



The Sensitivity and Role of Mycology Laboratory in Management of Superficial Fungal Infections in Zliten Teaching Hospital

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: The microscopic examination of skin, nails and hairs scrapings to detect the pathogenic fungi in patients with superficial fungal infections is very important step in the management, and this would be helpful to choose the most appropriate antifungals, and to expect their efficacy and needed duration of therapy.

Aims: This study was done to evaluate the sensitivity of KOH mounts as well as the sensitivity of fungal cultures on Sabouraud's dextrose agar media in Zliten Teaching Hospital.

Methods: The data of eighty four patients with confirmed superficial fungal infections were enrolled in this retrospective study. The sites of samples intake from skin, nails or hairs were cleaned with ethanol 70%, and the scraped material was collected with use of sterile scalpel, and placed on a slide and covered with a drop of a 10% Potassium Hydroxide (KOH) solution, then a coverslip was applied, and after 10 minutes examined under microscope with power (x10) and (40). Part of

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collected scrapings was placed on Sabouraud's dextrose agar media. The media were incubated in 26°C, and were examined twice weekly, over 4 weeks, to determine the specific etiologic fungus. The final results were made by interpretation of macroscopic and microscope features of grown fungal colonies.

Results: Males with confirmed fungal infection were 37 (represented 44%), while females were 47 (represented 56%). The mean age of patients was 16.5 years (16.5±18). The most frequently diagnosed fungal infection was *Tinea capitis*, that its causative *dermatophytes* were isolated from 55 patients (consisted 65.5% of total number of patients).

The presence of superficial fungal infections was confirmed with direct microscopy of KOH mounts in 40 patients out of 54 patients, (represented 74% of performed KOH exams). The more frequently isolated dermatophytes were *Trichophyton rubrum* and *Microsporum canis*, which represented 14.29% and 13.9% respectively. While, no growth of pathogenic fungi was found in 25 patients, although, the presence of fungal skin infections was confirmed with examination of KOH preparations.

Conclusion: In Zliten Teaching Hospital, the sensitivity of direct microscopic examination of KOH mounts for fungal elements was 74%, and the sensitivity of cultural method with cultivation on Sabouraud's dextrose agar media was 70%, this make use of both available methods would be very helpful as a diagnostic tools for patients with fungal infections.

Keywords: Superficial fungal infection; sensitivity of KOH mounts; sensitivity of fungal cultures; Zliten Teaching Hospital.

1. INTRODUCTION

Fungal infections cause common skin diseases in all communities and societies and were estimated to affect 20% to 25% of people worldwide. The fungal infections are mainly divided into superficial and deep infections [1].

Dermatophytes are the most common cause of nail, skin, and hair infections, which called superficial fungal infections (SFI), they are classified into three genera, *Trichophyton*, *Microsporum*, and *Epidermophyton* [1]. Moreover, *Malassezia furfur*, *Malassezia globosa* as well as *Candida albicans*, and other *Candida* species (spp.) could also cause SFI [2].

KOH test is a simple, rapid, inexpensive, and requires minimum infrastructure but needs experience to interpret the smears [3]. The identification of causative fungal species is useful for recognition of infection source, whether human, animal, or even environmental, and helpful to prescribe the suitable treatment [1,2].

In Libya, there were few studies of fungal infections of skin, although, Superficial fungal infections (SFI) are common health problem and need to be further investigated [4-7].

This study was conducted to evaluate the sensitivity of KOH mounts and fungal cultures in Zliten Teaching Hospital, and emphasize their role in choosing therapeutic regimes. It shed

some light on mycology laboratory and its utmost importance in the management of libyan patients with different superficial mycosis.

2. MATERIALS AND METHODS

Eighty four patients from both sexes and from all age groups, with confirmed superficial fungal infections, were enrolled in this retrospective study, The diagnosis was made with use of direct microscopy of infected materials in KOH mounts or with cultivation of part of same material on Sabouraud dextrose agar media or through both methods together. Patients who had no fungal cultures were excluded from study. All of enrolled patients had sought medical advice at dermatology clinic of Zliten Teaching Hospital (ZTH) in the period of time from August 2015 to February 2018.

Materials were collected from clinically suspected lesions with use of sterile scalpel No.12, then the material was put onto a glass slide and drops of 10% Potassium Hydroxide were added and then the slide was covered with a glass cover slip, and after 10 minutes, examined under microscope with power (x10) and (40).

Before intake of scraping for culture purposes, the scraped sites were cleaned aseptically with 70% ethanol and specimens were directly inoculated on SDA supplemented with chloramphenicol and cycloheximide. The petri dishes were incubated at 26°C and the growth of

cultures was observed twice weekly and petri dishes were discarded only after 4 weeks in the absence of growth.

In case of growth, identification of fungi was performed through interpretation of gross morphological features of grown colonies from both sides of petri dishes as well as through microscopic characteristics of macroconidia, microconidia, and hyphae. Statistical Analysis with use of Statistical Package for the Social

Sciences (SPSS 23) to study the distribution and frequency of patients, clinical types and their etiologic fungus.

3. RESULTS

The mean age of patients enrolled in our study was 16.5 years, and the more frequently diagnosed clinical types of SFI was *Tinea capitis* (65.5%), *T. manuum* (8.3%), and *T. pedis* also (8.3%), Fig. 1.

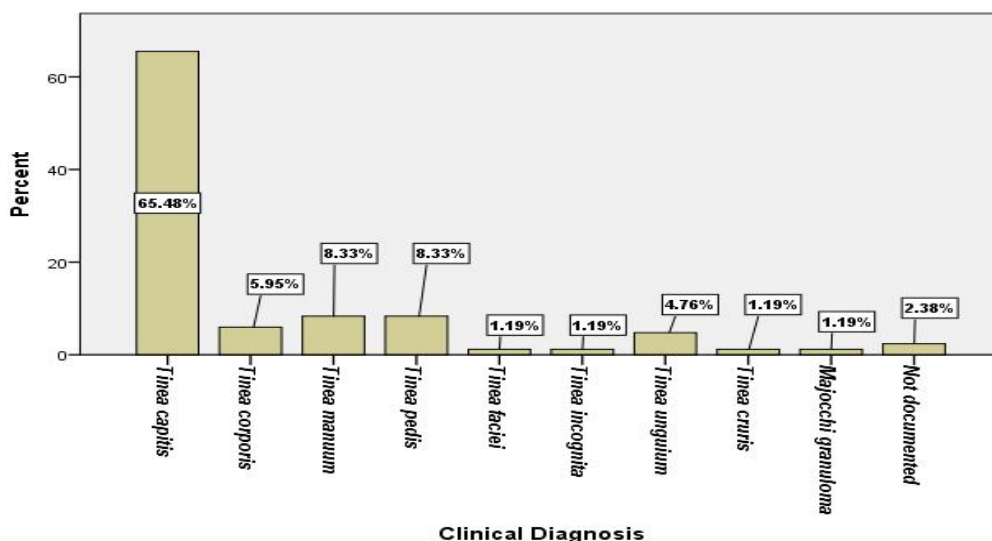


Fig. 1. The distribution of different clinical types of SFI in mycology Lab. of ZTH

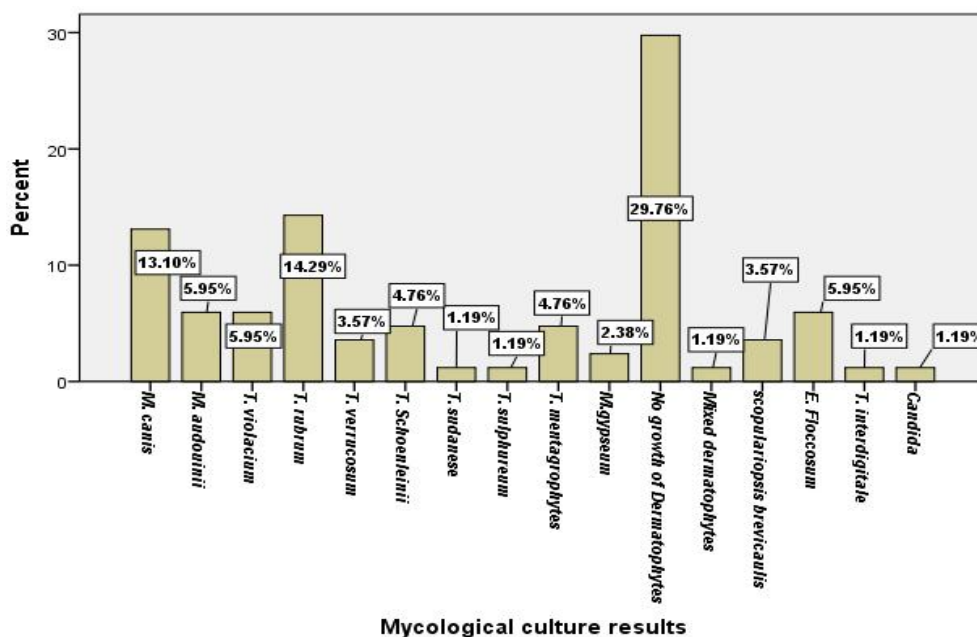


Fig. 2. Distribution of culture results

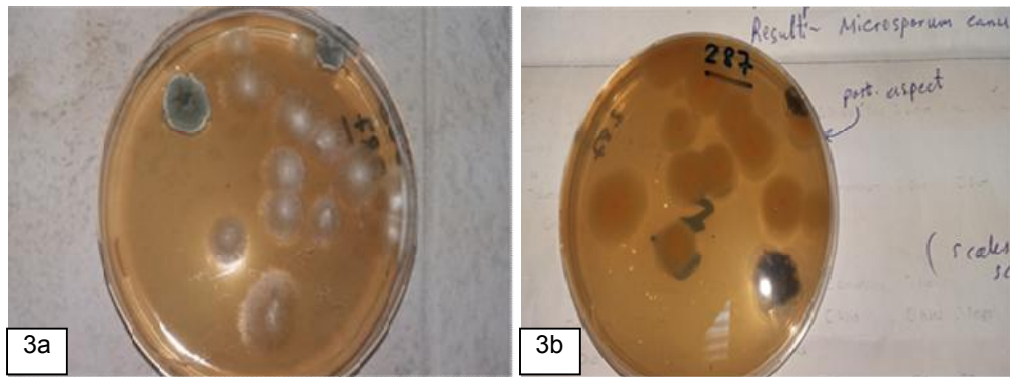


Fig. 3. (3a) Macroscopic features of *M. canis* colonies, white to cream-colored with a dense cottony surface. (3b) *M. canis* colonies with canary yellow colour, reverse view

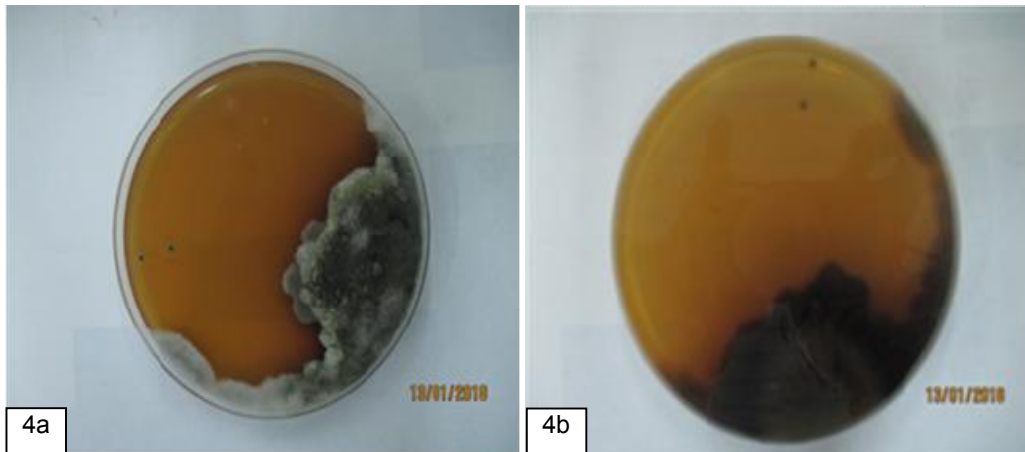


Fig. 4 (4a) *T. violaceum* colonies. (4b) *T. violaceum*. Reverse side



Fig. 5. Microscopic view of *T. violaceum* colonies

Positive direct microscopy were found in 74% (40 patients out of 54) of patients, for them KOH mounts were performed, and 25 patients had

negative results for cultures, although their direct microscopy were positive for presence of fungi, this represent around 30% of total 84 patients.

The most frequently isolated fungi were *T. rubrum* and *M. canis* (14.29%, 13.10%) respectively followed with *M. audouinii*, *E. floccosum*, *T. schonleinii* and *T. mentagrophyte* in descending order, Fig. 2, Fig. 3 a, b; Fig. 4 a, b; Fig. 5.

4. DISCUSSION

In our mycology Laboratory of ZTH, the most frequently diagnosed SFI was *T. capitis*, with 55 patients (represented 65.5%) out of total number (84 patients) Fig. 1, which was similar to distribution of *T. capitis* in Bengazi, Libya, where *T. capitis* represented 45% of all SFI [5]. On the other hand, previous study in ZTH, had revealed that *T. capitis* contributed with only 25.5% of total percentage of patients with SFI, this may indicate that dermatologists at ZTH had later developed tendency to confirm the diagnosis of *T. capitis* with use of laboratory methods and they don't rely only on clinical findings, that *T. capitis* manifests with clinical features similar to other common conditions like *Alopecia areata*, and needs always to be treated with systemic antifungal, which have its potential risks for side effects [6]. *T. capitis* has multiple differential diagnosis include: *Bacterial scalp folliculitis*, *alopecia areata*, *seborrheic dermatitis*, and *trichotillomania*, they could be excluded with direct microscopic examination and cultivation of fungal elements on SDA [1].

Forty patients had positive direct microscopy, out of 54 patients, for them KOH mounts were performed, while KOH preparation was not done for 30 patients with suspected fungal infections, although it was available test to be done, The causes might be, that not all dermatologists have enough experience and trust themselves to perform this available test.

The sensitivity of KOH preparations varied widely in different settings, ranging from 12% to 88%, depending on different studies [8]. KOH test showed false negative results at 26% in our dermatology clinic, which was lower percentage compared with one Indian study, which reported higher false negative results, up to 36%, for KOH mounts from nail materials [9].

A study was conducted at Al-Hussein University hospital in Cairo, Egypt, had compared KOH mounts with culture in group of patients, who were clinically suspected to have *T. capitis*, had found that KOH preparations had higher sensitivity compared to mycological cultures (85.7% versus 60%) [10]. In our current study,

the most frequently isolated fungi in ZTH were *T. rubrum* and *M. canis* (14.29%, 13.10%) respectively followed by *M. audouinii*, *E. floccosum*, *T. schonleinii* and *T. mentagrophyte* in descending order. On the other hand, the most isolated dermatophytes in Tripoli- Libya, was *T. violaceum* (44%) followed by *T. rubrum* (13.8%) and *M. canis* (8%) [4].

Regarding the therapy of superficial mycosis, the limited SFI are usually treated with safe and cost-effective topical agents. On other hand, systemic therapy with oral antifungal agents is necessary for *T. capitis*, *T. unguium* as well as the wide-spread SFI. The exact identification of etiologic fungus, whether *microsporum* or *trichophyton* in cases of *T. capitis* would be helpful for dermatologist to choose the appropriate oral antifungal, considering that *M. canis* responds well to griseofulvin, while, *T. capitis* caused with *Trichophyton* genus responds more to oral Terbinafine therapy [1,11].

5. CONCLUSION

In ZTH, the most frequently confirmed SFI with use of laboratory methods was *T. capitis*.

T. rubrum and *M. canis* were the more frequently isolated dermatophytes. The sensitivity of direct microscopy with use of KOH preparations was 74% and sensitivity of fungal cultures on SDA was 70%. Direct microscopy of KOH mounts, and fungal cultures for materials taken from skin, hairs and nails were not always confirmatory methods for presence of pathogenic fungi, but they would be very helpful in diagnosis and management of patients with fungal infections.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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