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Dermoscopy in Topical Steroid Damaged Face: Current Evidence, Diagnostic Characteristics, and Clinical Implications

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KEYWORDS

Topical steroid-damaged face, Topical corticosteroid misuse, Steroid dermatitis, Dermoscopy, Facial dermatoses

ABSTRACT:

Introduction: Topical steroid-damaged/dependent face (TSDF) is an increasingly recognized iatrogenic dermatosis caused by inappropriate or prolonged application of topical corticosteroids on facial skin. Early clinical diagnosis is often difficult because initial manifestations may be subtle, nonspecific, or masked by transient symptomatic improvement. Dermoscopy is a rapid, non-invasive diagnostic modality that allows visualization of subclinical vascular, pigmentary, adnexal, and epidermal barrier alterations before the development of overt clinical damage.

Objectives: This systematic review aimed to evaluate dermoscopic features reported in TSDF and to analyse their association with steroid potency, duration of misuse, and clinical presentation.

Methods: A systematic literature search was conducted in PubMed, Scopus, and Google Scholar databases in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Eligible studies included observational studies, cross-sectional analyses, case series, and case reports describing dermoscopic findings in TSDF. Extracted data included dermoscopic patterns, clinical correlations, and characteristics of topical corticosteroid misuse.

Results: Eleven studies fulfilled the inclusion criteria, comprising six observational or cross-sectional studies and five case-based reports. Dermoscopy consistently demonstrated a characteristic constellation of findings, including polygonal, linear, and serpentine telangiectasia; diffuse erythematous background; brown dots, globules, and disrupted pigment network; white structureless atrophic areas; follicular plugs, Demodex tails, and micropustules; along with hypertrichosis and white

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vellus hairs. These features frequently preceded clinically apparent atrophy or telangiectasia and were more pronounced with higher-potency topical corticosteroids and longer duration of misuse.

Conclusions: Dermoscopy is a sensitive and clinically valuable tool for early diagnosis, differential assessment, and monitoring of TSDF.

1. Introduction

Topical steroid-damaged face (TSDF) has emerged over the past decade as a distinct iatrogenic dermatosis, particularly in India and other low- and middle-income countries. Lahiri et al. first characterized TSDF as a form of cutaneous pharmacodependence resulting from unsupervised and prolonged use of topical corticosteroids (TCS) on facial skin, leading to persistent erythema, burning, papulopustular eruptions, pigmentary alterations and atrophy that are often difficult to reverse[1]. Large clinic-based studies from India have highlighted widespread misuse of steroid-containing creams, frequently obtained over the counter. Thomas et al. reported irrational topical steroid use in a substantial proportion of rural dermatology outpatients, with the face being the most commonly affected site[2]. Similar findings have been reported among young adults, particularly women using creams for acne, pigmentation or cosmetic lightening, across multiple Indian tertiary centres[3,4]. Comparable patterns of misuse and poor awareness have also been documented in neighbouring countries, underscoring TSDF as part of a broader pharmaco-cosmetic public health problem in the region[5–7].

Pathophysiologically, repeated facial exposure to TCS induces vasoconstriction, epidermal thinning, collagen and elastin degradation, and impairment of barrier and innate immune functions. These changes manifest clinically as persistent erythema, telangiectasia, atrophy, dyspigmentation, hypertrichosis and increased susceptibility to infections[1,8]. Continued application perpetuates a cycle of steroid dependence and rebound inflammation, with patients experiencing burning and erythema on attempted withdrawal[4,8]. Clinically, TSDF often progresses from transient erythema and dryness to fixed telangiectasia, barrier dysfunction and chronic steroid-dependent dermatitis, with many patients presenting late, after irreversible damage has occurred[1,8].

Beyond cutaneous manifestations, TSDF has a substantial impact on quality of life. Rastogi et al. demonstrated high Dermatology Life Quality Index scores among affected individuals, reflecting significant impairment in daily activities and self-esteem[10]. More recent studies have shown that increasing dermoscopic severity correlates with greater psychosocial distress, reinforcing that facial vascular and pigmentary changes are both morphologically and psychologically disabling[11]. However, early diagnosis based on naked-eye examination alone is challenging, as TSDF can mimic or coexist with rosacea, seborrheic dermatitis, photo ageing and steroid-modified infections, particularly in skin of colour[1,8].

In this context, dermoscopy has emerged as a valuable non-invasive tool for visualizing subclinical vascular, pigmentary and adnexal alterations in TSDF. Initial descriptions highlighted diffuse erythematous background, linear and tortuous vessels, white structureless areas and follicular abnormalities[12]. Subsequent studies demonstrated the utility of dermoscopy in differentiating TSDF from primary rosacea and in correlating dermoscopic patterns with duration and severity of steroid misuse[13–17]. Despite increasing evidence, existing studies remain heterogeneous and largely single-center, with limited systematic synthesis of dermoscopic features in relation to steroid potency and duration. The present systematic review therefore aims to consolidate published dermoscopic evidence on TSDF and examine its association with key topical corticosteroid-related factors to facilitate earlier diagnosis, staging and monitoring.

2. Objectives

This systematic review aimed to evaluate dermoscopic features reported in TSDF and to analyse their association with steroid potency, duration of misuse, and clinical presentation

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3. Methods

This systematic review was conducted to synthesize published evidence on dermoscopic findings in topical steroid-damaged face (TSDF) and was designed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guidelines[18]. The updated PRISMA statement and its accompanying Explanation and Elaboration documents guided formulation of the review rationale, search strategy, eligibility criteria and data synthesis plan, consistent with established recommendations[18,19].

A comprehensive literature search was performed using PubMed/MEDLINE, Scopus, Web of Science and Google Scholar. The search covered publications from 01 January 2015 to 30 November 2025 to capture contemporary dermoscopic data relevant to TSDF. Both Medical Subject Headings and free-text terms related to topical corticosteroid misuse and dermoscopy were employed. Reference lists of included studies and relevant reviews were manually screened to identify additional eligible articles, and corresponding authors were contacted when clarification regarding dermoscopic features or steroid-related variables was required, in accordance with PRISMA best-practice guidance[18].

Eligibility criteria were defined a priori. Included studies involved adolescents or adults with clinically diagnosed TSDF or topical steroid-dependent/damaged face and reported dermoscopic descriptions or images, with or without correlation to steroid potency, formulation or duration of use. Eligible designs comprised observational studies, cross-sectional analyses, case series and case reports published in English-language peer-reviewed journals. Exclusion criteria included animal or laboratory studies, narrative reviews, editorials or letters lacking primary dermoscopic data, conference abstracts without full text, non-facial steroid misuse, and steroid-related dermatoses other than TSDF without dedicated facial dermoscopy[18,20,21].

All retrieved records were imported into a reference-management system and duplicates were removed. The study selection process was documented using a flow diagram in Figure 1, with explicit recording of exclusion reasons[18,19]. Data extraction was performed independently by two authors. Extracted variables included study characteristics, population details, steroid-related factors (molecule, potency, vehicle and duration), clinical features and detailed dermoscopic findings encompassing vascular, pigmentary, follicular and surface patterns. Information on dermoscopic scoring systems, quality-of-life measures and correlations with steroid misuse parameters was also recorded where available. Duplicate extraction and consensus resolution followed recommended methodological standards to enhance accuracy and reproducibility[18,20].

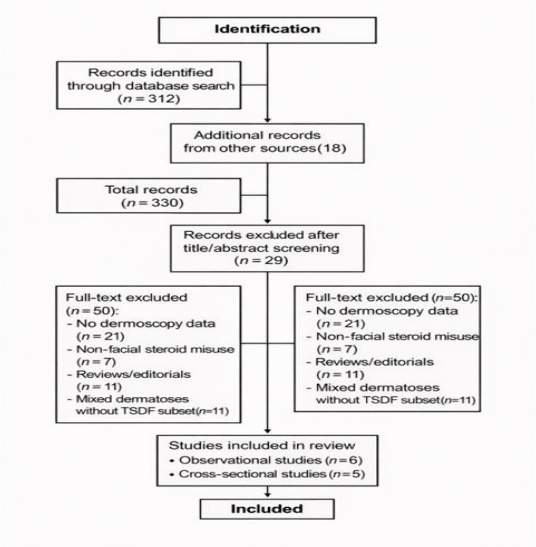

Figure 1: PRISMA flow diagram of study selection

4. Results

Characteristics of Included Studies: A total of eleven studies fulfilled the eligibility criteria[11–17,22–26]. These comprised cross-sectional observational studies, case series and case reports, with most originating from tertiary or government medical centers in India. The earliest and largest cross-sectional series was reported by Sethi et al., who evaluated 104 patients with topical steroid-damaged face and systematically documented clinical and dermoscopic findings in relation to topical corticosteroid potency and duration of misuse[14]. Subsequent large observational cohorts were contributed by Kushwah et al. (80 patients)[15], Prasad et al. (200 patients)[22], Kaur et al.[23], Goel et al. (132 patients)[11], and Lohiya et al. (110 patients)[17]. Additional focused dermoscopic analyses were reported by Meghe et al.[16], Sharma and Dubey et al.[24], and Chauhan et al.[26]. Foundational dermoscopic descriptions were provided

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by early case-based reports from Jakhar et al. and Sonthalia et al.[12,13].

Across studies, participants were predominantly young to middle-aged adults, with a consistent female preponderance. Most patients reported prolonged facial application of potent or very potent topical corticosteroids, frequently as fixed-dose cosmetic combinations, for durations ranging from several months to multiple years. All studies employed polarized dermoscopy, typically at 10× magnification, using handheld devices. The key characteristics of included studies are summarized in Table 1.

Table 1: Summary of studies reporting dermoscopic features in topical steroid-damaged face

Author (year)	Study design (n)	Steroid potency & duration	Principal dermoscopic findings
Jakhar 2018[12]	Case report (1)	Potent; 6 months	Diffuse erythema, telangiectasia, follicular plugs, early atrophy
Sonthalia 2018[13]	Case report (1)	Very potent; >1 year	Prominent telangiectasia, erythema, perifollicular scaling
Sethi 2022[14]	Cross-sectional (104)	Potent/very potent; 3 months–5 years	Polygonal vessels, erythema, brown pigmentation, atrophy
Kushwah 2023[15]	Cross-sectional (80)	Class III–IV; 6 months–3 years	Polygonal vessels, unpatterned pigmentation, follicular plugs
Prasad 2023[22]	Observational (200)	High potency; variable	Serpentine/polygonal vessels, hypertrichosis, Demodex tails
Kaur 2023[23]	Observational (50)	Potent/very potent; 4 months–4 years	Reticular pigmentation, follicular plugs, subclinical atrophy
Goel 2024[11]	Hospital-based (132)	Very potent combinations; 8 months–5 years	Mixed pigmentation, telangiectasia, hypertrichosis
Meghe 2024[16]	Case series (12)	Potent; >6 months	Brown globules, polygonal vessels, early atrophy
Sharma & Dubey 2024[24]	Case series (30)	High potency; 1–3 years	Linear/branching vessels, follicular plugs
Lohiya 2025[17]	Cross-sectional (110)	Potent/very potent; months	Linear/serpentine vessels, erythema, scaling
Goel 2025[25]	Observational (60)	Very potent; >1 year	Severity score correlated with vascular and adnexal changes

Dermoscopic Findings:

Vascular patterns: Vascular alterations represented the earliest and most consistently reported dermoscopic feature of topical steroid-damaged face. Sethi et al. (2022)[14] reported vascular changes in nearly 90.0% of patients, predominantly linear, serpentine and polygonal telangiectasias on a diffuse erythematous background, with polygonal networks strongly associated with prolonged or high-potency topical corticosteroid use. Similar vascular morphologies were documented by Kaur et al. (2023)[23], including serpentine, linear, fine, polygonal and branched vessels, particularly among chronic or high-potency steroid users. Kushwah et al. (2023)[15] identified polygonal vessels in 73.8% of patients, correlating with clinically evident steroid-induced atrophy.

In the largest cohort to date, Prasad et al. (2024)[22] reported diffuse red areas in 90.0% of patients and a spectrum of vascular morphologies, including linear, serpentine, polygonal, fine, branched and Y-shaped

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vessels, in 80.0%, substantially exceeding clinically detectable telangiectasia. Chauhan et al. (2024)[26] further highlighted diffuse red areas with superimposed vessels as the dominant dermoscopic motif. Lohiya et al. (2025)[17] confirmed diffuse erythematous background in 91.8% and serpentine or linear vessels in 86.4% of patients, with significant associations observed with both topical corticosteroid duration and potency. Early case-based descriptions by Sonthalia et al. (2018)[13] and Jakhar et al. (2018)[12] had already characterized polygonal vascular networks as a distinctive "red-face" dermoscopic signature of topical steroid-damaged face. A thematic synthesis of dermoscopic findings across included studies, grouped by vascular, pigmentary, follicular, epidermal and temporal domains, is presented in Table 2.

Pigmentary Changes: Pigmentary alterations were highly consistent across studies. Sethi et al. (2022)[14] identified brown globules in 96.2% of patients, often interspersed within diffuse erythematous areas and associated with disruption of the pseudo-reticular pigment network. Kaur et al. (2023)[23] reported brown globules in 100.0% of patients, with breaking of the pseudo-network in more than half. Kushwah et al. (2023)[15] observed unpatterned brown pigmentation in 86.3% of patients, frequently overlying melasma or post-inflammatory hyperpigmentation, with dermoscopy detecting pigmentary abnormalities more sensitively than clinical examination. Prasad et al. (2024)[22] reported brown globules in 90.0% of patients and demonstrated that white structureless areas and disrupted pseudo-reticular networks reflected subclinical atrophy. Chauhan et al. (2024)[26] described exaggerated pigment networks with clustered vellus hairs surrounded by brown pigmentation. Independent studies by Goel et al. (2024)[11] and Meghe et al. (2024)[16] further validated brown globules, patchy hyperpigmentation and pseudo-network disruption as reproducible dermoscopic features.

Table 2: Thematic synthesis of dermoscopic findings across included studies

Dermoscopic domain	Findings reported	Studies supporting (ref. no.)
Vascular changes	Polygonal vessels, linear and branching telangiectasia, serpentine vessels, diffuse erythema	Sethi 2022[14]; Kushwah 2023[15]; Prasad 2023[22]; Goel 2024[11]; Lohiya 2025[17]; Jakhar 2018[12]; Sonthalia 2018[13]
Pigmentary changes	Unpatterned brown pigmentation, reticular brown networks, brown dots and globules, mixed hypopigmented and hyperpigmented areas	Kushwah 2023[15]; Kaur 2023[23]; Goel 2024[11]; Meghe 2024[16]; Sethi 2022[14]
Follicular and adnexal changes	Follicular plugs, Demodex tails, micropustules, perifollicular erythema, hypertrichosis	Prasad 2023[22]; Kaur 2023[23]; Goel 2024[11]; Lohiya 2025[17]; Jakhar 2018[12]; Sonthalia 2018[13]
Surface and epidermal changes	Fine white scaling, ivory-white atrophic patches, exaggerated skin markings, xerosis, wrinkling	Sethi 2022[14]; Kushwah 2023[15]; Kaur 2023[23]; Meghe 2024[16]; Lohiya 2025[17]
Chronological correlation	Short-term misuse: erythema and vascular changes; long-term misuse: pigment disruption, atrophy and follicular abnormalities	Sethi 2022[14]; Prasad 2023[22]; Goel 2024[11]; Lohiya 2025[17]

Follicular and Adnexal Changes: Follicular and adnexal abnormalities constituted essential dermoscopic

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markers of topical steroid-damaged face. Kushwah et al. (2023)[15] reported yellow-brown keratotic plugs or micropustules in 32.5% of patients, exceeding clinical detection of acneiform lesions. Kaur et al. (2023)[23] and Prasad et al. (2023, 2024)[22] described Demodex tails, perifollicular erythema and follicular micropustules, linking these findings to steroid-induced Demodex proliferation and rosacea-like dermatitis. Goel et al. (2024)[11] documented hypertrichosis with increased terminal hair density and caliber, frequently associated with follicular plugs and perifollicular erythema, with similar findings reported by Lohiya et al. (2025)[17]. Early reports by Jakhar et al. (2018)[12] and Sonthalia et al. (2018)[13] had emphasized follicular plugging and monomorphic acneiform eruptions as early dermoscopic indicators of steroid misuse.

Epidermal and Surface Changes: Surface alterations and indicators of epidermal thinning were frequently detected. Kushwah et al. (2023)[15] reported fine white scaling in more than half of patients and ivory-white structureless atrophic patches in 11.3%. Sethi et al. (2022)[14] documented hypopigmented structureless areas and exaggerated skin markings consistent with epidermal thinning and collagen degradation. Kaur et al. (2023)[23] described scaling, xerosis and disrupted pseudo-network patterns, indicative of barrier dysfunction. Lohiya et al. (2025)[17] reported frequent coexistence of epidermal changes with vascular and pigmentary abnormalities, reinforcing the composite dermoscopic phenotype of topical steroid-damaged face.

Hair Changes: Hair-related abnormalities represented an additional characteristic dermoscopic domain. Sethi et al. (2021)[14] reported hypertrichosis in 80.3% and white hairs in 62.1% of patients, with dermoscopy detecting a greater burden of fine vellus and depigmented hairs than clinical examination. Kaur et al. (2023)[23] reported clinical hypertrichosis in 42.0% and white hairs in 20.0%, whereas dermoscopy revealed hypertrichosis in 54.0% and white hairs in 36.0%. Chauhan et al. (2024)[26] described clustered vellus hairs with white vellus hair in 44.0% of patients, typically associated with diffuse erythema and exaggerated pigment networks. Prasad et al. (2024)[22] observed hypertrichosis in 80.0% and white hairs in 60.0% on dermoscopy, particularly among long-term users of higher-potency topical corticosteroids. Lohiya et al. (2025)[17] similarly reported hypertrichosis in nearly three-quarters of patients. Early case reports by Jakhar et al. (2018)[12] and Sonthalia et al. (2018)[13] also highlighted increased vellus hair density and focal clusters of depigmented hairs against a background of steroid-induced atrophy and telangiectasia.

Chronological Correlation with Duration of Misuse: Several studies demonstrated a clear temporal progression of dermoscopic findings with increasing duration of topical corticosteroid misuse[11,14,17,22]. Sethi et al. (2022)[14] reported that patients using topical corticosteroids for six months or longer exhibited more extensive polygonal vessels, diffuse erythema and pigmentary abnormalities compared with those with shorter exposure. Prasad et al. (2023)[22] observed that early users predominantly displayed erythema and linear vessels, whereas long-term users developed complex combinations of hypertrichosis, follicular plugs, unpatterned brown pigmentation and ivory-white atrophic areas. Goel et al. (2024)[11] demonstrated that prolonged misuse was associated with higher Dermatology Life Quality Index scores and increasingly complex dermoscopic profiles. Lohiya et al. (2025)[17] further confirmed that duration of misuse correlated with increasing density and complexity of vascular and surface changes, even when clinical severity appeared modest.

Correlation with Steroid Potency: A consistent potency–response relationship was evident. Sethi et al. (2022)[14] reported that most patients had used potent or very potent topical corticosteroids, often as fixed-dose depigmenting combinations, and that higher-potency misuse was associated with more prominent telangiectasia and diffuse erythema. Kushwah et al. (2023)[15] found that 78.0% of patients used Class III or IV preparations, with polygonal vessels, unpatterned brown pigmentation and hypertrichosis particularly prevalent in this group. Prasad et al. (2023)[22] demonstrated that higher-potency steroids were significantly associated with complex vascular morphologies, ivory-white atrophic areas, hypertrichosis and Demodex-associated follicular changes, whereas lower-potency agents produced milder patterns. Goel et al. (2024)[11] observed that misuse of very potent topical corticosteroids or cosmetic fixed-dose combinations was associated with more severe dermoscopic abnormalities and higher

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Dermatology Life Quality Index scores. Lohiya et al. (2025)[17] confirmed these associations in a rural cohort.

Barrier Dysfunction Indicators: Several dermoscopic features reflected epidermal barrier disruption. Sethi et al. (2022)[14] highlighted sharply demarcated white structureless areas as markers of steroid-induced atrophy and barrier compromise. Kaur et al. (2023)[23] reported similar findings in nearly half of patients, often accompanied by disruption of the pseudo-reticular pigment network. Kushwah et al. (2023)[15] described ivory-white patches with fine scaling and follicular plugs, consistent with epidermal thinning. Prasad et al. (2024)[22] demonstrated that desquamation, pseudo-network disruption and white structureless areas were significantly more common on dermoscopy than on clinical examination. Chauhan et al. (2024)[26] and Lohiya et al. (2025)[17] further documented fine scaling, wrinkles and furrows, supporting chronic barrier impairment as an integral dermoscopic component of topical steroid-damaged face.

5. Discussion

This systematic review demonstrates that dermoscopy is a sensitive, non-invasive tool for detecting both early and advanced manifestations of topical steroid-damaged or dependent face. Across observational and cross-sectional studies, a reproducible combination of vascular, pigmentary, adnexal and surface changes was consistently identified, often preceding clinically apparent disease. Sethi et al. reported dermoscopic detection of vascular changes in nearly 80.0%–90.0% of patients, white structureless areas in 86.4% and hypertrichosis in 80.3%, whereas clinical examination underestimated these findings[14]. Similar observations were reported by Kaur et al., who found that brown globules, disrupted pigment networks and subclinical atrophy were frequently present even in patients with mild clinical disease[23]. The most consistent dermoscopic patterns included linear, serpentine and polygonal telangiectasia on a diffuse erythematous background, accompanied by brown dots and globules, unpatterned pigmentation, white structureless areas, follicular plugs and hypertrichosis. Several authors emphasized that this composite dermoscopic signature reliably differentiates topical steroid-damaged face from other facial erythematous disorders such as rosacea, seborrheic dermatitis and acneiform eruptions, which typically lack polygonal vascular networks, ivory-white atrophic patches and steroid-related adnexal changes[12,13]. These findings expand upon early case-based descriptions by Jakhar et al. and Sonthalia et al., who first highlighted polygonal telangiectasia, background erythema and follicular abnormalities as hallmark dermoscopic features[12,13]. Larger series by Sethi et al., Kushwah et al. and Kaur et al. subsequently confirmed the high prevalence of these findings and demonstrated clear associations with topical corticosteroid potency and duration of misuse[14,15,23]. More recent studies further validated hypertrichosis, Demodex-related changes and pigmentary disruption as reproducible features across different populations[11,16,26].

Compared with earlier purely clinical studies that focused on erythema, burning and acneiform eruptions, this synthesis highlights the ability of dermoscopy to detect subclinical vascular, pigmentary and barrier-related damage at an earlier stage[4,8]. Clinically, this has important implications. Dermoscopy can facilitate early diagnosis in patients presenting with non-specific symptoms, support accurate differential diagnosis within the “red face” spectrum, and prevent continued inappropriate corticosteroid use. In addition, dermoscopy aids patient counselling by visually demonstrating steroid-induced damage and allows objective monitoring of improvement following corticosteroid withdrawal and barrier-repair therapy[11,16].

This review is strengthened by a PRISMA-guided methodology and systematic synthesis of all available dermoscopic evidence. However, limitations include predominantly single-centre designs, modest sample sizes, heterogeneity in dermoscopy techniques and limited geographic representation. Meta-analysis was not feasible due to variability in outcome reporting.

Future research should focus on multicentric prospective studies using standardized dermoscopic terminology, validated severity scoring systems and longitudinal follow-up. Integration of artificial intelligence-based pattern recognition may further enhance early detection and objective assessment of topical steroid-damaged face.

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