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Onychomycosis: Diagnosis made easy

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ABSTRACT

Background: Onychomycosis is the most prevalent nail disease, accounting to about 50% of all onychopathies. The diagnosis is still a challenge considering that the gold standard complementary test (direct microscopy and culture) may be false negative in many cases.

Objectives: The study aimed to evaluate the role of dermoscopy in diagnosis of onychomycosis in comparison with scrap microscopic examination, mycological culture and histopathology and to detect how close the dermoscopic examination to the previous diagnostic findings.

Patients and Methods: The present study included 20 patients suffered from onychomychosis and they were subjected to clinical, KOH microscopic, dermoscopic, mycological and histological examinations.

Results: Jagged edge with spikes, longitudinal striations, distal irregular termination and ruin appearance are dermoscopic criteria of onychomychosis observed in 75% of cases. KOH examination was positive in only 20% of patients showing spores and hyphae. Culture was positive in only 35% of cases with M. canis, T. violaceum, T. rubrum, Chaetomium sp. and Scopulariopsis brumpt and there were no difference between the dermoscopic features caused by different organisms. The histologic evaluation showed found septate hyphea and blastoconidias within the amorphous keratin of the nail in 65%.

Conclusions: Dermoscopy may be considered an easy, helpful, quite simple, quick and inexpensive technique for increasing the diagnostic accuracy of onychomycosis and could be a practical and effective diagnostic tool when mycology is not readily available. Mycology can, on the other hand, be avoided when nail dermoscopy fail to show any diagnostic sign of onychomycosis.

Kewords: Onychomychosis, Dermoscopy, Nail biopsy, Culture, KOH scraping

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Introduction

Infections of the nails by dermatophytes (tinea unguium), yeasts or moulds are clinically almost indistinguishable on clinical aspect and therefore the general term of onychomycosis is often used. [1] It is the most prevalent nail disease, amounting to about 50% of all onychopathies. [2] Onychomycosis affects the nail plate, bed, and the matrix, leading to the gradual damage which often considered a cosmetic problem. [3]

In accordance with progression in mycological diagnostic approaches, there are two diagnostic categories including traditional and advanced molecular diagnostic tools available. Accuracy, availability, rapidity, sensitivity, specificity and cost effectiveness are important items for diagnostic procedures. [4]

Although identification of the causative organism by microbiological techniques are still the cornerstone for disease diagnosis, but sampling technique affects greatly its sensitivity and specificity. [5]

Therefore, the diagnosis of onychomycosis is moving from clinico-pathologic tools, which are time-consuming and give false negative results in one third of cases, into clinico-imaging method by the use of dermoscopy. [6]

Dermoscopy is a fast, non-invasive and inexpensive diagnostic tool for recognition of morphological structures that cannot be seen with naked eye. It is used widely in the last three decades, especially on diagnosis of pigmented skin lesions. However, it has been increasingly used on many skin diseases such as hair and nail diseases, parasitic diseases and connective tissue diseases. [7]

Onychoscopy (Digital dermoscopy of the nail) is an easy and quick procedure that allows differential diagnosis of onychomycosis from the common nail dystrophies. [8] This study aimed to evaluate the role of dermoscopy in diagnosis of onychomycosis in comparison with scrap microscopic examination, mycological culture and histopathology and to detect how close the dermoscopic examination to the previous diagnostic findings.

Patients & Methods

The present study had included 20 patients suspected clinically to onychomycosis from the attendants of Dermatology Outpatient Clinic, Minia University Hospital and chosen randomly over a period of 12 months. The study was approved by the Ethical Committee for postgraduate studies and research, Faculty of Medicine, Minia University, Egypt.

All patients were subjected to:

- Informed consent signing.
- Full history taking and examination
- Photography of the lesions for clinical assessment
- Dermoscopic examination of the lesion(s)
- KOH Scraping and microscopic examination
- Fungal Culture (modified sabouraud's dextrose agar)
- Nail biopsies: (stained with Hematoxylin - Eosin stain (H&E) and Periodic Acid-Schiff stain (PAS))
- Evaluation and assessment of results & statistical analysis of the collected data were analyzed and collated into figures using the Software Package for Statistical analysis for Windows (SPSS© Version 16.0; SPSS Inc., Chicago, IL, USA).

Results

Fifteen patients were females (75%) and 5 patients were males (25%). The age of the patients ranged from 5 to 50 years with a mean of 30.15 ± 13.15. The duration of the disease ranged from 2 to 96 weeks with a mean of 31.35 ± 30.69.

Clinically; 16 patients (80%) presented with distal lateral subungual type, one patient (5%) presented with proximal type, one patient (5%) presented with superficial white and 2 patients (10%) presented with total dystrophic type (Fig. 1).

Dermoscopic examination revealed longitudinal striation of different color (white yellow longitudinal striae in the onycholytic nail plate) had been found in 10 (50%) (Fig. 2a), ruin appearance (subungual keratosis) in 3 (15%) (Fig. 2b),10 (50%) showed jagged edge with spikes (sharp longitudinal whitish indentations directed to the proximal nail fold, found at the jagged edge of the proximal margin of the onycholytic area) (Fig. 2c), different colors of nail plate in 17 (85%) (Fig. 2a,c) and distal irregular termination in only 2 patients (10%) (Fig. 2d).

KOH examination of nail scraping was positive in 4 (20%) showing spores and hyphae (Fig. 3a).

Cultures were positive in 7 (35%), M. canis in 2 (10%) T. violaceum in 2 (10%), T. rubrum in one patient (5%) on SDA colonies are white and cottony the surface and underside is red, Chaetomium sp. in one patient (5%) on SDA colonies are darkly-pigmented, globose, ovoid, barrel to flask-shaped with long dark terminal septa, Scopulariopsis brumpt in 1 patient (5%) colonies are varying in color from white, cream, grey to brown, black, microscopic morphology shows chains of single-celled conidia (Fig. 3b-e). There were no difference between the dermoscopic features in patients with onychomycosis caused by different organisms.

Fig. 1: Clinical view of different types of onychomychosis

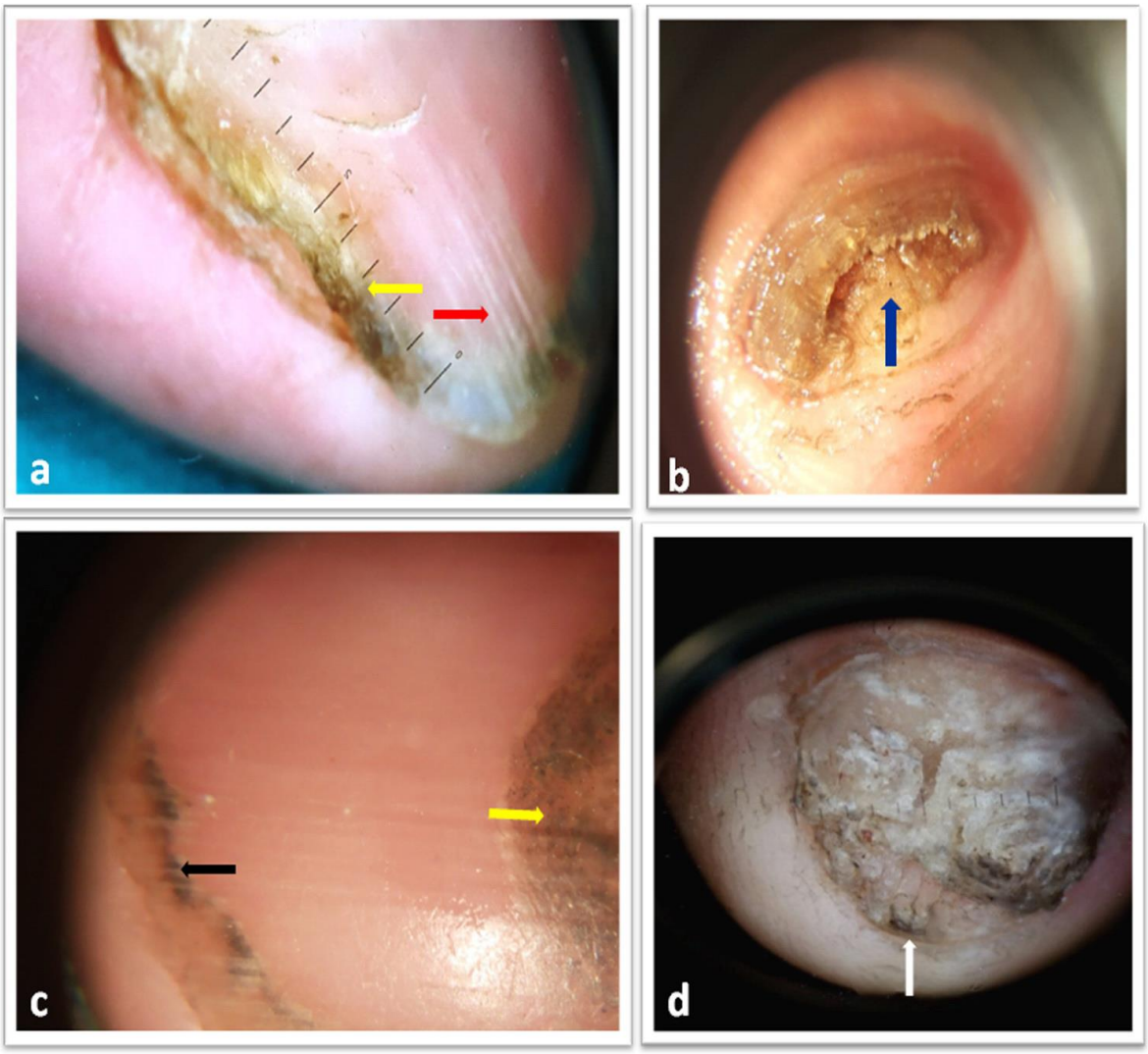

Fig. 2: Dermoscopic view of onychomycosis showing: longitudinal striations (red arrow), different colors of nail plate (yellow arrows), ruin appearance (blue arrows), Jagged edge with spikes (black arrow) and distal irregular termination (white arrow).

Table (1): Relation between dermoscope and other diagnostic tests of the onychomycosis.

Dermoscope	Scrap	Culture	Biopsy
Sensitivity	(50%)	(60%)	(50%)
Specificity	(19%)	(11%)	(0%)
Positive predictive value	(13.3%)	(27.3%)	(50%)
Negative predictive value	(60%)	(33.3%)	(0%)

The histologic examination of the nail biopsies showed that 13 cases (65%) expressed septate hyphea and blastoconidias pink to red purple in color within the amorphous keratin of the nail with PAS stain and with H&E stain fungi show pink cytoplasm and blue nuclei (Fig. 4). Hyphae in 6 cases and blastoconidias in 7 cases.

Dermoscopy is positive in 15 cases, while KOH microscopic examination is positive in 4 cases, 7

cases are positive by culture and 13 cases by histological examination.

The sensitivity of dermoscopy in onychomychosis is 50% in relation to KOH examination, 60% in relation to culture, 50% in relation to histological examination. The specificity is 19% in relation to KOH examination, 11% in relation to culture (Table 1).

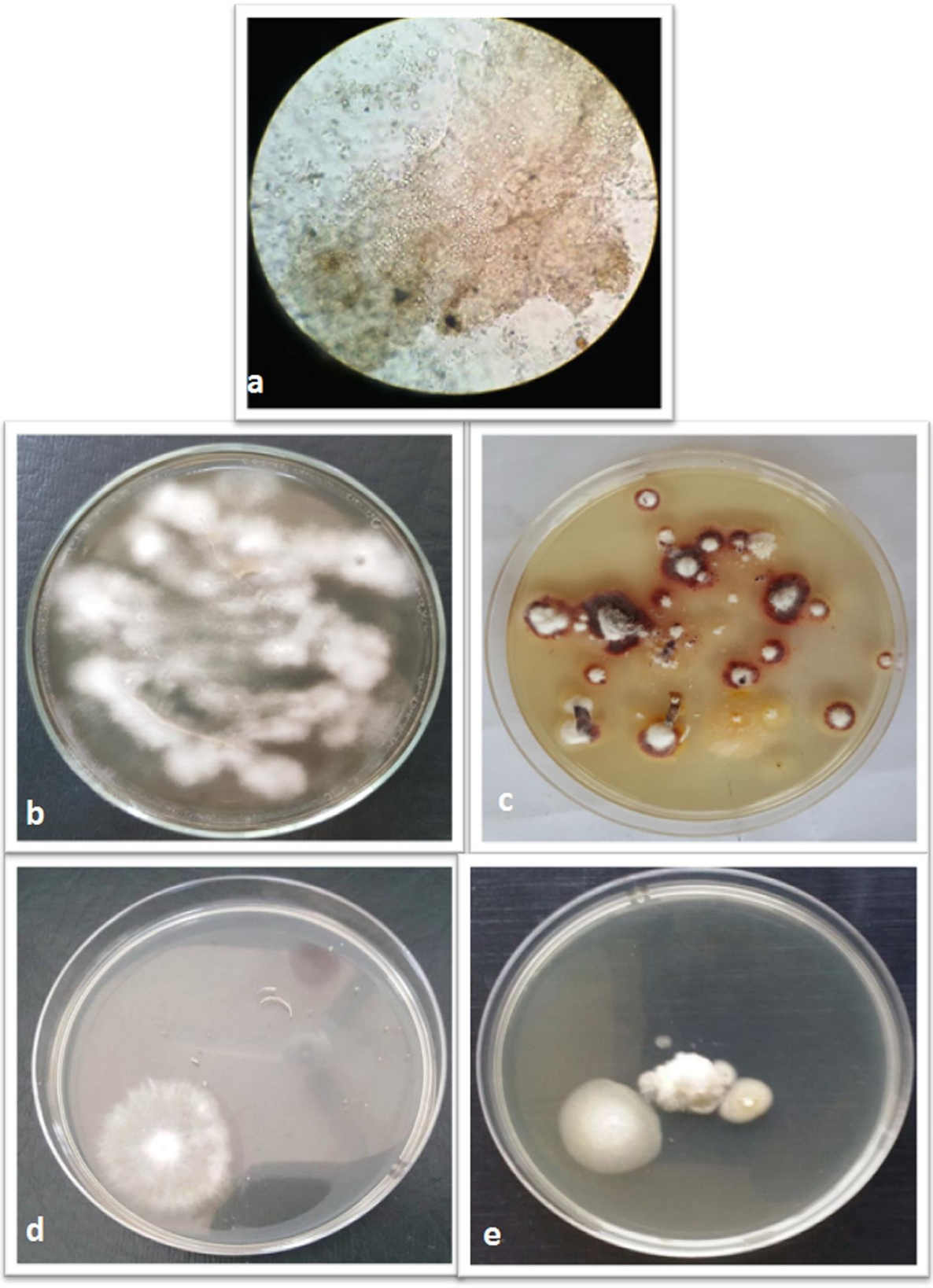

Fig. 3: KOH microscopic examination nail scraping showing spores (a); Cultures of nails showing T. rubrum (b), T. violecium (c), M. canis (d) and Macroconidia of M. canis (e).

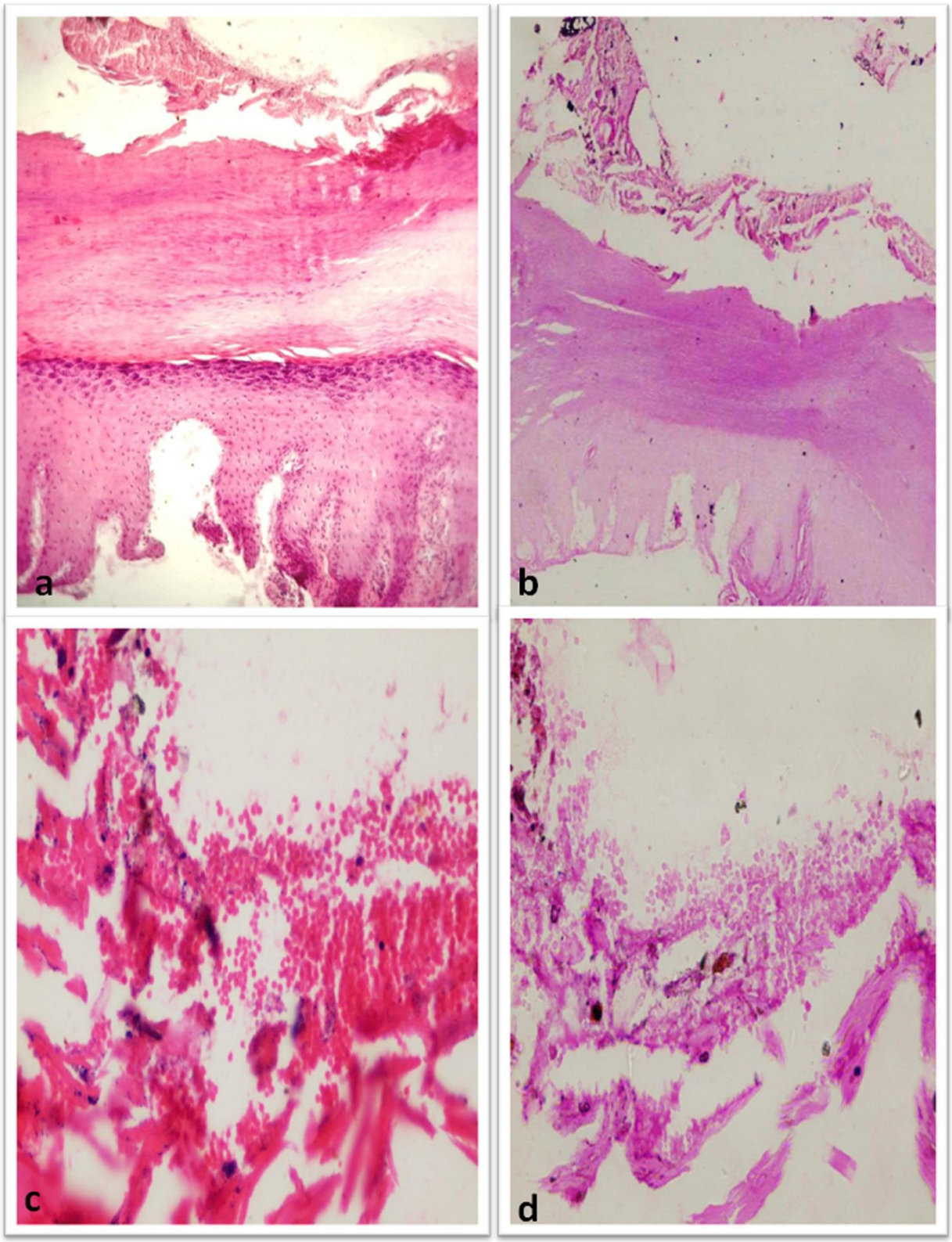

Fig. 4: Histologic examination of onychomychosis: multiple roundish spores ((a,c) H&E; (b,d) PAS; original magnification: x100,400 respectively).

Discussion

The diagnosis of onychomycosis is still a challenge considering that the gold standard complementary test (direct microscopy and culture) may be false negative in up to 35% of the cases. [2]

In the present study, using dermoscopy in onychomycosis revealed jagged edge with spikes and longitudinal striations in only 50% of

cases. However, other studies such as Piraccini et al. [9] De Crignis et al. [10] and El –Hoshy et al. [6] which detected spikes in jagged edge in all patient and longitudinal striations in 82.5%.

The presence of spikes is a significant sign of onychomychosis to differentiate it from the linear edge associated with traumatic onycholysis. Therefore, this simple dermoscopic finding could differentiate onychomycosis from traumatic onycholysis. [9]

Color changes were observed in 85% of cases which agreed with the study of Piraccini et al.[9] who detected them in 95%, nevertheless, they mentioned them as non- exclusive sign of onychomycosis.

Also, ruin appearance of subungual keratosis was observed in the present study in 15% of 20 patients. In contrary to, De Crignis et al. [10] who detected them in 88% of a series of 502 cases in a specialized outpatient center for nail diseases and reported them in fungal infection of the nail plate, although they may also be observed in nail psoriasis when associated with onychomycosis.

In the present study distal irregular termination was observed in 10% of patients, although Jesus-Silva et al. [11] detected it in 61% and reported that it corresponded to the distal pulverization characteristic of the thickening of the nail plate and occurred more frequently in total dystrophic onychomycosis.

KOH examination under microscopy was positive in only 20% of patients showing spores and hyphae. An advantage of this technique is that it can be performed in the office setting within minutes. However, this technique lacks sensitivity, cannot determine viability, and is expertise-dependent. Sensitivity is even worse for the detection of non-dermatophyte molds. [12,13]

Nada et al. [14] reported that the most common organisms which were isolated in culture were Candida, followed by dermatophytes then non dermatophytes moulds. On contrary, culture was done to all cases demonstrated that only 35% was positive with M. canis, T. violaceum, T. rubrum, Chaetomium sp. and Scopulariopsis brumpt and this finding agreed with other studies reported greater prevalence of dermatophytes as the etiological agents of onychomycosis. [15,16]

The histologic evaluation showed found septate hyphea and blastoconidias within the amorphous keratin of the nail in 65%. Meanwhile, both culture and nail biopsy examinations failed to reveal any difference between the dermoscopic features caused by different organisms.

Although, many methods are used in diagnosis of onychomycosis like culture media, direct microscopic examination, histopathologic study, and polymerase chain reaction (PCR). Meanwhile, only two tests of the abovementioned methods could be used to confirm the diagnosis. [17]

In conclusion, dermoscopy of the nail may be considered an easy, helpful, quite simple, quick and inexpensive technique for increasing the diagnostic accuracy of onychomycosis and could be a practical and effective diagnostic tool when invasive nail biopsy and time-consuming mycology are not readily available. Mycology and invasive nail biopsy can, on the other hand, be avoided when nail dermoscopy fail to show any diagnostic sign of onychomycosis.

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