



## PREVALENCE AND RISK FACTORS OF STEROID-INDUCED SKIN ATROPHY IN PATIENTS WITH CHRONIC DERMATOLOGIC DISORDERS: A MULTICENTER STUDY

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### ABSTRACT

**Background:** Topical corticosteroids have been extensively used in dermatology due to their anti-inflammatory and immunosuppressive properties. Although they have therapeutic advantages, a long-term or an inappropriate usage can lead to local adverse effects, especially to steroid-induced skin atrophy. The use of powerful corticosteroids without the appropriate medical control has become widespread particularly in patients with chronic skin diseases.

**Objective:** To determine the prevalence and associated risk factors of steroid-induced skin atrophy among chronic dermatologic patients attending multiple tertiary care centers.

**Methods:** This multi-center cross-sectional study was carried out at Pak International Medical College Peshawar and Wah Medical College, POF Hospital, Wah Cantt, Pakistan, from January 2024 to January 2025. Non-probability consecutive sampling was used to enroll a total of 72 patients with chronic dermatologic conditions who used topical corticosteroids. A structured proforma was used to capture demographic information, clinical presentation, and steroid-use history. Clinical examination was performed to identify steroid-induced skin atrophy and related cutaneous findings. IBM SPSS Statistics version 26 were used to analyze the data. The Chi-square test and logistic regression were used to assess the associations.

**Results:** Among 72 participants, 33 (45.8%) developed steroid-induced skin atrophy. Mild atrophy was the most frequent presentation. Chronic eczema was the leading dermatologic diagnosis, followed by psoriasis and atopic dermatitis. Potent corticosteroids were the most commonly used preparations, while prolonged steroid use beyond three months was reported in 55.5% of patients. Significant associations were observed between skin atrophy and prolonged steroid use ( $p=0.001$ ), potent or super-potent steroid application ( $p=0.021$ ), facial application ( $p<0.001$ ), and self-medication

( $p=0.028$ ). Regression analysis identified prolonged use, facial application, and higher steroid potency as independent predictors of skin atrophy.

**Conclusion:** Steroid-induced skin atrophy is a common complication among chronic dermatologic patients using topical corticosteroids. Inappropriate duration of therapy, stronger steroid potency, and unsupervised use significantly increase the risk of cutaneous damage. Proper prescribing practices and patient education are necessary to reduce preventable steroid-related complications.

**Keywords:** Topical corticosteroids; Skin atrophy; Dermatology; Steroid misuse; Chronic dermatoses; Cutaneous adverse effects

## INTRODUCTION

Topical corticosteroids continue to be one of the most commonly prescribed drugs in dermatology due to their high anti-inflammatory, antiproliferative, and immunosuppressive effects. These agents have a wide range of application in the management of chronic inflammatory skin diseases like eczema, psoriasis, atopic dermatitis and lichen simplex chronicus. They are very effective in everyday clinical practice because their quick symptomatic response is often helpful in itching, erythema and scaling. But a long and unreasonable usage can have a number of local and general negative effects, especially with the use of strong preparations on sensitive parts of the body (1-3).

One of the most well-known complications linked to the chronic exposure to topical corticosteroids is the skin atrophy caused by steroids. The condition occurs because it suppresses fibroblast activity, prevents collagen production, and decreases dermal connective tissue components. The patients can clinically present epidermal thinning, telangiectasis, striae, easy bruising, pigmentary changes, and skin fragility. Such changes become more noticeable in places that have thinner skin, such as the face, flexural regions and the genital regions. The extent of atrophy depends on various factors that include strength of steroid solution, application frequency, treatment duration, use of occlusives, age of the patient and the location of the anatomy (4-6).

Topical corticosteroids are widely misused and applied without proper supervision in most developing countries since they are usually sold over the counter. Availability of combination creams with corticosteroids with ease has also contributed to increased inappropriate use by the general population. The combination of self-medication practices, long-term therapy in the absence of dermatologic follow-ups, and awareness about the negative effects has resulted in the increasing number of steroid-damaged skin. Past researches have been done in South Asian populations where growing prevalences of steroid induced facial dermatoses and atrophic skin alterations have been noted among prolonged users of high potency topical corticosteroids (7-9).

Despite the fact that topical steroid abuse has been commonly observed in dermatology clinics, there is a paucity of local data on the prevalence of topical steroid-induced skin atrophy and risk factors in chronic dermatologic patients in Pakistan. Understanding these factors is important for promoting rational prescribing practices and improving patient counseling. Therefore, the present multi-center study was conducted to determine the prevalence of steroid-induced skin atrophy and identify the associated risk factors among chronic dermatologic patients attending tertiary care hospitals.

## METHODOLOGY

This multi-center cross-sectional study was carried out at Pak International Medical College Peshawar and Wah Medical College, POF Hospital, Wah Cantt, Pakistan, from January 2024 to January 2025. The study was conducted to determine the prevalence and associated risk factors of steroid-induced skin atrophy among chronic dermatologic patients using topical corticosteroids.

A total of 72 patients were enrolled through non probability consecutive sampling method. The sample size was calculated based on the number of patients expected to flow during the study period and the accessibility of the eligible patients in the sampled centers. The study included patients of both sexes who were 18 years old and older and had a history of topical corticosteroid application at least four weeks. Those who had a congenital skin thinning disorder, systemic connective tissue

disease, Cushing syndrome, or had undergone chemotherapy or prolonged systemic corticosteroid use were excluded to reduce confounding factors on skin integrity.

The demographic and clinical data were documented on a structured proforma after informed consent was given in writing. Age, gender, residence, length of skin disease, dermatologic diagnosis, location of lesions, type and potency of topical corticosteroid applied, duration of application, frequency of application, self-medication practices, and use of occlusive dressings were variables that were collected. Consultant dermatologists undertook clinical examination to determine signs of skin atrophy caused by steroids. The diagnosis was made by such findings as epidermal thinning, telangiectasia, hypopigmentation, striae, fragile skin, and purpura. The degree of skin atrophy was classified as mild, moderate or severe based on the degree of visible cutaneous alterations.

IBM SPSS Statistics version 26 was used to enter and analyze the data. The quantitative variables were summarized in form of mean, mean standard deviation, and categorical variables were summarized in form of frequencies and percentages. The Chi-square test or Fisher exact test was used to determine the associations of the risk factors with the skin atrophy. To determine independent predictors of steroid-induced skin atrophy, logistic regression analysis was done. The p-value that was taken to be significant was below 0.05.

## RESULTS

Out of 72 patients who were using topical corticosteroids to treat chronic skin conditions, the highest percentage were aged 31-45 years. There were slightly more female participants than males and urban residents more than rural residents.

**Table 1. Demographic profile of participants (n=72)**

| Variables                       | Frequency (n) | Percentage (%) |
|---------------------------------|---------------|----------------|
| <b>Age group</b>                |               |                |
| 18–30 years                     | 18            | 25.0           |
| 31–45 years                     | 31            | 43.1           |
| Above 45 years                  | 23            | 31.9           |
| <b>Gender</b>                   |               |                |
| Male                            | 31            | 43.1           |
| Female                          | 41            | 56.9           |
| <b>Residence</b>                |               |                |
| Urban                           | 44            | 61.1           |
| Rural                           | 28            | 38.9           |
| <b>Duration of skin disease</b> |               |                |
| <1 year                         | 19            | 26.4           |
| 1–3 years                       | 34            | 47.2           |
| >3 years                        | 19            | 26.4           |

The most common diagnosis was chronic eczema then psoriasis. Most patients had no reported systemic comorbidity and the face was the most frequently affected site.

**Table 2. Clinical characteristics of dermatologic conditions (n=72)**

| Variables                             | Frequency (n) | Percentage (%) |
|---------------------------------------|---------------|----------------|
| <b>Primary dermatologic diagnosis</b> |               |                |
| Chronic eczema                        | 24            | 33.3           |
| Psoriasis                             | 18            | 25.0           |
| Atopic dermatitis                     | 13            | 18.1           |
| Lichen simplex chronicus              | 9             | 12.5           |
| Seborrheic dermatitis                 | 8             | 11.1           |

| Site of lesions      |    |      |
|----------------------|----|------|
| Face                 | 21 | 29.2 |
| Upper limbs          | 17 | 23.6 |
| Lower limbs          | 14 | 19.4 |
| Trunk                | 11 | 15.3 |
| Intertriginous areas | 9  | 12.5 |
| Comorbid conditions  |    |      |
| Diabetes mellitus    | 14 | 19.4 |
| Hypertension         | 11 | 15.3 |
| None                 | 47 | 65.3 |

Strong corticosteroids were preferentially employed as compared to the other potency groups. More than half of the patients reported taking steroid use of greater than three months and 29 patients reported self-directed use.

**Table 3. Pattern of topical corticosteroid exposure (n=72)**

| Variables                | Frequency (n) | Percentage (%) |
|--------------------------|---------------|----------------|
| Potency of steroid used  |               |                |
| Mild                     | 11            | 15.3           |
| Moderate                 | 19            | 26.4           |
| Potent                   | 28            | 38.9           |
| Super-potent             | 14            | 19.4           |
| Duration of steroid use  |               |                |
| <1 month                 | 12            | 16.7           |
| 1–3 months               | 20            | 27.8           |
| >3 months                | 40            | 55.5           |
| Frequency of application |               |                |
| Once daily               | 22            | 30.6           |
| Twice daily              | 39            | 54.2           |
| More than twice daily    | 11            | 15.2           |
| Self-medication          |               |                |
| Yes                      | 29            | 40.3           |
| No                       | 43            | 59.7           |

Steroid-related skin atrophy was observed in 33 patients. Majority of the cases were mild and the changes that were commonly observed were telangiectasia and hypopigmentation.

**Table 4. Occurrence and clinical grading of steroid-induced skin atrophy (n=72)**

| Variables                 | Frequency (n) | Percentage (%) |
|---------------------------|---------------|----------------|
| Presence of skin atrophy  |               |                |
| Yes                       | 33            | 45.8           |
| No                        | 39            | 54.2           |
| Severity of skin atrophy  |               |                |
| Mild                      | 18            | 54.5           |
| Moderate                  | 11            | 33.3           |
| Severe                    | 4             | 12.2           |
| Associated manifestations |               |                |
| Telangiectasia            | 16            | 22.2           |
| Hypopigmentation          | 14            | 19.4           |
| Striae formation          | 10            | 13.9           |

|                  |   |      |
|------------------|---|------|
| Skin fragility   | 9 | 12.5 |
| Purpura/bruising | 7 | 9.7  |

Significant associations with skin atrophy were noted with steroid use (after 3 months), more potent steroid preparations, applied to the face, and self-medication. There were more cases of occlusive use in affected patients but this was not significant.

**Table 5. Relationship of selected risk factors with skin atrophy (n=72)**

| Risk factors                 | Skin atrophy present<br>n (%) | Skin atrophy absent<br>n (%) | p-value |
|------------------------------|-------------------------------|------------------------------|---------|
| Duration >3 months           | 26 (78.8)                     | 14 (35.9)                    | 0.001   |
| Potent/super-potent steroids | 24 (72.7)                     | 18 (46.2)                    | 0.021   |
| Facial application           | 17 (51.5)                     | 4 (10.3)                     | <0.001  |
| Self-medication              | 18 (54.5)                     | 11 (28.2)                    | 0.028   |
| Use under occlusion          | 9 (27.3)                      | 5 (12.8)                     | 0.114   |

Facial application, long-term steroid use, and the consumption of potent/super-potent preparations were also significant predictors in the adjusted model. Self-medication was a significant probability factor but not statistically significant on adjustment.

**Table 6. Regression model for factors associated with steroid-induced skin atrophy**

| Variables                         | Odds ratio (OR) | 95% CI     | p-value |
|-----------------------------------|-----------------|------------|---------|
| Duration of steroid use >3 months | 3.84            | 1.42–10.37 | 0.006   |
| Facial application                | 4.26            | 1.51–11.98 | 0.003   |
| Potent/super-potent steroids      | 2.71            | 1.01–7.29  | 0.041   |
| Self-medication                   | 2.18            | 0.89–5.37  | 0.072   |

**Figure 1. Steroid-Induced Skin Atrophy According to Duration of Steroid Use**

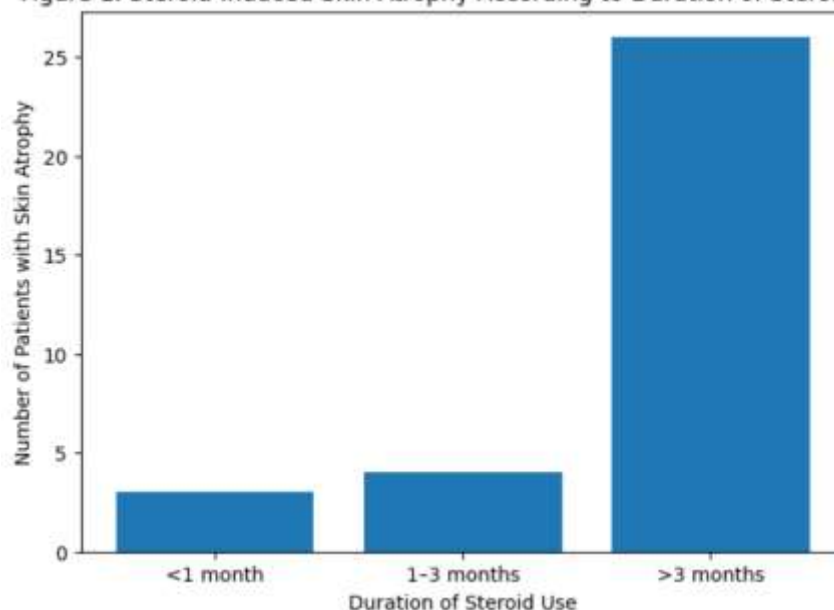


**Figure 1. Steroid-Induced Skin Atrophy According to Duration of Steroid Use**

Patients with prolonged topical steroid exposure, particularly beyond three months, showed the highest number of steroid-induced skin atrophy cases.

## DISCUSSION

The present multi-center study evaluated the prevalence and contributing factors of steroid-induced skin atrophy among chronic dermatologic patients using topical corticosteroids. Nearly half of the participants developed varying degrees of cutaneous atrophy, indicating that prolonged and inappropriate corticosteroid exposure remains a frequent clinical problem in dermatology practice. The findings also demonstrated that duration of use, potency of steroid preparation, facial application, and self-medication behavior were strongly linked with the occurrence of skin atrophy(10-12).

Steroid-related skin thinning was demonstrated in 45.8% of patients in this study. Similar findings have been made in recent dermatologic studies, in which chronic topical corticosteroid application was found to be a primary cause of epidermal and dermal structural damage. Research has pointed out that prolonged exposures to corticosteroids may result in collagen breakdown, vascular frailty, and destruction of dermal support tissue especially when the strength of the agent is prolonged. Findings Studies on similar findings revealed that irrational steroid use is still very widespread among South Asian communities because of the easy access of over-the-counter and lack of awareness among people (13-15).

The present study showed that strong and super-potent corticosteroids were more often linked with skin atrophy compared to weak preparations. This finding is biologically plausible since higher corticosteroids inhibit more aggressively fibroblast activity and lessen collagen synthesis. Recent reports have also shown that high-potency steroids can significantly contribute to the risk of atrophic changes, particularly of thin-skinned surfaces, like the face, and flexural regions. Studies indicated that the abuse of powerful topical steroids is a major cause of chronic facial dermatoses and steroid-damages skin syndromes (16, 17).

The other significant result of the current study was that there was a close correlation between long-term use of steroids and skin atrophy. Corticosteroid users with a lasting use of over 3 months had significantly higher prevalences of cutaneous thinning than short-term users. Other studies have reported similar trends in the international studies where long-duration therapy was found to one of the strongest predictors of steroid-related complications. The chronic effect interferes with epidermal turnover and connective tissue integrity which ultimately results in telangiectasia, striae and skin fragility (18).

Facial application was also a predictor in regression model that was independent of skin atrophy. It is especially prone to the facial area due to the relatively thin epidermis and high absorption of topical agents. Previous studies have also highlighted that facial corticosteroid abuse often causes atrophic, erythematous and vascular prominence. Such undesirable results may have a profound impact on cosmetic appearance and quality of life in patients particularly in younger patients and females (19). Another behavior that was prevalent in the study group was self-medication. Quite a number of participants were taking topical steroids without any medical follow-up. The same issues have been raised by the research in developing nations, where the availability of corticosteroid-containing creams is not restricted, and irrational usage is encouraged. Misuse at the community level is a common occurrence due to the recommendation by the non-medical individual, the impact of social media, or uncontrolled pharmacy dispensing. These practices put the risk of long-term exposure and delayed awareness of negative outcomes (20).

The current study has numerous strengths, such as its multi-center design and assessment of various clinical and treatment-related factors. Nevertheless, there are certain limitations to be considered. The sample size was quite low and the study design was cross-sectional which restricts the interpretation of causality. Moreover, patient recall was also used in part to assess steroid exposure, which could cause recall bias. Irrespective of these constraints, the study offers some useful local data on the cost of skin atrophy caused by steroids and demonstrates the need to treat corticosteroids carefully and educate patients.

## CONCLUSION

Steroid-induced skin atrophy was frequently observed among chronic dermatologic patients using topical corticosteroids. Prolonged duration of therapy, use of potent or super-potent preparations,

facial application, and self-medication practices were identified as major contributing factors. Careful prescription practices, patient counseling, regular dermatologic follow-up, and public awareness regarding inappropriate steroid use are essential to minimize preventable cutaneous complications associated with long-term topical corticosteroid therapy.

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