ORIGINAL RESEARCH

Assessment of Dermatological Changes in Patients Receiving Long-Term Corticosteroid Therapy

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ABSTRACT

Aim: The aim of this study was to evaluate the prevalence, types, and predictors of dermatological changes in patients receiving long-term corticosteroid therapy. **Material and Methods:** This prospective observational study included 120 patients receiving corticosteroids for chronic conditions for a minimum of six months. Data collection involved detailed clinical histories, dermatological examinations conducted at baseline and 3-month intervals, and laboratory investigations to assess systemic effects. The prevalence of dermatological changes was evaluated, and associations with corticosteroid dosage, duration, and systemic markers were analyzed using statistical methods, including chi-square tests, Pearson's correlation, and logistic regression. **Results:** The study revealed a high prevalence of dermatological changes, with skin thinning (60.00%), striae (46.67%), and easy bruising (36.67%) being the most common manifestations. Patients on corticosteroid therapy for ≥12 months showed significantly higher rates of skin thinning (84.21%) compared to those on therapy for ≥6 months (48.78%) ($p < 0.01$). High-dose therapy (≥10 mg/day) was associated with a greater prevalence of dermatological changes, including skin thinning (79.31%) and striae (62.07%) ($p < 0.001$). Laboratory findings demonstrated significant correlations, with low serum cortisol ($r = -0.45$, $p < 0.01$) and hypoalbuminemia ($r = -0.38$, $p < 0.05$) being strongly associated with severe dermatological changes. Logistic regression identified long therapy duration, high dosage, and low cortisol levels as significant predictors of severe dermatological changes. **Conclusion:** This study underscores the high prevalence and dose- and duration-dependent nature of corticosteroid-induced dermatological changes. Proactive monitoring, individualized corticosteroid regimens, and early management are critical to minimizing these adverse effects and improving patient outcomes.

Keywords: Corticosteroids, Dermatological changes, Skin thinning, Striae, Long-term therapy

INTRODUCTION

Corticosteroids are among the most widely prescribed medications for managing a range of chronic conditions, including autoimmune disorders, inflammatory diseases, and respiratory conditions. Their potent anti-inflammatory and immunosuppressive properties make them invaluable in controlling disease progression and improving patient outcomes. However, long-term corticosteroid therapy is often associated with a spectrum of side effects, many of which affect the skin. These dermatological changes not only impact physical appearance but also influence a patient's quality of life and overall compliance with treatment.[1-3]The skin, being one of the most visible organs, often reflects the systemic effects of prolonged corticosteroid use. Common dermatological manifestations include skin thinning, striae, and easy bruising, which occur due to corticosteroids' inhibitory effects on collagen synthesis and dermal integrity. Patients may also develop delayed wound healing, acneiform eruptions, hyperpigmentation, hypopigmentation, and in some cases, hirsutism. These conditions can lead to significant physical discomfort and emotional distress, compounding the challenges of living with chronic disease.[4,5] The pathophysiology of corticosteroid-induced dermatological changes is complex and multifactorial. At a molecular level, corticosteroids alter protein metabolism and reduce fibroblast activity, which leads to weakened structural support in the skin. They also disrupt the balance of melanocyte activity, resulting in pigmentary changes. Furthermore, the suppression of inflammatory pathways impairs normal wound healing and tissue repair mechanisms. The severity and type of dermatological effects are often influenced by factors

such as dosage, duration of therapy, and individual patient characteristics, including age, underlying conditions, and nutritional status.[6] Despite their prevalence, these dermatological side effects are often underrecognized and undertreated in clinical practice. Patients receiving long-term corticosteroid therapy may not always report these issues unless prompted, and healthcare providers may prioritize other systemic complications over cutaneous manifestations. However, early identification and management of these changes are essential to improve patient adherence to treatment and minimize the psychosocial impact of visible skin alterations.[7] The importance of understanding corticosteroid-induced dermatological changes lies in their potential reversibility and prevention with appropriate interventions. Strategies such as dose minimization, alternate-day dosing, and the use of topical corticosteroids or non-corticosteroid alternatives can mitigate these adverse effects. Additionally, educating patients about proper skin care, including hydration and sun protection, can help reduce the severity of skin changes.[8]

MATERIAL AND METHODS

This study was designed as a prospective observational study to assess the dermatological changes in patients receiving long-term corticosteroid therapy. The study was conducted on 120 patients prescribed corticosteroids for chronic conditions.

Study Population

Inclusion Criteria

- Age ≥18 years.
- Patients receiving corticosteroid therapy for ≥6 months for chronic conditions (e.g., autoimmune diseases, chronic obstructive pulmonary disease, inflammatory bowel disease).
- Willingness to provide written informed consent.

Exclusion Criteria

- Patients with pre-existing dermatological disorders unrelated to corticosteroid use.
- Patients receiving other immunosuppressive therapies.
- Patients with acute infections or active dermatological infections at the time of enrollment.

Data Collection

Data collection was conducted systematically to ensure comprehensive evaluation of dermatological changes in patients receiving long-term corticosteroid therapy. Detailed clinical histories were obtained from all participants, including information on the indication for corticosteroid use, dosage, duration, and concurrent medications. Associated medical conditions and comorbidities were also documented to account for potential confounding factors. A thorough dermatological examination was performed at baseline and repeated at 3-month intervals by a qualified dermatologist, focusing on corticosteroid-induced changes such as skin thinning, striae, easy bruising, delayed wound healing, hyperpigmentation, hypopigmentation, acneiform eruptions, and hirsutism. High-resolution photographs of significant dermatological findings were captured for documentation and to allow for comparison over time. Where necessary, skin biopsies were performed to confirm corticosteroid-induced changes. Laboratory investigations, including serum cortisol levels, were conducted to evaluate systemic effects of corticosteroids and correlate these with observed skin changes. All data were recorded in a standardized format to ensure consistency and accuracy.

Outcome Measures

The primary outcome of the study was to determine the prevalence and types of dermatological changes attributable to long-term corticosteroid therapy. Secondary outcomes included identifying correlations between the dosage and duration of corticosteroid use and the severity of dermatological manifestations. Additional outcomes included exploring associations between dermatological changes and systemic side effects or laboratory abnormalities. Data analysis was aimed at identifying predictors of severe dermatological changes, with the ultimate goal of understanding the risk factors and patterns associated with corticosteroid-induced skin alterations.

Data Analysis

Data were compiled and analyzed using SPSS version 16.0. Descriptive statistics were used to summarize baseline characteristics and dermatological findings. The prevalence of specific skin changes was calculated, and associations with dosage and duration of corticosteroid use were analyzed using chi-square tests for categorical variables and Pearson's correlation for continuous variables. Logistic regression was employed to identify predictors of severe dermatological changes.

RESULTS

Demographic and Clinical Characteristics (Table 1)

The study included 120 patients with a mean age of 46.8 years (±12.3), reflecting a middle-aged population predominantly affected by conditions requiring long-term corticosteroid therapy. Gender distribution showed a slight male predominance, with 68 males (56.67%) and 52 females (43.33%). Most participants (68.33%) had been on corticosteroid therapy for six months or more, while 31.67% had been receiving therapy for over a year, underscoring the chronicity of their underlying conditions. Autoimmune diseases were the most common indication for corticosteroid use, reported in 48.33% of patients, followed by chronic pulmonary diseases (33.33%) and inflammatory bowel disease (18.33%). This demographic data highlights the prolonged exposure to corticosteroids in this population, increasing their risk for dermatological side effects.

Prevalence of Dermatological Changes (Table 2)
Dermatological changes were prevalent in patients receiving long-term corticosteroid therapy. The most common finding was skin thinning, observed in 60.00% of patients, which aligns with corticosteroids' known inhibitory effects on collagen synthesis. Striae, present in 46.67%, were another hallmark sign of corticosteroid-induced skin changes. Easy bruising, seen in 36.67% of patients, reflects the fragility of capillaries due to weakened connective tissue. Delayed wound healing affected 23.33% of patients, emphasizing corticosteroids' impact on inflammatory and repair processes. Hyperpigmentation and hypopigmentation were reported in 31.67% and 21.67% of patients, respectively, while acneiform eruptions (28.33%) and hirsutism (15.00%) highlighted the diverse cutaneous side effects of corticosteroid therapy.

Association Between Dermatological Changes and Duration of Corticosteroid Use (Table 3)
A significant association was observed between the duration of corticosteroid use and the prevalence of dermatological changes. Patients receiving corticosteroids for ≥12 months exhibited a markedly higher prevalence of skin thinning (84.21%) compared to those on therapy for ≥6 months (48.78%) ($p < 0.01$). Striae and easy bruising were also significantly more common in the ≥12-month group, with prevalence rates of 78.95% and 68.42%, respectively ($p < 0.001$ and $p < 0.01$). Delayed wound healing was present in 42.11% of the ≥12-month group, compared to 14.63% in the ≥6-month group ($p < 0.05$). These findings indicate a direct relationship between the duration of corticosteroid therapy and the severity of skin changes.

Association Between Dermatological Changes and Dosage of Corticosteroid Therapy (Table 4)
The dosage of corticosteroid therapy also significantly influenced the prevalence of dermatological changes. Patients on high doses (≥10 mg/day) were more likely to exhibit skin thinning (79.31%) compared to those on low doses (<10 mg/day) (34.67%) ($p < 0.001$). Similarly, striae (62.07% vs. 26.67%), easy bruising (48.28% vs. 21.33%), and acneiform eruptions (41.38% vs. 13.33%) were significantly more prevalent in the high-dose group ($p < 0.01$ for striae and acneiform eruptions; $p < 0.05$ for easy bruising). These results underscore the dose-dependent nature of corticosteroid-induced dermatological changes.

Laboratory Findings and Correlation with Dermatological Changes (Table 5)
Laboratory findings revealed significant correlations between systemic markers and dermatological changes. Serum cortisol levels showed a negative correlation ($r = -0.45$, $p < 0.01$), indicating that lower cortisol levels may be linked to more pronounced dermatological side effects. Serum albumin levels, negatively correlated with dermatological changes ($r = -0.38$, $p < 0.05$), suggest that hypoalbuminemia may exacerbate corticosteroid-induced skin thinning and fragility. Hemoglobin levels also demonstrated a negative correlation ($r = -0.41$, $p < 0.01$), possibly reflecting corticosteroids' impact on erythropoiesis and overall tissue health.

Logistic Regression Analysis for Predictors of Severe Dermatological Changes (Table 6)
Logistic regression identified several predictors of severe dermatological changes. Patients on long-term corticosteroid therapy (≥12 months) had 2.80 times higher odds of developing severe skin manifestations (OR: 2.80, 95% CI: 1.70–4.50, $p < 0.01$). High-dose therapy (≥10 mg/day) further increased the risk, with an odds ratio of 3.60 (95% CI: 2.20–5.90, $p < 0.001$). Low serum cortisol levels were also significant predictors, with an odds ratio of 2.10 (95% CI: 1.30–3.40, $p < 0.05$). These findings highlight the cumulative effects of prolonged and high-dose corticosteroid use on skin integrity.

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Number (n)	Percentage (%)
Mean Age (years)	46.8 ± 12.3	-
Gender Distribution		
Male	68	56.67
Female	52	43.33
Duration of Corticosteroid Use		
≥6 months	82	68.33
≥12 months	38	31.67
Indications for Corticosteroid Use		
Autoimmune Diseases	58	48.33
Chronic Pulmonary Diseases	40	33.33
Inflammatory Bowel Disease	22	18.33

Table 2: Prevalence of Dermatological Changes in Patients

Dermatological Change	Number (n)	Percentage (%)
Skin Thinning	72	60.00

Striae	56	46.67
Easy Bruising	44	36.67
Delayed Wound Healing	28	23.33
Hyperpigmentation	38	31.67
Hypopigmentation	26	21.67
Acneiform Eruptions	34	28.33
Hirsutism	18	15.00

Table 3: Association Between Dermatological Changes and Duration of Corticosteroid Use

Dermatological Change	≥6 months (n = 82)	≥12 months (n = 38)	p-value
Skin Thinning	40 (48.78%)	32 (84.21%)	<0.01
Striae	26 (31.71%)	30 (78.95%)	<0.001
Easy Bruising	18 (21.95%)	26 (68.42%)	<0.01
Delayed Wound Healing	12 (14.63%)	16 (42.11%)	<0.05

Table 4: Association Between Dermatological Changes and Dosage of Corticosteroid Therapy

Dermatological Change	Low Dose (<10 mg/day)	High Dose (≥10 mg/day)	p-value
Skin Thinning	26 (34.67%)	46 (79.31%)	<0.001
Striae	20 (26.67%)	36 (62.07%)	<0.01
Easy Bruising	16 (21.33%)	28 (48.28%)	<0.05
Acneiform Eruptions	10 (13.33%)	24 (41.38%)	<0.01

Table 5: Laboratory Findings and Correlation with Dermatological Changes

Parameter	Mean ± SD	Correlation (r)	p-value
Serum Cortisol Levels (µg/dL)	7.8 ± 2.4	-0.45	<0.01
Serum Albumin (g/dL)	3.1 ± 0.6	-0.38	<0.05
Hemoglobin (g/dL)	12.2 ± 1.8	-0.41	<0.01

Table 6: Logistic Regression Analysis for Predictors of Severe Dermatological Changes

Variable	Odds Ratio (95% CI)	p-value
Duration of Corticosteroid Use (≥12 months)	2.80 (1.70–4.50)	<0.01
High Dose Corticosteroid Therapy (≥10 mg/day)	3.60 (2.20–5.90)	<0.001
Low Serum Cortisol Levels	2.10 (1.30–3.40)	<0.05

DISCUSSION

The demographic distribution in this study aligns with findings from Oelzner et al. (2008), who reported a similar age range and gender distribution among patients requiring long-term corticosteroid therapy for autoimmune diseases. The male predominance observed in this study may reflect a slightly higher prevalence of chronic pulmonary conditions in males. Autoimmune diseases as the most common indication for corticosteroid use corroborates the findings by Oelzner et al., emphasizing the reliance on corticosteroids for managing chronic inflammatory conditions. Chronic corticosteroid therapy in this middle-aged population highlights the necessity for vigilant monitoring to mitigate dermatological and systemic side effects.[9] The high prevalence of dermatological changes, particularly skin thinning (60.00%), is consistent with observations by Davis et al. (2010), who documented thinning in 62% of corticosteroid users. The effects of corticosteroids on collagen and dermal integrity explain this finding. Striae and easy bruising were also reported in similar proportions, further validating corticosteroids' impact on skin fragility. Acneiform eruptions and hirsutism, observed in nearly 30% and 15% of this study's participants, respectively, mirror the findings by Davis et al., which attributed these effects to corticosteroid-induced hormonal changes. These results reinforce the necessity of balancing therapeutic benefits with the risk of adverse effects.[10]The significant increase in skin thinning (84.21%) and striae (78.95%) in patients receiving corticosteroids for ≥12 months compared to ≥6 months is supported by findings from Werth et al. (2009). Their study demonstrated a similar dose-time relationship, emphasizing that prolonged corticosteroid use exacerbates the risk of dermatological complications. The higher prevalence of delayed wound healing in the longer-duration group also corroborates Werth et al., highlighting corticosteroids' suppressive effects on tissue repair mechanisms. These findings emphasize the importance of monitoring dermatological changes in patients on extended corticosteroid regimens.[11] This study's findings that high-dose corticosteroid therapy (≥10 mg/day) significantly increases the prevalence of skin thinning, striae, and acneiform eruptions align with observations by Hengge et al. (2006). Their research highlighted a dose-dependent risk of dermatological side effects, attributing this to corticosteroids' potent anti-inflammatory and

catabolic effects on skin structure. Striae, which were more pronounced in the high-dose group, reflect corticosteroids' impact on elastic fiber breakdown. These dose-related findings underscore the importance of using the lowest effective dose to minimize adverse effects.[12] The negative correlation between serum cortisol levels and dermatological changes observed in this study is consistent with findings by Connors et al. (2011). Their work identified a similar inverse relationship, linking reduced cortisol levels with exacerbated skin thinning and delayed wound healing due to prolonged suppression of the hypothalamic-pituitary-adrenal axis. Additionally, the correlation between hypoalbuminemia and increased skin fragility reinforces the role of nutritional status in modulating corticosteroid side effects. These findings emphasize the importance of regular biochemical monitoring to identify and address exacerbating factors.[13]The logistic regression analysis identified prolonged duration and high dosage of corticosteroid therapy as strong predictors of severe skin changes, consistent with the findings of Cushing et al. (2009). Their study highlighted the cumulative effects of corticosteroids on skin integrity and the increased risk of complications with higher cumulative doses. The association with low serum cortisol levels further emphasizes the systemic impact of corticosteroids on both dermatological and endocrine functions. These predictors highlight the need for individualized corticosteroid regimens and proactive management to minimize adverse effects.[14]

CONCLUSION

This study highlights the significant prevalence of dermatological changes in patients receiving long-term corticosteroid therapy, with skin thinning, striae, and easy bruising being the most common manifestations. The findings demonstrate a clear dose- and duration-dependent relationship, emphasizing the need for careful monitoring and individualized corticosteroid regimens. Laboratory correlations, such as low serum cortisol and albumin levels, further underscore the systemic impact of corticosteroids on skin integrity. Early identification and proactive management of these dermatological side effects are essential to improving patient quality of life and ensuring adherence to therapy.

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