 16 | | 42.1% | | 53 | | 38.1% | | 0.656 | $X^2$ |
| | Effective | 22 | | 57.9% | | 86 | | 61.9% | | | |
| 14-Day follow-up treatment | Ineffective | 9 | | 56.3% | | 33 | | 62.3% | | 0.604 | $X^2$ |
| | Effective | 7 | | 43.8% | | 20 | | 37.7% | | | |
| End of treatment (switched to the alternative therapy) | Ineffective | 9 | | 23.7% | | 33 | | 23.7% | | 0.519 | $X^2$ |
| | Effective | 29 | | 76.3% | | 106 | | 76.3% | | | |

Data are presented as numbers (n) and percentages (%), [m]Mann-whitney u test, [X]Chi-square test
SD: Standard deviation, Mean: Minimum, and maximum values

of the lack of available appointments with dermatologists and the ease of access to emergency services [5]. Similarly, in the United States, many patients with scabies seek treatment in the ED [6]. Tripathi et al. [6] showed that 52.37% of patients diagnosed with scabies in the ED were men; 41.53% of patients were between the ages of 18 and 39 years. Yurekli and Duran [7] also reported that 54% of the patients in their study were men. In this study, 59.9% of patients were men, and the mean age was 40.5±15.7 years.

Some studies have indicated that the effectiveness and safety of topical permethrin and oral ivermectin, both commonly used as first-line treatments for scabies, are similar [8,9]. However, a meta-analysis revealed an association between oral ivermectin and a significantly higher risk of treatment failure compared with topical permethrin [10]. In our study, we found that the efficacy of both drugs were similar (i.e., they did not significantly differ).

The reported success rate of a single dose of topical permethrin ranges from 89% to 98%; the rate increases to 98-100% when applied at a 1-week interval [2]. The efficacy of a single dose of oral ivermectin has also been noted in European scabies management guidelines [11]. Ranjkesh et al. [12] reported that two doses of topical permethrin were more effective than a single dose of oral ivermectin. Oral ivermectin administration twice at a 1-week interval reportedly improves treatment compliance [7,11]. Owing to its ease of use, oral ivermectin has received considerable attention in endemic communities, and it is considered an essential medicine by the WHO [1,9]. In our study, 61% of patients achieved treatment success with a single dose of the treatment. Treatment efficacy was observed in 61.9% of patients who received a single dose of permethrin, 37.7% of patients who received two doses of permethrin, 57.9% of patients who received a single dose of ivermectin, and 43.8% of patients who received two doses of ivermectin.

Contrary to the literature, the treatment efficacy of both drugs were lower than expected. Notably, 23.74% of patients using permethrin and 23.68% of patients using ivermectin did not respond to treatment. Factors such as treatment resistance, non-compliance by family members, and failure to properly clean household items in contact with scabies mites may have contributed to this outcome. Thus, adherence to recommendations for combined treatments may be a more effective approach [13].

### Study Limitations

This prospective observation, cross-sectional study was conducted with a limited number of patients at a single center. Due to the absence of an on-call or available dermatologist at the hospital, patients presenting to the ED with a presumptive diagnosis of scabies could not be referred for consultation; the diagnosis of scabies could not be confirmed using alternative diagnostic methods. The study might have yielded more robust results if it had been conducted with a larger number of participants at a hospital where an on-call dermatologist was available for consultation regarding all dermatological cases.

## Conclusion

Scabies are managed and treated by dermatologists and emergency medicine physicians in Türkiye. The effectiveness of topical permethrin and oral ivermectin, both commonly used as first-line treatment for scabies, appears to be similar. Although oral ivermectin is convenient, its accessibility is limited because patients must pay for it out-of-pocket when it is prescribed in the ED. In contrast, topical permethrin is financially accessible, but it is challenging to apply correctly. The treatment efficacy of both drugs may be lower than expected. Therefore, combined treatment with permethrin and ivermectin may be a viable treatment option. Improvements in patient adherence and medication access, family member contributions to treatment, and patient education regarding home hygiene can also contribute to better treatment outcomes.

### Ethics

**Ethics Committee Approval:** Ethical approval was obtained from the Haseki Training and Research Hospital Clinical Research Ethics Committee (decision number: 238-2023, date: 20.12.2023).

**Informed Consent:** Informed consent was obtained from all participants prior to their inclusion in the study.

### Footnote

### Authorship Contributions

Surgical and Medical Practices: T.B.Ü., Concept: T.B.Ü., H.A., Design: T.B.Ü., H.E., Data Collection or Processing: T.B.Ü., H.E., H.A., Analysis or Interpretation: T.B.Ü., H.E., H.A., Literature Search: T.B.Ü., H.E., H.A., Writing: T.B.Ü., H.A.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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