JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/knde7h67

Original Article

Frequency of Different Risk Factors in Scabies Treatment Failure

Dr. Rubab Ayesha Rasheed[1], Dr. Aisha Akhter[2], Dr Uzma Bashir[3], Dr. Syed Muzzamal Bukhari[4], Dr. Zarmeen Khawar[4], Dr. Aurangzaib Khan[4]

[1] Postgraduate Resident, Department of Dermatology, Pak Emirates Military Hospital, Rawalpindi, Pakistan
[2] Associate Professor of Dermatology, AFPGMI, Department of Dermatology, Pak Emirates Military Hospital, Rawalpindi, Pakistan
[3] Associate Professor of Dermatology, AFPGMI, Department of Dermatology, CMH Gujranwala, Gujranwala, Pakistan
[4] Department of Dermatology, Pak Emirates Military Hospital, Rawalpindi, Pakistan

***Corresponding author: Dr. Rubab Ayesha Rasheed, rubabayesharasheed@gmail.com**

"Cite this Article" Received: 09 August 2024; **Accepted**: 10 April 2025; **Published**: 21 April 2025
Author Contributions: Author Contributions: Concept: RAR, AA; Design: RAR, AA, UB; Data Collection: RAR, SMB, ZK, AK; Analysis: RAR, AA; Drafting: RAR, AA, UB. **Ethical Approval**: Pak Emirates Military Hospital, Rawalpindi, Pakistan**. Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

ABSTRACT

Background: Scabies is a highly contagious parasitic skin infestation and an important public health problem, particularly in settings with close contact, overcrowding, and inadequate treatment implementation. Although effective therapies are available, treatment failure remains common and may result from behavioral, household, environmental, and treatment-related factors. Objective: To determine the frequency of different risk factors associated with scabies treatment failure among patients presenting to a dermatology outpatient department. Methods: This questionnaire-based cross-sectional study was conducted at the outpatient Department of Dermatology, Pak Emirates Military Hospital, Rawalpindi, from 1 April 2024 to 1 June 2024. A total of 323 adults with persistent scabies at least three weeks after treatment were enrolled. Treatment failure was clinically assessed and supported by microscopic identification of mites, eggs, or fecal pellets on skin scraping. A structured questionnaire with ten dichotomous items was used to assess patient-related, treatment-related, and environmental or household-related risk factors. Data were analyzed using SPSS version 26 and presented as frequencies and percentages. Results: The most frequent risk factors were absence of written or verbal instructions regarding treatment application (98.5%), failure of all family members to apply treatment simultaneously (90.0%), and lack of understanding of the correct application method (79.6%). Additional factors included failure to repeat treatment (61.3%), not washing clothes and bedding (51.1%), use of other creams instead of prescribed treatment (39.3%), and incomplete or shortened cream application. Conclusion: Scabies treatment failure in this population was predominantly associated with poor patient education, inadequate treatment execution, incomplete household-wide management, and insufficient environmental decontamination. Keywords: Scabies, treatment failure, close contacts, improper treatment, delayed second dose, decontamination practices.

INTRODUCTION

Scabies is a highly contagious ectoparasitic dermatosis caused by Sarcoptes scabiei var. hominis and remains a substantial public health problem, particularly in settings characterized by overcrowding, close physical contact, and limited hygiene resources (1). Transmission occurs predominantly through prolonged skin-to-skin contact, although indirect spread through contaminated clothing, bedding, and other fomites may also contribute under certain circumstances (2,3). Clinically, the disease is characterized by intense pruritus, often with nocturnal exacerbation, along with burrows, papules, excoriations, and secondary eczematous or impetiginized lesions involving typical sites such as the interdigital spaces, wrists, flexural surfaces, trunk, and genital region (4,5). Despite being readily

diagnosable and treatable, scabies continues to impose a considerable burden worldwide, with millions affected annually, and its persistence in endemic and resource-constrained communities has led to its recognition as a neglected tropical disease of global importance (6-8).

Although effective topical and systemic therapies are available, successful eradication of scabies depends not only on drug efficacy but also on correct application technique, adherence to repeat treatment schedules, simultaneous management of close contacts, and adequate environmental decontamination (9,13). Increasing reports of repeated prescriptions, recurrent infestation, and reduced therapeutic response have raised concern regarding treatment failure and pseudo-resistance, particularly where treatment is improperly applied or incompletely implemented at the household level (9-12). In practice, failure may occur because the medication is not applied to all body surfaces, is washed off too early, is not repeated at the appropriate interval, or is used without parallel treatment of family members and close contacts, thereby allowing reinfestation to persist despite apparently appropriate medical care (14-17).

Previous literature has identified several determinants of poor treatment outcomes, including non-compliance, inadequate contact treatment, delayed second dosing, insufficient decontamination of clothing and bedding, and emerging concerns regarding reduced sensitivity to permethrin in some settings (10-12,14,15). However, much of the existing evidence has focused primarily on pharmacologic management or on patient-level treatment adherence, with comparatively less attention to the combined influence of patient understanding, physician-patient communication, household treatment behavior, and living conditions in real-world outpatient populations (14-17). This gap is clinically important because even an effective anti-scabetic regimen may fail when patients do not receive clear instructions, do not understand how to apply treatment, or remain exposed to untreated household reservoirs of infestation.

In low-resource and high-density living environments, the interaction between behavioral, educational, and environmental factors may be particularly relevant to treatment failure, yet these contributors are often underreported in routine clinical studies (16,17,20). Identifying the frequency of such factors in patients with persistent scabies after treatment may help refine practical management strategies beyond drug selection alone. A clearer understanding of these patterns could support interventions centered on patient counselling, simplified treatment instructions, simultaneous contact management, and household decontamination, all of which are potentially modifiable components of care.

Therefore, this study was undertaken to determine the frequency of different risk factors associated with treatment failure among patients with scabies presenting to the outpatient dermatology department of a tertiary care hospital. It was hypothesized that treatment failure would be commonly associated with inadequate patient education, improper application practices, incomplete treatment of household contacts, and insufficient environmental decontamination (14-17,21).

MATERIALS AND METHODS

This questionnaire-based cross-sectional study was conducted in the outpatient Department of Dermatology at Pak Emirates Military Hospital, Rawalpindi, Pakistan, from 1 April 2024 to 1 June 2024 to determine the frequency of risk factors associated with treatment failure among adult patients previously treated for scabies. The cross-sectional design was selected because the primary objective was to describe the distribution of predefined behavioral, treatment-related, and household/environmental factors among patients who continued to have evidence of infestation after treatment, rather than to estimate incidence or establish temporal causation. All eligible participants were assessed during follow-up visits occurring at least three weeks after completion of medical treatment, allowing sufficient time for post-treatment clinical reassessment and identification of persistent or recurrent infestation consistent with treatment failure (19).

The study population comprised adults aged 18 years or older with a clinical diagnosis of scabies who had received treatment not less than three weeks earlier and re-presented for follow-up evaluation. Patients younger than 18 years and pregnant or breastfeeding women were excluded. Participants were recruited consecutively from eligible follow-up attendees in the dermatology outpatient setting in order to minimize arbitrary selection and reflect routine clinical practice. After an explanation of study purpose and procedures, written informed consent was obtained before enrollment. Diagnosis of treatment failure was established on clinical grounds supported by dermatologist evaluation, and cases were classified as failures when symptoms or signs suggestive of ongoing scabies persisted or recurred after treatment and mites, eggs, or fecal pellets were identified on skin scraping examined microscopically, consistent with accepted descriptions of persistent infestation after standard therapy (18,19).

Data were collected using a structured questionnaire developed to assess commonly reported contributors to scabies treatment failure identified from the literature, including failure to treat close contacts, delayed or incomplete retreatment, improper application of prescribed medication, possible treatment resistance, and inadequate decontamination of personal items and the domestic environment (14-17,20,21). The instrument contained ten dichotomous yes/no items and was organized to capture patient-related, treatment-related, and household/environmental factors. In addition, demographic and background information was recorded, including age category where relevant, sex, literacy status, living conditions such as shared or congested housing, and the presence of a disabled family member who could potentially serve as an untreated or undertreated reservoir of reinfestation. To improve content validity, the questionnaire was reviewed by ten dermatologists prior to its use in the study. The finalized instrument was then administered in a standardized manner at the follow-up encounter by trained study personnel to reduce variability in question delivery and interpretation.

Operational definitions were specified in advance to improve consistency in classification. Scabies was defined as a parasitic skin infestation diagnosed clinically by a dermatologist on the basis of characteristic features such as burrows, nocturnal pruritus, and compatible skin lesions (18). Scabies treatment failure was defined as the persistence or recurrence of symptoms or signs of infestation three weeks or more after completion of standard therapy, with clinical confirmation by a dermatologist and supportive microscopic evidence on skin scraping where available (19). Close contacts were defined as individuals living with the patient or having frequent close skin-to-skin contact during the month preceding treatment (20). Improper treatment referred to incorrect or inconsistent use of the prescribed regimen, including missed applications, incomplete body coverage, inadequate contact time, or use of non-prescribed creams in place of the recommended therapy (15,16). Delayed second dose referred to administration of the repeat treatment later than the recommended interval after the initial dose (15). Decontamination practices referred to washing or sanitizing exposed clothes, towels, and bed linens in hot water or isolating potentially contaminated items in sealed bags for an adequate period, in accordance with accepted control measures for scabies transmission prevention (17).

Several procedural steps were used to improve data quality and reduce bias. Restricting recruitment to clinically confirmed follow-up cases reduced the likelihood of including participants without true ongoing infestation. Standardized administration of the same structured questionnaire to all participants helped limit interviewer-related variability. Use of dichotomous items reduced ambiguity in responses and facilitated uniform coding for analysis. Because some variables depended on patient recall and self-report, there remained a risk of recall bias and social desirability bias; however, data collection was anchored to the recent treatment episode and performed during follow-up visits to improve response accuracy. Selection bias was also limited by enrolling consecutive eligible patients presenting during the study period. Since the purpose of the study was descriptive rather than comparative, formal adjustment for confounding was not central to the primary analysis; nevertheless, key demographic and living-environment characteristics were recorded to allow clinically relevant interpretation of the observed frequencies.

The sample size was calculated using the single population proportion formula, with a 95% confidence level, 5% margin of error, and an assumed prevalence of treatment failure-related risk factors of 30% based on prior literature addressing scabies persistence and therapeutic challenges (20). This yielded a required sample of 323 participants, which was adopted as the final study size. All recruited participants meeting the eligibility criteria during the study period were included until this target was achieved.

Data were entered and analyzed using SPSS version 26. Continuous variables, where applicable, were summarized as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Because the study objective was to determine the frequency distribution of risk factors among confirmed treatment-failure cases, the main analysis remained descriptive and table-based. Data cleaning and range checks were performed before final analysis to ensure internal consistency between recorded responses and coded variables. Records with incomplete responses on key study variables were excluded from the relevant variable-specific summaries to preserve accuracy of reported denominators. The final presentation of results focused on patient-related, treatment-related, and environmental or household-related factors contributing to scabies treatment failure. Ethical approval for the study was obtained from the Ethics Committee of Pakistan Emirates Military Hospital, Rawalpindi, Pakistan, under reference number A/28/ERC/96/24, and the study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to inclusion in the study.

RESULTS

A total of 323 patients with persistent scabies after prior treatment were evaluated. The descriptive analysis showed that the most frequently reported contributors to treatment failure were deficiencies in treatment instruction, poor understanding of correct application, and incomplete household-wide management. Among patient-related factors, 257 patients (79.6%) reported that they did not understand the correct method of application, 246 (76.2%) were male, 41 (12.7%) were illiterate, and 22 (6.8%) reported the presence of a disabled family member in the household, which may have increased the likelihood of undertreatment or reinfestation. These findings indicate that treatment-failure cases in this cohort were characterized more strongly by knowledge and implementation barriers than by demographic vulnerability alone.

Treatment-related factors were also highly prevalent. The single most common risk factor in the entire dataset was failure to receive written or verbal treatment instructions, reported by 318 patients (98.5%). In addition, 198 patients (61.3%) did not repeat the treatment as recommended, 127 (39.3%) used other creams instead of the prescribed treatment, 115 (35.6%) kept the cream on for less than 12 hours, and 111 (34.4%) each reported either failure to apply cream to the back or failure to apply it to the entire body. Taken together, these data suggest that incorrect or incomplete therapeutic execution was common, with multiple treatment-process failures clustering in more than one-third to two-thirds of cases.

Environmental and household-related factors further emphasized the importance of reinfestation risk. A total of 291 patients (90.0%) reported that all family members did not apply the cream simultaneously, making this the second most frequent overall contributor after absent treatment instruction. In addition, 165 patients (51.1%) did not wash clothing and bedding, while 107 (33.1%) reported living in shared or congested conditions. These observations indicate that even where individual treatment is attempted, the persistence of untreated close contacts and contaminated domestic environments may substantially undermine eradication efforts.

Across domains, the highest observed frequencies were concentrated in modifiable behavioral and communication-related factors rather than in fixed demographic characteristics. The three most prevalent risk factors overall were lack of written or verbal instructions (98.5%), failure of all family members to apply the cream (90.0%), and poor understanding of the application method (79.6%). By

contrast, illiteracy (12.7%) and the presence of a disabled family member (6.8%) were less common, although still clinically relevant in selected households. This pattern supports the interpretation that scabies treatment failure in this setting was driven predominantly by gaps in counselling, treatment execution, and concurrent household management rather than by isolated patient characteristics alone.

Table 1. Patient-Related Risk Factors Reported Among Scabies Treatment-Failure Cases (n=323)

Risk Factor	n	%
Did not understand method of application	257	79.6
Male sex	246	76.2
Illiterate	41	12.7
Disabled family member in household	22	6.8

Table description: Patient-related findings showed that lack of understanding of the application method was the dominant factor, affecting 257 of 323 patients (79.6%), followed closely by male sex at 246 cases (76.2%). In contrast, illiteracy was present in 41 patients (12.7%) and a disabled family member in 22 patients (6.8%), indicating that knowledge-related barriers were much more frequent than these background characteristics.

Table 2. Treatment-Related Risk Factors Reported Among Scabies Treatment-Failure Cases (n=323)

Risk Factor	n	%
Did not receive written/verbal instructions	318	98.5
Repeated treatment was not done	198	61.3
Used other creams instead of prescribed treatment	127	39.3
Duration of cream application was less than 12 hours	115	35.6
Did not apply cream to back	111	34.4
Cream was not applied to entire body	111	34.4

Treatment-related failures were prominent, with 318 patients (98.5%) reporting that they had received no written or verbal instructions, making this the most frequent risk factor in the study. Failure to repeat treatment was reported by 198 patients (61.3%), while substitution with other creams occurred in 127 cases (39.3%). Inadequate application duration affected 115 patients (35.6%), and incomplete body coverage was documented in 111 patients (34.4%) for both back application and total-body application.

Table 3. Environmental and Household-Related Risk Factors Reported Among Scabies Treatment-Failure Cases (n=323)

Risk Factor	n	%
All family members did not apply cream	291	90.0
Clothes and bedding were not washed	165	51.1
Shared/congested living conditions	107	33.1

Environmental and household-level barriers were also substantial. The most frequent household-related issue was failure of all family members to apply treatment simultaneously, reported by 291 patients (90.0%). In addition, 165 patients (51.1%) did not wash clothes or bedding, and 107 (33.1%) lived in shared or congested environments, underscoring a strong reinfestation pathway within domestic settings.

Table 4. Rank Order of Overall Reported Risk Factors in Scabies Treatment Failure (n=323)

Rank	Risk Factor	Domain	n	%
1	Did not receive written/verbal instructions	Treatment-related	318	98.5
2	All family members did not apply cream	Environmental/household	291	90.0
3	Did not understand method of application	Patient-related	257	79.6
4	Male sex	Patient-related	246	76.2
5	Repeated treatment was not done	Treatment-related	198	61.3
6	Clothes and bedding were not washed	Environmental/household	165	51.1
7	Used other creams instead of prescribed treatment	Treatment-related	127	39.3
8	Duration of cream application was less than 12 hours	Treatment-related	115	35.6
9	Did not apply cream to back	Treatment-related	111	34.4
10	Cream was not applied to entire body	Treatment-related	111	34.4
11	Shared/congested living conditions	Environmental/household	107	33.1
12	Illiterate	Patient-related	41	12.7
13	Disabled family member in household	Patient-related	22	6.8

Ranking all 13 factors together shows a clear dominance of modifiable communication and adherence-related issues. The top three factors all exceeded 79%, with lack of instructions reaching 98.5%, incomplete family treatment 90.0%, and poor understanding of application 79.6%. The least frequent factors were illiteracy at 12.7% and the presence of a disabled household member at 6.8%, suggesting that system-level counselling failures and household treatment gaps were more influential than demographic vulnerabilities in this cohort.

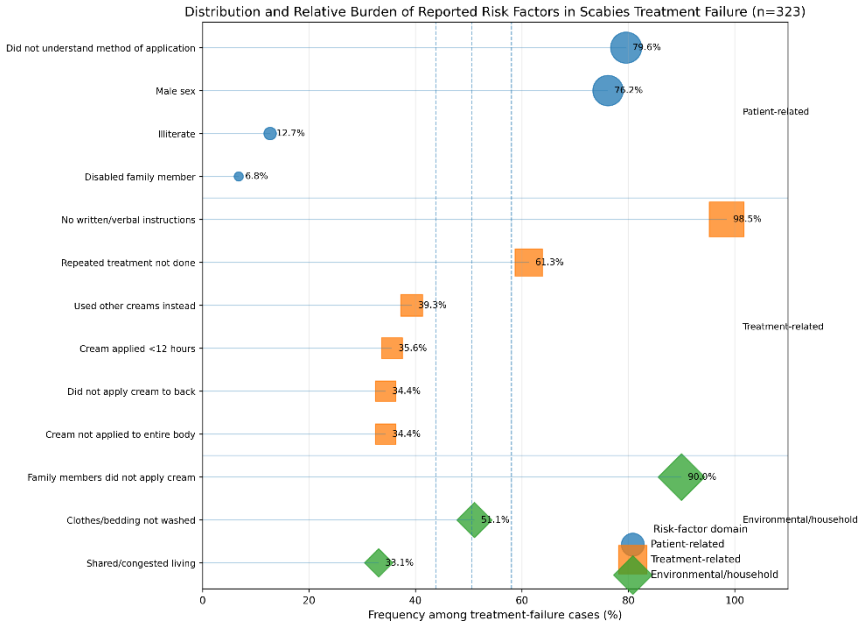

Figure 1: Distribution and Relative Burden of Reported Risk Factors in Scabies Treatment Failure (n=323)

The figure demonstrates a marked concentration of treatment-failure burden in modifiable communication, adherence, and household-management factors. The highest frequencies were observed for absence of written or verbal instructions (98.5%), lack of simultaneous treatment among family members (90.0%), and poor understanding of the application method (79.6%), whereas lower-frequency factors included illiteracy (12.7%) and the presence of a disabled family member (6.8%). Within the treatment-related domain, the reported burden extended across multiple implementation failures, including omission of repeat treatment (61.3%), substitution with non-prescribed creams (39.3%), shortened application duration (35.6%), and incomplete body coverage (34.4% each). Environmental risk remained substantial, with 51.1% reporting failure to wash clothing and bedding and 33.1% reporting shared or congested living conditions. Overall, the distribution indicates that persistent scabies in this cohort clustered around remediable failures in counselling, whole-household treatment coordination, and treatment execution rather than around fixed patient characteristics alone.

DISCUSSION

The present study showed that scabies treatment failure in this outpatient cohort was driven predominantly by modifiable behavioral, communication-related, and household-management factors rather than by fixed demographic characteristics. The most striking finding was that 98.5% of patients reported not receiving written or verbal instructions regarding treatment use, while 79.6% did not understand the correct method of application and 90.0% reported that all family members did not apply the cream simultaneously. These patterns suggest that treatment failure in routine practice may reflect not only pharmacologic issues but also a breakdown in treatment delivery, patient counselling, and implementation at the household level. This observation is clinically important because scabies management depends on a sequence of coordinated actions, including correct application, adequate duration of treatment, timely repeat dosing, simultaneous treatment of close contacts, and

environmental decontamination, all of which must be performed properly to interrupt transmission and prevent reinfestation (1,9,13).

The high frequency of poor understanding of treatment application in the present study is consistent with the broader literature showing that successful scabies treatment depends heavily on patient adherence and procedural accuracy rather than prescription alone. Standard anti-scabetic regimens may fail when medication is not applied to the entire skin surface, when areas such as the back are missed, or when the product is removed too early, thereby allowing viable mites or eggs to persist (4,13,15,19). In this study, 34.4% of patients did not apply the cream to the back, another 34.4% did not apply it to the entire body, and 35.6% kept it on for less than 12 hours, indicating that incomplete treatment execution was common. These findings support the view that apparent drug failure may often represent pseudo-resistance or procedural failure rather than true biologic resistance, a distinction that has been emphasized in recent literature discussing reduced permethrin responsiveness and the importance of correct treatment technique before concluding that resistance is present (10-12).

Household-level non-compliance emerged as another major contributor to treatment failure. Simultaneous treatment of close contacts is a central principle in scabies control because untreated household members can function as reservoirs for reinfestation even when the index patient receives appropriate therapy (3,14,17,20). In the current study, 90.0% of participants reported that all family members did not apply the cream, making this one of the most common factors identified. This finding aligns with Anderson and Strowd, who highlighted the poor management of close contacts as a leading explanation for recurrent infestation in dermatologic practice (14). It also reinforces public health recommendations that scabies should be approached not merely as an individual dermatologic condition but as a transmissible household or community problem requiring synchronized management of exposed contacts (1,17).

Environmental decontamination was another important area of deficiency. More than half of the participants (51.1%) reported that clothes and bedding were not washed, while 33.1% lived in shared or congested conditions. Although direct skin contact is the principal route of transmission, fomites may contribute to ongoing spread in domestic environments, especially where clothing, towels, or bedding are reused without adequate sanitation (3,17). In crowded households, the opportunity for repeated exposure is amplified, further complicating eradication. The present findings therefore support the concept that treatment success requires a broader control strategy extending beyond medication prescription to include household hygiene, patient education, and living-environment risk reduction where feasible (1,16,17).

The observation that 61.3% of patients did not repeat treatment is also clinically significant. Repeat dosing is commonly recommended to eliminate newly hatched mites that survive the initial application, and failure to administer the second dose within the recommended interval may substantially reduce treatment success (15). Likewise, the use of alternative creams instead of prescribed therapy, reported by 39.3% of patients in this study, may reflect confusion, poor counselling, self-medication, or lack of confidence in the prescribed regimen. These findings indicate that treatment failure may result from a cascade of communication and adherence problems beginning at the point of care and continuing throughout the treatment course. In this regard, the present study adds useful real-world evidence by demonstrating that the most frequent barriers are operational and educational rather than exclusively pharmacologic.

The current findings also help extend previous work by examining factors that are often insufficiently captured in treatment-outcome studies. Recent work by Azzolina et al. examined determinants of treatment success and failure after scabies management and provided valuable insight into outcome-related factors in a prospective clinical setting (21). However, the present study adds a more explicit focus on patient understanding, absence of physician instructions, incomplete household treatment, and environmental practices, thereby addressing practical dimensions of treatment failure that are

particularly relevant in everyday outpatient care. This broader perspective is important because healthcare systems may overestimate the effectiveness of standard regimens when the actual failure lies in how treatment instructions are communicated, understood, and implemented.

From a service-delivery perspective, these findings suggest that relatively simple interventions could produce meaningful improvements in treatment outcomes. Written and verbal instructions, pictorial application guides, counselling regarding repeat dosing, explicit advice about treating all household contacts simultaneously, and clear recommendations for bedding and clothing decontamination may reduce the risk of persistent infestation. Such measures may be especially useful in populations with literacy barriers, crowded living conditions, or dependence on family support for treatment implementation. The relatively lower frequency of illiteracy (12.7%) compared with knowledge-related treatment failure suggests that communication gaps are not explained by literacy alone; even literate patients may fail treatment when counselling is incomplete or unclear. This underscores the need for structured patient education rather than reliance on brief verbal prescription instructions alone.

The study should also be interpreted in light of its limitations. First, it was conducted at a single tertiary care outpatient center, which may limit the generalizability of the findings to other clinical or community settings. Second, the design was descriptive and cross-sectional, involving only patients with treatment failure; as a result, the study can identify the frequency of potential risk factors but cannot determine causal relationships or quantify comparative risk relative to successfully treated patients. Third, several variables were based on self-report and were therefore subject to recall bias and response bias. Fourth, although resistance was considered conceptually, the study design did not allow direct biologic assessment of acaricide resistance, so true resistance cannot be distinguished from pseudo-resistance with certainty. Finally, the absence of a control group and inferential analysis precludes formal estimation of which factors were independently associated with failure. Despite these limitations, the study offers useful practice-based evidence by identifying highly prevalent and clinically modifiable contributors to poor treatment outcomes in scabies.

Overall, the findings support a shift in emphasis from drug prescription alone to comprehensive treatment delivery. In this cohort, the dominant pattern was one of inadequate counselling, incomplete application, missed retreatment, untreated family contacts, and insufficient environmental decontamination. These are potentially correctable failures of implementation, and addressing them may improve both individual outcomes and broader control of scabies in high-burden settings. Future studies should incorporate comparative designs with treatment-success controls, use multivariable analysis to identify independent predictors of failure, and evaluate whether structured educational interventions can reduce recurrence and improve adherence in routine dermatology practice (14-17,21).

CONCLUSION

Scabies treatment failure in this study was predominantly associated with modifiable deficiencies in patient counselling, treatment execution, household-wide compliance, and environmental decontamination rather than with fixed demographic factors alone. The very high frequencies of absent written or verbal instructions, poor understanding of cream application, failure of simultaneous family treatment, and missed repeat dosing indicate that persistent infestation in routine practice is often a consequence of inadequate implementation of otherwise standard therapy. Strengthening physician-patient communication, providing clear written or pictorial treatment instructions, ensuring repeat-dose adherence, and promoting coordinated household management may substantially improve treatment success and reduce reinfestation in similar clinical settings.

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