



Original Research Article

Beyond the surface: Understanding the complexity of partially treated tinea corporis

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Abstract

Introduction: Tinea corporis is a superficial dermatophytic infection of the glabrous skin surface of face, trunk and extremities that can be diagnosed by clinical examination, skin scrapings and skin punch biopsies. Histopathological evaluation with PAS stain aids in definitive diagnosis. Causative organisms are *T.rubrum*, *T.mentagrophytes*, *T.concentricum*, *E.floccosum*. Clinical presentations can be altered with use of various self-medicated applications and hence can pose diagnostic challenges.

Objectives: Objective of the current study is to elaborate the histomorphological changes in the skin biopsy of partially treated cases of tinea corporis. Histopathological features include epidermal changes and dermal inflammatory response.

Materials and Methods: This study is a cross-sectional study in a period of 2022-2023. A total of 100 skin biopsy cases were analysed from histologically confirmed PAS (periodic acid-Schiff) positive cases of partially treated tinea corporis.

Results: Most of the cases showed epidermal changes of spongiosis (91%) followed by orthokeratosis (85%). Other epidermal changes seen were parakeratosis (32%), Neutrophilic exocytosis (23%), Hyperkeratosis (9%) and microabscess (4%). Papillary dermis showed perivascular lymphocytic infiltrate (95%) with extravasated neutrophils (16%), extravasated RBCs (27%), eosinophils (21%) and perivascular edema (26%).

Conclusion: Local application of triple combination or steroid creams can alter the pattern in the lesion making diagnostic challenges both clinically and histopathologically. Histopathological evaluation of partially treated tinea corporis reveals presence of lamellated orthokeratosis with or without focal parakeratosis, acanthosis and spongiosis. In our study, Exocytosis of neutrophils, papillary dermal edema were noted only in few cases and lacks sandwich sign. This study, thus attempts to elaborate on subtle changes in histopathological features of partially treated Tinea corporis with unknown topical applications.

Keywords: Tinea corporis, KOH mount, PAS (periodic acid-Schiff), Spongiosis, Parakeratosis, Orthokeratosis.

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1. Introduction

The term "tinea corporis" most commonly known as "ring worm" refers to a superficial dermatophytic infection that affects the glabrous skin surface of the hands, feet, scalp, bearded areas, face, groin, and nails. Dermatophytes from one of the three genera—*Trichophyton*, which causes infections on the skin, hair, and nails; *Microsporum*, which causes infections on the skin and hair; and *Epidermophyton*, which causes infections on the skin and nails are the most common cause of tinea corporis.^{1,2,3} Clinically patients present with erythematous scaly papules that gradually progress to annular or nummular red patches or plaques, frequently with central clearing and peripheral scales.⁴ Since

tinea corporis is common and many other annular lesions can mimic this fungal infection, the dermatologist and physicians must familiarize themselves with its etiology and its dermatopathological changes in skin, that can be diagnosed by clinical examination, skin scrapings and skin punch biopsies. Histopathological evaluation with PAS stain aids in definitive diagnosis. The purpose of this study is to analyse histopathological features of partially treated tinea corporis as clinical presentations can be altered with use of various self-medicated applications and hence can pose diagnostic challenges. Extensive literature review does not yield subtle features in aiding the diagnosis of partially treated cases of tinea corporis.

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2. Objectives

Objective of the current study is to elaborate the histomorphological changes in the skin biopsy of partially treated cases of tinea corporis with nonspecific topical applications.

3. Materials and Methods

This study is a cross-sectional study of partially treated tinea corporis in a period of January 2022- December 2023 in department of dermatology and pathology in a tertiary care center in Mangalore, Karnataka. A total of 100 skin biopsy cases were analysed from histologically confirmed PAS (periodic acid-Schiff) positive cases of partially treated tinea corporis were reviewed by two pathologists. Age and clinical details were obtained from the requisition form received in department of Pathology. KOH mount was done in all cases. The Data collected was entered in Microsoft Excel Software and analysis was done. The results were expressed in terms of Mean and Percentage.

4. Results

In our study, the mean age was 42.56 years, with a standard deviation of 16.77 years with gender distribution of 52% males and 48% females. Histopathologic features of PAS positive tinea cases were evaluated for epidermal changes and dermal changes. KOH mount was done in all cases, however only 23% of cases showed positive for fungal hyphae. Out of all the KOH positive cases, PAS stain demonstrated occasional fungal hyphae. Rest of the cases that were negative in KOH mount had a good number of hyphae located deeper in the stratum corneum. Most of the cases showed epidermal changes of spongiosis (91%) followed by orthokeratosis (85%) out of which 65% of cases showed lamellated orthokeratosis and 35% showed basket weave orthokeratosis. Parakeratosis was seen in 32% of cases out of which 26% of the cases had focal parakeratosis and only 6% cases had diffuse parakeratosis. Hyperkeratosis was seen in 9% of cases. Neutrophilic exocytosis was present in 23% of cases and microabscess was present in 4% of cases. Papillary dermis in majority of cases showed perivascular lymphocytic infiltrate (95% of the cases) with other features of extravasated neutrophils in 16% of cases, extravasated RBCs in 27 % of cases, eosinophils in 21% of cases and perivascular edema was present in 26%. (Table 1, Figure 1, Figure 2, Figure 3)



Figure 1: Annular lesion, erythematous, scaly plaque with a raised edges



Figure 2: KOH MOUNT: Skin scrappings from lesion showing fungal hyphae

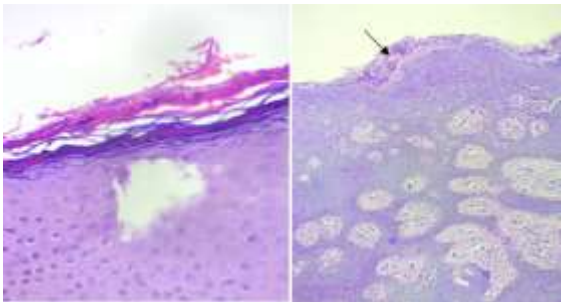


Figure 3: H & E stain 1000 x and PAS stain at 400 x positive-presence of fungal hyphae

Table 1: Histopathologic features of periodic acid-Schiff-positive tinea cases

Histopathological features	Percentage of cases (%)
Epidermal changes	
Spongiosis	91
Orthokeratosis	85
Parakeratosis	32
Neutrophilic exocytosis	23
Hyperkeratosis	9
Microabscess	4
Dermal changes	
perivascular lymphocytic infiltrate	95
Extravasated RBCs	27
Perivascular edema	26
Eosinophils	21
Extravasated neutrophils	16

5. Discussion

Tinea is a clinical term used to describe superficial fungal infections of the skin; the term is typically used in conjunction with an anatomical term to describe the infection's location or colour. Tinea corporis typically presents as a well-demarcated, sharply circumscribed, oval or circular, mildly erythematous, scaly patch or plaque with a raised leading edge with incubation period of 1-3 weeks.^{5,6} The lesion starts off as a flat scaly spot that spreads centrifugally and clears centrally to form a characteristic annular lesion giving rise to the term 'ringworm'.^{7,8} In adults, tinea corporis most commonly occurs on exposed skin. In children and adolescents, the site of predilection is the trunk. The host immune system, the virulence of the fungus, and environmental variables all play a major role in the inflammatory response to a superficial fungal infection.⁹

Histological features in tinea corporis are hyperkeratosis, parakeratosis, basket weave orthokeratosis, sandwich sign so called by the presence of fungal hyphae between orthokeratotic and parakeratotic layers of Stratum corneum, formation of micro abscess in stratum corneum, spongiosis, exocytosis of neutrophils, perivascular inflammatory infiltrate.¹⁵

In this study, 100 cases of PAS positive tinea corporis, partially treated with unknown topical applications were taken and evaluated for epidermal and dermal changes. Patient treated either with triple combinations or steroids can alter the histopathological features in tinea corporis.⁷ Patients included in our study did not have the details of topical applications used. However, all patients had come to tertiary care hospital with topical applications and hence were partially treated, with unknown drugs. In our study, spongiosis was the most common histological features compared to Meymandi et al¹⁰ were neutrophilic exocytosis (63% of cases) was the predominant feature. In a study done by Park et al¹¹ showed spongiosis 22% of cases.

In our study, 85% of cases showed lamellated orthokeratosis Parakeratosis was seen in 32% of cases out of which 26% of the cases had focal parakeratosis and only 6% cases had diffuse parakeratosis while study done by Park et al¹¹ showed only 22% of orthokeratosis. parakeratosis in 13 cases (72%), basket weave keratin layer in 10 cases (56%).

In our study, majority of cases showed lamellated orthokeratosis (85%), without sandwich sign. In a study done by Park et al showed parakeratosis in 13 cases (72%), basket weave keratin layer in 10 cases (56%).¹¹

In our study, neutrophilic exocytosis was present in 23% of cases, and microabscess was present in 4% of cases. In a study done by Park et al neutrophils in the stratum malpighii noted in 9 cases (50%).¹¹

This study shows extravasated RBCs in 27% of tinea cases and shows eosinophils in the papillary dermis in 21%

of cases possibly due to irrational use of topical steroids and other applications.

A diagnosis of dermatophytosis requires a careful search and performance of PAS or GMS stains. Fungal hyphae are not seen in areas of parakeratosis, probably because of the rapid epithelial turnover. The scrappings done for KOH mount would yield superficial stratum corneum. Topical application of triple combination with antifungal, antibacterial and steroids resulted in partial treatment of dermatophytes, which is likely cause of negative result in KOH mount. However histopathological evaluation enabled evaluation of deeper stratum corneum and hence a better chance of PAS stain demonstrating fungal hyphae in our study.

Although most commonly the background changes in dermatophytosis are those of spongiotic dermatitis,¹² as seen in our study with 91% of cases showing spongiosis. Tinea corporis can show a wide variety of reaction patterns can be associated with dermatophyte infections, such as reaction patterns associated with *T. rubrum* infection alone can resemble erythema multiforme, erythema perstans, purpuric dermatitis, granuloma faciale, granuloma annulare, pustular dermatitis, and papulonecrotic dermatitis with allergic angitis, in addition to forms of spongiotic dermatitis.¹³ Examples of tinea faciei may rarely mimic granuloma faciale or cutaneous lupus erythematosus histologically.¹⁴ Thus with these clinical features along with added difficulty of topical unknown applications a histopathological evaluation becomes inevitable, albeit challenging too. A bedside evaluation of KOH mount is the easiest, cost effective method to confirm tinea corporis. However, our study showed only 23% of cases were positive with KOH mount for fungal hyphae.

The KOH mount on skin scrappings of the lesion in 77% of cases were negative, although PAS on histopathological sample were positive. This is likely due to partial triple combination topical therapy and organisms not yielding superficially on scrapping. This study thus emphasizes on a careful evaluation and search for fungal hyphae in all annular erythematous lesions with or without suspicion of tinea corporis. Diagnosis of Tinea corporis definitively will enable a proper treatment and avoid unnecessary delay and morbidity in these patients. A definitive evidence of specific topical application was not possible due to lack of patient awareness of the topicals used. Hence unknown topical application is the limitation of this study.

6. Conclusion

Topical application of triple combination creams or steroid creams not only can reduce the possibility of KOH mount of skin scrappings to yield fungal hyphae but also alter the pattern in the lesion making diagnostic challenges both clinically and histopathologically. KOH mount were not effective (23%) in detecting fungal hyphae when compared

to PAS stain (100%). Histopathological evaluation of partially treated tinea corporis enabled evaluation of deeper stratum corneum and hence a better chance of PAS stain demonstrating fungal hyphae in our study. Other features are presence of spongiosis, lamellated orthokeratosis with or without focal parakeratosis and acanthosis. Exocytosis of neutrophils, papillary dermal edema were noted only in few cases. This study emphasizes on a careful evaluation and search for fungal hyphae in all annular erythematous lesions with PAS stain and it is an attempt to elaborate on subtle alterations in histopathological features of partially treated Tinea corporis with unknown topical applications.

7. Source of Funding

None.

8. Conflict of interest

None.

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