

Original Research Article

## Epidemic of Dermatophytosis in India, are Topical Steroids Adding Fuel to the Fire? - Hospital Based Longitudinal Prospective Study

Dr. Nayankumar H Patel<sup>1</sup>, Dr. Jigna Padhiyar<sup>2</sup>, Dr. Trusha Gajjar<sup>3</sup>, Dr. Mansi Buch<sup>4</sup>, Ms. Jayshree Tolani<sup>5</sup><sup>1</sup>Assistant Professor, Department of DVL, GCS Medical College, Hospital & Research Centre, Ahmedabad<sup>2</sup>Assistant Professor, Department of DVL, GCS Medical College, Hospital & Research Centre, Ahmedabad<sup>3</sup>Junior Resident, Department of DVL, GCS Medical College, Hospital & Research Centre, Ahmedabad<sup>4</sup>Junior Resident, Department of DVL, GCS Medical College, Hospital & Research Centre, Ahmedabad<sup>5</sup>Tutor, Department of Preventive and Social Medicine, GCS Medical College, Hospital & Research Centre, Ahmedabad

### \*Corresponding author

Dr. Nayankumar H Patel

Email: [patelnayan78.np@gmail.com](mailto:patelnayan78.np@gmail.com)

**Abstract:** Dermatophytic skin infections constitute major bulk of dermatological diseases in India. Use of topical corticosteroid is said to be compounding many aspects of clinical presentations and epidemiology of disease. This study is conducted with aim of bringing forth initial picture of this problem. The objective is to know prevalence of use of topical corticosteroids amongst patients of dermatophytosis and to analyze effects of topical corticosteroids on various clinical parameters of dermatophytosis. Material and Methods: This longitudinal prospective study was conducted by including all new patients who were clinically diagnosed as having dermatophytosis for 30 consecutive days. Epidemiological and clinical parameters were observed and use of corticosteroid was evaluated. Steroid treated patients were compared with de novo group for analysis of obtained parameters. History of Use of steroid was confirmed in 64.5% cases. Significantly longer duration of disease was observed in steroid treated patients compare to de novo cases ( $t=2.926$ , CL95%,  $P=0.00429$ .) Duration of disease equal to or greater than 1 month was found to be significantly associated with involvement of more than one anatomical site ( $\chi^2 8.94$ , CL95%,  $P 0.0028$ , Cramer's  $V 0.2099$ ). Atypical clinical presentations were more common (60.1%). Cutaneous signs of adverse effects of topical steroids were found in 36.7% of steroid treated patients. Increase in BMI poses additional risk of longer duration of diseases ( $\chi^2 10.446$ , CL95%, Cramer's  $V 0.227$ ). Conclusion: Abuse of topical corticosteroid is a significant problem in patients of dermatophytosis in this part of India and it is further fueling epidemic of dermatophytosis by changing clinical presentation, prolonging duration of disease and helping spread of disease to multiple anatomical sites.

**Keywords:** Cutaneous adverse reactions, Dermatophytosis, Duration of diseases, Topical Steroids.

### INTRODUCTION:

Infection of skin by dermatophytic fungus is an important cause of pruritic skin rashes in tropical countries. In India, skin infection caused by dermatophytic fungus is variably known in local language as "Dadar", "Daad" or "Dinay". Mainly three types of dermatophytes cause infection in India namely *Trichophyton*, *Epidermophyton* and *Microsporum* [1]. Hot and humid climate of India is said to be providing favorable environment for spread and persistence of infection in human host [2, 3]. Off late in last decade variable observations have been made by dermatologists in India regarding increase in incidence of dermatophytic fungal infections but no clear data

regarding population base prevalence of this condition is available. During same time period differing observations were made by various authors regarding complete or partial loss of efficacy of previously available antifungal drugs [4, 5]. Consequently use of newer and costlier antifungal drugs has increased among doctors leading to ever increasing cost of treatment to patient and government [6-8]. In India one more factor adds to epidemiology of dermatophytosis, namely 'use of topical corticosteroid'. It is well known practice particularly in economically lower and lower middle class population to take advice of chemist attending drug store or general physicians. In country with low patient doctor ratio quakes and graduates of

alternative medicine prescribing allopathic medicine is not new [9-11]. Topical skin preparations containing corticosteroid, mostly potent is first choice of both primary physician and chemist of medical stores for variety of skin conditions. Irrational topical drug combination of corticosteroid, antibacterial and antifungal is used with a perception of treating everything when making correct diagnosis is not possible. Despite of available laws and statutory warning on product, over the counter sale of such topical skin preparations and wide spread use in population is rampant. Use of these products is considered one of the reasons for increase in incidence of disease and persistence of fungus in hosts in India.

#### **MATERIALS AND METHODS:**

All new patients presenting to dermatology clinic during outpatient working hours for 30 consecutive days starting from 16th may 2016, who were clinically diagnosed as having dermatophytosis by single dermatologist, were included in the study. After obtaining written consent for participation in the study, detailed history of all patients for duration of disease, use of oral or topical medicine and presence of similar lesion in family were evaluated. 'Duration of disease' was defined as continuous period of time from onset of symptoms and skin rashes to presentation to our centre, reappearance of skin lesions or symptoms in less than 7 days after stoppage of treatment is considered as continues duration of disease. Detailed physical examination was undertaken for anatomical sites of involvement, morphology of lesions and presence of signs of corticosteroid adverse effects. Anatomical sites were divided in 6 locations - crural fold, non-glabrous skin excluding face and scalp, glabrous skin of palms and soles, face, scalp and nail. Body Mass Index (BMI) of all patients was measured. Skin scrapping was obtained from all patients and examined in 10% KOH preparation for presence of fungus.

#### **Inclusion criteria:**

All new patients clinically diagnosed as dermatophytosis irrespective of age, sex or concomitant medical illness who were willing to give consent (in case of patients below 18 years consent was obtained from parent or guardian). Patients having doubtful diagnosis of dermatophytosis were confirmed for presence of fungus by KOH preparation before enrolling into study.

#### **Exclusion criteria:**

Patients who refused to give consent for participation in study.

#### **Statistical Analysis:**

Obtained data was analyzed using SPSS 20.0 version. Chi square, unpaired t test, Pearson's chi square and Cramer's V test were used at p value 0.05 and 0.1 for analyzing significance of various findings.

#### **RESULTS:**

Out of total 1056 new patients registered in dermatology clinic, 203 were clinically diagnosed as having dermatophytosis which constitutes 19.22% of new patients seeking dermatology services. Table-1 shows age, sex and BMI distribution. Out of total 203 patients, remarkably only 25 patients (12.31%) had directly approached dermatology clinic. Remaining 178 patients (87.68%) had history of previous treatment. Out of 178 patients who were previously treated 131(64.5%) had history of using topical steroid either as mono therapy or in topical fix drug combination with topical antibacterial and antifungal. Among these patients, in 64.9% cases it was dispensed by chemist and in 35.1% cases it was prescribed by family physician. Amongst patients who had consulted general physician, 93.5% of them admitted to have refilled their prescription from drug store without follow up consultation. In remaining 47 patients, it was not possible to confirm type of treatment used though history of treatment was available. For further analysis patients were divided into two groups, those patients who had directly approached our clinic without using any treatment labeled as "de novo patients" (n=25) and patients who had confirmed history of treatment with topical corticosteroid labeled as "steroid treated" (n=131).

Family history was positive in total 73 patients (36%). When positive family history was analyzed for de novo and steroid treated patients, it was found positive in 10 out of 25 de novo(40%) and 43 out of 131(32.8%) steroid treated patients. Statistically this difference was not significant ( $P0.4876$ ,  $\alpha0.05$ ). Maximum number of patients in our study had normal BMI (43.8%). Number of patients having disease duration exceeding 3 months were significantly higher in obese compare to underweight and normal BMI patients.( $P0.0004$ , $\alpha0.05$ ). Number of patients showing multiple site involvement compared to single site involvement also significantly increases with increasing BMI ( $P0.0976$ ,  $\alpha0.1$ ). Skin scrapping for presence of fungus using KOH method was positive in 117 out of 203 patients (57.6%). Statistical difference in rate of positive family history between steroid treated and de novo cases was not significant. (Cramer's  $V0.141$ ,  $\alpha0.05$ ).

Annular plaque without central clearing was most commonly observed morphological type of lesion in 117 out of 203 patients (57.6%). Classical clinical presentation of annular or polycyclic plaque with central clearing was observed in 81(39.9%) patients. Various other patterns like eczematized plaque, Tinea circinata, papular eruption within annular plaque and plaque with secondary infection were observed in 24.6%, 3.9%, 10.8% and 3.4% respectively (Figure 1).

Involvement of crural fold was observed in 151 patients (74.4%) and equal number had involvement of non glabrous skin. Eight patients (3.9%) had involvement of glabrous skin, 5 had face (2.5%), 1 patient each had involvement of nail and scalp. Involvement of single anatomical site was seen in 88 patients(43.3%) and more than one above mentioned anatomical sites were seen in 115 patients (56.7%). 75 out of 131 steroid treated patients had more than one anatomical site involved at the time of presentation, which was true for 11 de novo cases. Statistically this difference was not significant ( $P0.222, \alpha0.05$ ).

In entire study population shortest duration of disease was 3 days and maximum was 72 months. Average duration of disease in de novo cases was 1.8 months whereas same for steroid treated patients was 4.5 months. When mean duration of disease was analyzed using unpaired t test for de novo cases and in those patients treated with topical steroids, it was found to be significantly higher in later group ( $P0.0043, \alpha0.05$ ). Table- 2 shows computation of duration of disease in de novo and steroid treated patients. Only 16 patients having duration of disease less than one month showed more than one anatomical site involvement and same was true for 98 patients having duration exceeding 1 month or more, which was statistically significant ( $P0.0028, \alpha0.05$ )(Figure 2).

Out of 131 patients who had previously applied topical corticosteroids, 48 patients (36.6%) manifested one or more signs of cutaneous adverse reactions (ADRs) of topical corticosteroids (Figure 3&4).

**Table 1: Age, Sex and BMI distribution of study population**

n=203	Age (years)	0-10	11-20	21-30	31-40	41-50	51-60	61-70	Total
Sex	Female	2	8	24	18	15	5	2	74
	Male	2	28	41	23	17	15	3	129
BMI*	Underweight <18.5	3	14	10	2	0	1	0	30
	Normal 18.5-24.9	0	17	31	14	14	8	5	89
	Overweight 25-29.9	1	4	20	18	9	9	0	61
	Obese >30	0	1	4	7	9	2	0	23

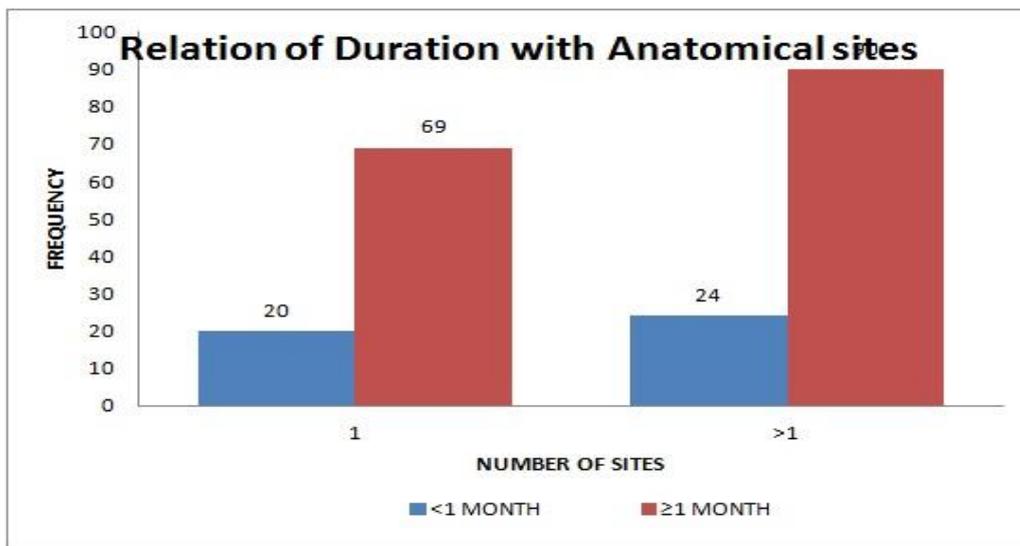
\*Body Mass Index

**Table 2: Shows computation of duration of disease in steroid treated and de novo cases.**

t-test	De novo	Steroid Treated
Mean	1.804	4.561069
Variance	9.82915	64.79301
Observations	25	131
Hypothesized Mean Difference	0	
t-stat	2.92616	
P-value	0.004293	



**Fig 1: Various morphological presentations of dermatophytosis. a. Classical presentation, b. Plaque without central clearing, c. Small papules in plaque, d. Tinea Circinata, e. Plaque with ezematization, f. Plaque with secondary infection.**



**Fig 2: Chart showing frequency of multiple site involvement with increasing duration.**

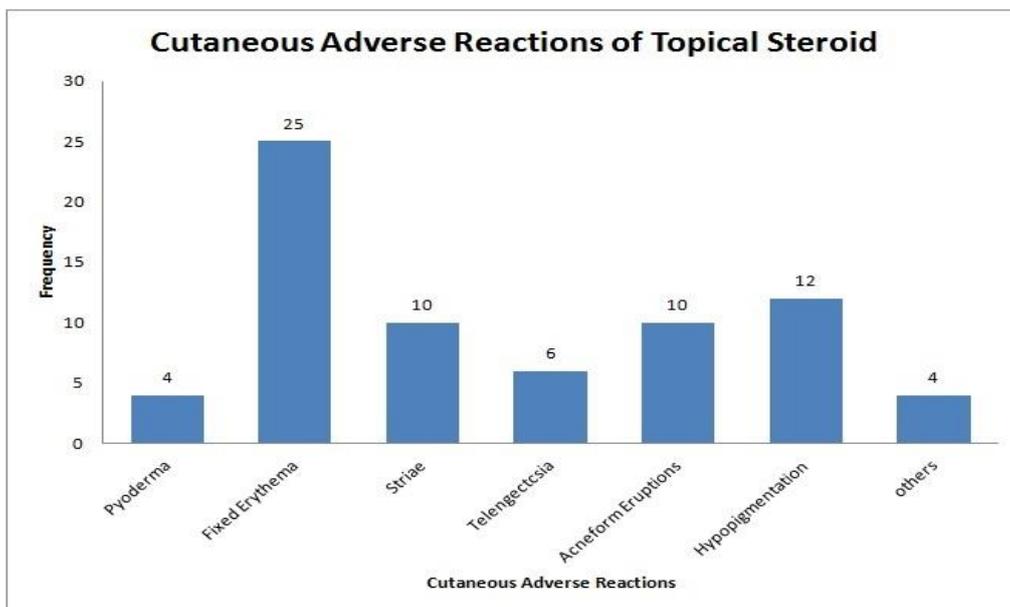


Fig 3: Frequency of Cutaneous ADRs of topical steroid observed



Fig 4: Cutaneous ADRs of topical steroid a. Fixed Erythema, b. Secondary infection, c. Steroid induced striae, d. Acneform eruptions

## DISCUSSION:

Though dermatophytic skin infections are major bulk of dermatological consultation in India, no community based prevalence data is available. It is a well known fact that in given socio economical scenario of our country, self medication for any skin condition is a norm rather than exception [12-16]. Relatively low cost of these preparations and immediate symptomatic relief they provide to the subject due to steroid content, make them first choice for patients for variety of skin ailments. Cost of dermatological consultation and non availability of dermatologist are major issues in many areas of country and availability of around 750 thousand medical stores which are first contact for many patients for routine skin ailments further compound this problem. Consequences of this practice on dermatological health of patient and over all burden it produces on public health is a topic of hot discussion off late, but reliable data for same is unavailable. Studies on adverse effects of topical steroid on face due to abuse of same in various fairness and complexion enhancing cream was recently published by Saraswat A *et al.* [17]. We conducted this study with primary aim of bringing forth initial picture of this problem particularly in dermatophytosis.

### Changing epidemiology:

In our study incidence of dermatophytic skin infection among new patients seeking dermatological consultation was 19.22 percent, which is highest among recently reported Indian studies [18-22]. Male to female ratio in our study was 1.7:1 and highest number of patients was seen in 21 to 30 years of age group, which are not in major contradiction to other studies from India [23, 24]. Presence of fungus in Skin scrapping using KOH method was found positive in 57.6% of sample tested which was 86% and 73.3% in other studies [24, 25]. KOH testing has low negative predictive value and difference in positivity was not significant between two groups. Positive family history was found in 37.43% cases in our study which was higher than 14% reported by Mitruka B *et al.*[23]. Though statistical analysis for duration of disease and steroid use as compounding factor for positive family history was not significant in our study, further investigations in larger sample size and multicentre studies are warranted. With increasing BMI, increase in duration of disease and involvement of more anatomical sites were observed in our study. High BMI provides additional favorable environment for growth of fungus as increase in skin folds prevent rapid drying of skin and hold moisture for longer time.

Fuel of steroid in fire of dermatophytosis: Only 12.3% patients had directly sought dermatologist advice for their skin infections and 64.55% of patients had used topical corticosteroid before consulting dermatologist. Findings from our studies clearly highlight the practice of unauthorized dispensing by chemist (64.5% of steroid treated), preference of general physicians for use of corticosteroid (35.1% of steroid treated) and unauthorized refill of prescription of topical corticosteroid by chemist (93.5% of General Physician's prescriptions) in this part of country. Topical corticosteroid use in our study was much higher than reported for face 14.8% [17]. This shows that more number of patients are abusing topical steroid for dermatophytosis compared to as a fairness and complexion enhancing product on face.

Classical presentation of dermatophytosis is annular or polycyclic plaque with central clearing as fungus invades stratum corneum centrifugally and host inflammatory response is mounted on advancing border of lesion [1]. This pattern was observed in 39.9% patients in our study. Non classical morphological presentation collectively outnumbered classical presentation in our study. Use of topical steroid and longer duration of disease could be factors for this finding. This finding is also important because use of topical steroid and change in morphology of disease make it increasingly difficult for dermatologists to diagnose this common skin condition. In our study most common site involved was crural fold known as tinea cruris but interestingly equal number of patients had involvement of non glabrous skin known as tinea corporis also. Involvement of more than one anatomical sites in more than half of our study population (56.7%) is in stark contrast to previous studies which reported it in only less than 5% cases [26, 27]. Evaluation of this fact with further finding in our study where strong correlation was found between increase duration of diseases beyond 1 month and involvement of multiple anatomical sites reflects role of topical steroid in these findings. This data particularly reflects changing pattern of dermatophytosis where multiple site involvement is increasingly common.

Mean duration of disease was significantly higher in steroid treated patients. Patients having disease duration exceeding 3 months was also higher in our study compared to other studies [23]. Average duration of steroid application in our study was 4.5month which was 5.5 month reported for all indications [28]. Cutaneous adverse drug effect of topically applied corticosteroids was observed in 36.7% patients. Other studies reported it to be 90.5% on face

and 5.63% for mix anatomical sites [17, 29]. Fixed erythema and hypo pigmentation were most reported ADRs in our study which was different from other study for face [17]. Inherent difference in response of skin on various anatomical sites to steroid could be responsible for this. Our study draws following important conclusions. Incidence of Dermatophytosis in tertiary care hospital is increasing compared to last studies. Number of patients directly seeking dermatologist advice for this disease is very low. Practice of self medication and consultation with primary care physician and unauthorized refill of prescriptions are prevalent in this part of country. Involvement of multiple anatomical sites at the time of presentation to dermatologist is increasing. Atypical clinical presentations of dermatophytosis are increasingly common than classical presentation. Increasing BMI poses additional risk factor for longer duration of disease and multiple sites involvement. Duration of disease was significantly higher in steroid treated patients. Duration exceeding more than 1 month has strong correlation with multiple sites involvement. 36.7% patients already had cutaneous ADRs of steroid at the time of presentation. Fixed erythema and hypopigmentation are most common.

#### CONCLUSION:

Abuse of topical corticosteroid is a significant problem in patients of dermatophytosis in this part of India and it is further fueling epidemic of dermatophytosis by changing clinical presentation, prolonging duration of disease and helping spread of disease to multiple anatomical sites.

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