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Original Article

Topical steroid damaged skin: A clinico-epidemiological and dermatological study

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Abstract

Objective To evaluate patients clinically diagnosed as having topical steroid damaged skin clinically as well as by dermoscopy. To tabulate the common side effects observed, source and potency of the steroid used.

Methods A thorough history, clinical evaluation, photography and dermoscopy of lesions performed. Details entered in a structured 14 point questionnaire.

Results 189 patients were studied. Common diagnoses which led to steroid abuse were dermatophytosis (40.2%), pigmentary abnormalities, (30.1%) and acne scars (12.1%). Dermatologists (51.2%) and pharmacists (21.2%) were the foremost prescribers; The average duration of use was 2 weeks to 2 years. The common steroids abused were betamethasone (34%), mometasone (28%), clobetasol and halobetasol derivatives. Common side effects included erythema, hypopigmentation, tinea incognito, striae, atrophy and visible veins. White to translucent hairs admixed with the normal pigmented vellus facial hair was a novel dermatoscopic observation. Early changes of TSDS in users of less than four weeks were found to be erythema and hypopigmentation which on dermatoscopy showed loss of rete pigmentary network, tortuous dilated vessels with brown clods and white to pink structureless zones.

Conclusion Topical steroid damaged skin is a common dermatological concern. Dermoscopy can be used to detect early steroid induced changes to prevent its further unmonitored use and side effects along with creating awareness in general population about potential harm of indiscriminate use.

Key words
Topical steroid, adverse effect, dermoscopy, potency, abuse, erythema, white hair.

Introduction

The discovery of topical steroids in 1952 by Sulzberger and Witten changed the timeline of Dermatology forever.[1] Topical steroid industry is booming with over 2500 steroid preparations including fairness creams, antifungal and antibiotic creams that often come with added steroids and are available as over the counter (OTC) products in many countries including India.[2] Owing to their potent anti-inflammatory, anti-proliferative, immunosuppressive, anti-pruritic and atrophogenic effect on the skin, Topical steroids have become the most commonly used drug for various papulosquamous, inflammatory, and immunologic disorders in dermatology.[3] In addition to dermatologists, topical steroids are also often suggested by other specialists, general practitioners, relatives, neighbours or quacks. Adverse effects like acne, erythema, perioral dermatitis, pseudo stellate scars, hirsuitism, steroid induced rosacea, telangiectasia, epidermal atrophy invariably occur on continued

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use.[4] However early subtle changes of steroid damage is not visible with naked eye. This warrants the need for a strong awareness among dermatologists, other doctors to put a check and devise clinical methods and gain expertise to detect early topical steroid induced changes.

Dermatoscopy or epiluminence microscopy is being increasingly practiced as a simple, cost effective, non-invasive, diagnostic technique that detects clinical patterns of skin lesions and to visualize subsurface skin structures not normally visible to the unaided eye. Widely used in increasing the diagnostic accuracy of pigmented lesions, its use has been described in single case reports in tinea incognito and topical steroid induced rosacea.[5-6] There is no large-scale available data on the dermatoscopic findings of early or late topical steroid damaged skin. Because topical steroid abuse is rampant in our country it is important to fill some of these gaps in the data.

Methods

This was a prospective, open labelled study carried out for a period of 15 months, after obtaining institutional ethical committee clearance, and informed consent from the study patients. The study was conducted in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Patients attending Dermatology OPD between September 2015 to January 2017 were evaluated for topical steroid induced cutaneous damage.

Patients aged 18 years and above, with history of topical steroid use and clinical findings compatible with topical steroid damaged skin (TSDS), or those that had unwarranted topical steroid use of more than 2 weeks were included. Patients not consenting for the study or photography, and those with systemic hypercortisolism and on systemic steroids were excluded.

There were several objectives to the present study. The first objective was to clinically evaluate patients who are suspected to have developed topical steroid related side effects. The second objective was to enumerate the common topical steroid preparations used by patients. Lastly, we sought to detect and determine the extent of subtle as well as overt steroid induced skin damage using dermatoscopy.

Patient details were collected with the help of a structured 14 point questionnaire which was filled by the principal investigator. Detailed history was taken pertaining to the steroid used and duration of application. Clinical and dermatoscopic evaluation with photography were performed. Two dermoscopic images were taken from each patient using a manual dermoscope (DermLite DL3×10; 3 Gen) equipped with a camera (Coolpix 4500; Nikon). All pictures were evaluated by two of the authors (S.R, S. P.) in consensus for the presence of specific morphological patterns. All dermoscopic (descriptive and metaphoric) terms were standardized adhering to results of Standardization of terminology by the third consensus conference of the International Society of Dermoscopy.[7] Patients and accompanying persons were educated regarding the side effects of steroid abuse using patient education sheets. Statistical analysis SSPS software was used for analysis. Continuous variables were compared using the Chi-square test. Significance levels P less than 0.005.

Results

This study included 189 patients out of which 107 were females (56.61%) and 82 were males

(43.39). Majority belonged to 31-40 years' age group, followed by 21-30 years. The most common diagnosis for steroid application in the descending order were dermatophytosis (40.2%), pigmentary abnormalities like melasma, (30.1%) acne (12.1%), psoriasis, lichen planus, dermatitis (11%), and for general fairness (6%) **(Table 1)**.

Most of the patients were educated (78%). Combination topical steroids along with antibacterial, antifungal or depigmenting agents were mostly used over single topical steroid creams. Dermatologists (51.2%) were the foremost prescribers, followed by pharmacists (21.2%), general physicians (16.2%), beauticians, relatives, friends and other doctors. The average duration of application ranged from 2 weeks to 2 years. 78% patients gave history of continuous usage over intermittent application. Multiple side effects were noted in many patients. In 47 cases (24.87%), changes were observed within 4 weeks of use in the form of clinically apparent erythema and mild hypopigmentation. Out of these 47, 25 patients had late onset side effects too. Cream Base was preferred by 86.2% over lotion and ointment base. The most common steroid abused was betamethasone (34%) followed by mometasone (28%), clobetasol and halobetasol derivatives **(Table 2)**.

Table 1 Clinical indications for topical steroid use.

S.No	*Indication*	*n (%age)*
1	Dermatophytosis	76/189 (40.2%)
2	Pigmetaryabormalities	57/189 (30.1%)
3	Acne/ acne scars	23/189 (12.1%)
4	Dermatitis/ Lichen planus/ Psoriasis	21/189 (11%)
5	Fairness cream	12/189 (6%)

Table 2 Potency of topical steroid used.

S.No	*Steroids*	*n (%age)*
1	Betamethasone valerate	64 (34%)
2	Mometasone furoate	53 (28%)
3	Halobetasol propionate	27 (14%)
4	Clobetasol propionate	23 (12%)
5	Others	23 (12%)

Many patients had more than one side effect and the common side effects noted were erythema, acneiform eruptions **(Figure 1a,1b)** hypopigmentary changes, striae, atrophy and visible veins **(Figure 1c)**, dermatophytoses including tinea incognito **(Figure 1d)**, telangiectasia, ochronosis (due to hydroquinone content of triple combination creams containing retinoids and topical steroid too), acneform

Figure 1 a) Erythema, pigmentation, hirsuitism b) Acneiform eruptions with pustules c) Atrophy with broad striae lividae in axilla and anterior chest wall d) Tinea incognito with erythema and telangiectasia.

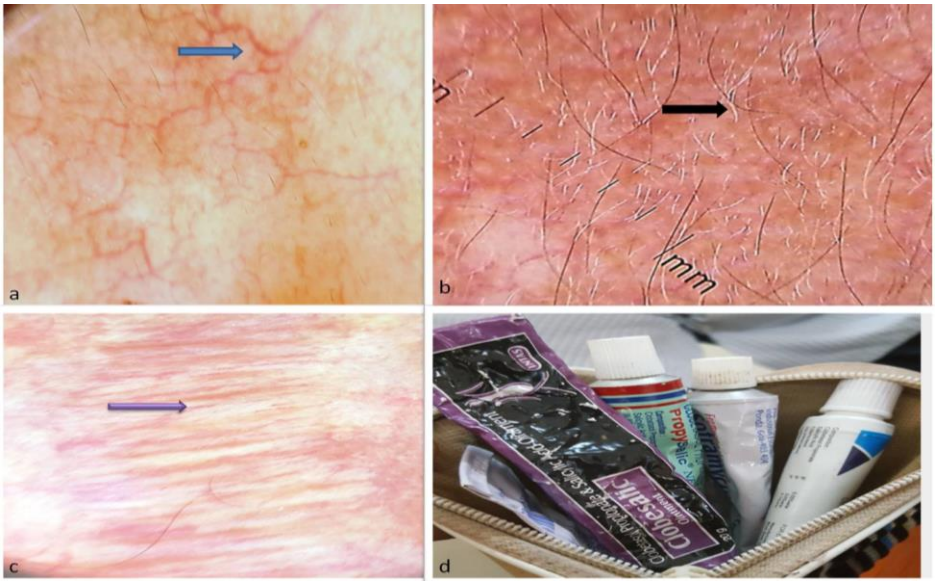

Figure 2 a) Arborizing telangiectasia on dermoscopy b) White facial hair on dermoscopy c) Broad striae lividae on dermoscopy d) The 'steroid pouch' phenomenon.

eruptions and pustules **(Figure 1b)**, hirsutism and hypertrichosis, facial white hair, scaling, steroid induced rosacea and post laser erythema.

Dermatoscopic findings was performed in 170 patients excluding 19 who had genital lesions, and there were overlapping dermatoscopic observations. The commonest finding was fine and arborizing telangiectasia seen as multiple tortous linear and branched vessels in a background of erythema, mostly over the face (78%) **(Figure 2a;** denoted by blue arrow**)**. Red dilated, tortuous or polygonal interconnected vessels with white dots depicting follicular plugging were observed in steroid induced rosacea on face. Follicular plugging on dermatoscopy was seen as white dots in facial lesions of 3 patients out of 5 suspected steroid induced rosacea. In contrast the lesions over the lower extremities showed features of perilesional hypopigmentation and atrophy as evidenced by structureless white zones around normal to pigmented skin with linear vessels on dermatoscopy. In lesions over the groin and periungum, features of hypopigmentation and striae with atrophy were visualized as structureless ivory white zones with branching blue vessels and curved lines in a parallel wavy pattern respectively (**Figure 2c**; denoted by purple arrow) In patients who had steroid induced acneform eruption with small pustules, dermatoscopy was helpful in delineating subclinical pustules in the form of white clods and radial lines with central dots displaying a starburst appearance. Hirsutism and hypertrichosis in females was a common observation in most facial lesions mainly over the upper lip and chin. White to translucent hair seen as short, fine white hair admixed with the normal pigmented hair was a novel dermatoscopic observation seen in 8 women (**Figure 2b**; denoted by black arrow). Few white hairs were visible with naked eye too. This was not present on the face of 10 random age matched women who were not using topical steroids. Two patients who used topical steroids as a part of Kligman formula along with hydroquinone and retinoids showed features of ochronosis with globules and curvilinear masses of dark brown pigmentation arranged in a worm like pattern.

Clinical and dermatoscopic findings are tabulated in **Table 3**.

Table 3

Clinical findings	*No. of Patients*	*Dermatoscopic findings (metaphoric term)*	*Descriptive term*	*No. of Patients*
Striae rubrae and thinning	31	linear to wavy streaks occasionally parallel to each other	Curved Lines in a parallel and wavy pattern	31
Erythema and telangiectasia	25	Fine linear arborizing telangiectasia	Vessel pattern- Reticular and branched lines	25
Erythema and hypopigmentation (early steroid use)	22	Loss of normal rete pigmentary network with reddish white areas	Brown Clods and skin colored to white circles. White structureless zones Pink structureless zones	22 11 16 9
Perilesional hypopigmentation, atrophy	35	White structureless globules with vessels and visible veins	Structureless white zones around normal to pigmented skin with linear vessels	33
Acneform lesions and pustules	27	White blotches with Starburst pattern with central plug	White clods Radial lines with central dots	27 3
Steroid induced rosacea	5	Linear tortuous fine polygonal vessels Follicular plugging	red dilated, reticular, linear, tortuous, or *polygonal vessels* with white dots	5 2
White facial hair	8	White vellus hair between normal pigmented hairs	Short fine white hair, Single follicular unit between normal hair	8
Tinea incognito	19	Coarse scaling Vague erythema Broken and twisted hair White structureless areas Arborizing telangietasia	Whitish to yellow scales- box shaped with short broken hair Vessel pattern- Structureless white zones Reticular and branched lines	12 11 9 7
Atrophy with visible veins	8	Structureless white areas with visible veins	Structureless white zones with linear blue vessels	8
Hirsuitism	15	Clustered vellus and terminal hairs	Clustered vellus and uprightregrowing hairs	15
Ochronosis	2	Worm like pattern	showing globules and curvilinear masses of dark brown pigmentation in a reticulate pattern	2
Hyperpigmentation	11	Exaggerated rete pigment network Blotches and streaks of brown pigmentation (brown-black)	Pigment network with brown-black clods and structureless zones	11 8 6
Stellate pseudoscars and ulcerations over extremities	7	Structureless whitish and reddish globules, dilated vesssels around the lesions Loss of rete pigmentary network	Structureless pink to red zones with linear red and branching vessels.	6 4

* Fine arborizing telangiectasia was seen overlapping many conditions on the face, and has not been mentioned unless it is a prominent feature.
* Cumulative number of patients is more than 170 as a single patient has had more than one cutaneous adverse effects.

Significance of early side effects

Within two weeks of potent topical steroid use facial lesions showed loss of normal pigmentary rete network along with few areas of erythema and hypopigmentation evidenced brown clods and white to pink structureless zones. Dermatoscopy findings in early steroid induced side effect cases revealed loss of normal rete pigment network of the skin in all patients, brown clods and reticular and branched vessel pattern in 11, white structureless zones in 16 and pink structureless zones in nine. As a total of 47 patients (24.87%) developed erythema and hypopigmentation within 4 weeks of topical steroid use, a two table chi-square test was used to assess the significance and was found to be significant (P value 0.0001) **(Table 4)**.

Patients' perceptions about topical steroid use

Majority of the patients (86.2%) were happy with topical steroid use; 66.2% patients did not attribute their side effects to steroid application while additional 20% presumed that further application of steroids will improve their conditions, and only 13.8% felt that use of topical steroids may have contributed to the lesions. Patients often showed the multiple used and half-used tubes which they carried in pouches or bags, which we named **steroid pouch phenomena (Figure 2d)**.

Discussion

Topical steroid abuse is of alarming global concern today. Several countries other than India including African countries, Iraq and China too are facing this menace. expediting a stern universal control measure.[8-10] The Chinese study has a mean age group of 35.3 years,[8] the Iraqi study had a much younger population of 15-19 years,[9] as compared to 31-40 years predominance in our study. The most common side effect noticed in the Chinese study was acne in contrast to our study that highlighted telangiectasia and perilesional hypopigmentation. Ethnicity and differences in sebum production and activity may be the underlying factor.

Table 4 Significance of early onset topical steroid side effects.

Duration	*Early side effects*	*Late side effects*	*Total*
< 4weeks	22	0	22
> 4weeks	25	169	194
Total	47	169	216

A multicentric study conducted in India on 2926 patients found maximum side-effects to occur in one to three months, and Betamethasone combination to be most commonly misused which was similar to our study.[11] Our patients were mostly using steroid cocktails with irrational combinations.

In our study we found that in 24.87% cases, even a very short duration of use (less than 4 weeks, and less than 15 days in upto half of these) led to damage in thin skinned areas like groin and face. Most of these early cases presented with loss of normal pigmentary rete network along with few areas of erythema and hypopigmentation which was corroborated by dermoscopy.

Due to the combined effect of dermal atrophy induced by topical steroids and release of nitric oxide by endothelial vasculature on its withdrawal [12] especially on thinner areas like face, vasodilatation and erythema was the commonest feature observed. Since no large scale studies have utilized dermatoscopy in studying the side effects of topical steroids no comparison could be done. A similar observation of dilated polygonal vessels was seen in erythematotelangiectatic rosacea (ER). Dermoscopic features of ER include polygonal vessels, superficial scales, and follicular plugs

owing to demodex infection. However topical steroid damaged skin was distinguished from ER in our study as it presents only with polygonal vessels in a background of erythema.[6,13]

The persistence of dark vellus hair even on withdrawal of topical steroids has been reported in the past.[14] The appearance of fine small white hairs on dermoscopy on face in patients who were using topical steroids mainly for melasma is a novel observation. Further studies need to be done on effect of steroids on hair follicle melanisation though it is well known that topical steroids can induce cutaneous hypo or depigmentation. While facial hirsutism was observed in most facial lesions the extremities and groins showed broken hairs. A similar observation of scaly and broken Morse code hairs was made by Gomez *et al.* in a single case report of dermoscopic features of tinea incognito.[5]

Dermatoscopy on TSDF in another case report has shown that erythema due to steroid use demonstrates tortuous vessels, white structureless areas and yellowish areas corresponding to dermal and epidermal atrophy[15].We mostly observed tortuous and fine arborizing vessels and white structureless ivory white areas.

Striae rubrae was a common feature seen in Tinea incognito over the medial thighs and groins which presented with curved lines in a parallel and wavy pattern on dermatoscopy owing to inhibition of collagen and fibroblast synthesis with epidermal atrophy. This can be distinguished from from striae rubrae due to weight gain which presents with linear and dotted vessels with a faint violaceous background on dermoscopy. However as per our observation early lesions of striae rubrae due to topical steroid abuse may appear violaceous and fade over time.

In summary, this study provides an important overview of the dermatoscopic findings of topical steroid damaged skin. It highlights that the use of topical steroids for non-indications like acne, dermatophytoses and for skin fairness is a cause for concern, especially as steroids are OTC products in India. Hence its important that we keep in mind the propensity to develop cutaneous adverse effects like erythema and hypopigmentation in a relatively short time, which was shown by nearly a quarter of the patients studied rendering the unwarranted use of topical steroids further harmful. . Moreover, many side effects like atrophy, striae, telangiectasia are permanent and not easily amenable to treatment. Dermatoscopy can be used as user friendly method to detect the early steroid induced changes as well as to monitor and educate the patient's compliance to treatment. Ultimately use and abuse of this double edged wonder drug boils down to a decent patient doctor communication which can prevent many of these side effects if the message is well conveyed and well understood. The efforts of IADVL Task Force Against Topical Steroid Abuse (ITATSA) and International Topical Steroid Addiction Network (ITSAN) in preventing the misuse of topical corticosteroids at a national and international level respectively is highly commendable and noteworthy.

Limitations of the study

1. Being a hospital-based study, and may be only a relative representative of the true pattern in the community.
2. Limited sample size as it was a time bound study.
3. An active search for TSDS was not done among all patients attending the Outpatient department.
4. Dermatoscopic examination was not done for all cases as groin lesions were excluded to avoid contamination.

5. Only individual case reports are available for cross comparison for the dermatoscopic findings.

As Dermatologists it would be prudent if we ask ourselves these four questions before prescribing topical steroids to a patient.

1. Is the topical steroid being prescribed in a justified manner for the right diagnosis?
2. Is the topical steroid prescribed to the right patient?
3. Is the topical steroid prescribed in its right potency and molecular form?
4. Have I explained the right amount, frequency and duration of use to the patient?[10].

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