Journal of Pakistan Association of Dermatologists. 2021; **31(3)**:484-488.

Original Article

Prevalence of dermatophytes in superficial skin infections in a tertiary care hospital

Shahida Kashif, Fakhur Uddin[*], Farhina Nasir[**], Shahid Zafar, Shahjabeen[†], Suresh Kumar[†]

Department of Pathology, Liaquat college of Medicine and Dentistry.
* Department of Microbiology, BMSI, JPMC.
** Department of Pathology, Karachi Medical & Dental College.
† Department of Physiology, Fazaia Ruth Pfau Medical College.

Abstract

Objective To determine the prevalence of dermatophyte in superficial skin infection in a tertiary care hospital.

Methods It was a cross sectional study and conducted in the Department of Microbiology, BMSI, JPMC, Karachi, in collaboration with the dermatology department. Total 310 skin samples were collected. Samples were processed for primary screening test potassium hydroxide solution wet mount. Sabouraud's dextrose agar with (cycloheximide and chloramphenicol) & without antibiotics and dermatophyte test media were used for culture.

Results Data was analyzed using SPSS version 22. Out of the 310 skin samples, 79 (31.29%) were positive for the dermatophytes. In this study, dermatophytes were most common group of fungi responsible for superficial skin infection in the said tertiary care Hospital. About 23(7.4%) were non-dermatophytes. A total of 78(25.16%) accounted for yeast and 8(2.5%) were found to be mixed growth. Tinea capitis was found to be the most prevalent clinical type followed by tinea corporis and tinea ungium, respectively.

Conclusion This study reveals that children are most commonly affected and followed by the age group of 21-30 year. Tinea capitis is the most prevalent skin infection in the studied population. The known prevalence of dermatophytes (31.29%) in superficial skin infections should be considered an important factor when determining the causative factors of skin diseases. In addition to this, the derived results can be taken as a base for probing further in the topic. This will help in adopting a more targeted approach towards treating the superficial skin infections.

Key words
Dermatophytes**,** superficial skin infection, tinea Capitis .

Introduction

Despite numerous advances in medicine, superficial fungal infections are known as one of the most prominent skin diseases.[1,6] Superficial fungal infections are caused by multiple types of fungi that have the ability to affect various parts of the human body.[13] Superficial fungal infections include common skin disease as well as rare infections confined to specific geographical areas.[12] These infections include Dermatophytes which infect keratinized epithelium hair follicles and nail apparatus, Candida spp. which grow in warm, humid environment and Malassezia spp.: requires a humid microenvironment and lipid to grow.[13]

Dermatophytes are considered as the most

Address for correspondence
Dr. Shahjabeen
Assistant Professor,
Department of Physiology,
Fazaia Ruth Pfau Medical College
Ph: 03343715382
Email: khanshahjabeen@gmail.com

prevailing fungi species involving hair, skin, and nails.[9] There are three genera of dermatophytes include: Trichophyton spp., Microsporum spp. and Epidermatophyton. Dermatophytosis is classified by the body regions such as 1.Tinea capitis, 2.Tinea barbae, 3.Tinea corporis, 4.Tinea cruris, 5.Tinea manuum, 6.Tinea pedis, 7.Tinea unguim and 8.Tines versicolor.[6,13]

Dermpatophytes cause a disease known as dermatophytosis that affects the keratinized tissues of the body. Infections that are caused typically by dermatohpytes are known as ring worm infections. The name is given because of the typical appearance. "Tinea infections" is the name given to these infections and the different names given to these are due to the site that they affect. Another importance of this study is due to the fact that these are often confused with other diseases; therefore early diagnosis is imperative for appropriate management. Humidity in higher concentration, densely populated areas, and poor living conditions are some of the factors that are usually common with the prevalence of these infections on a higher scale.[4]

A study conducted on the prevalence of tinea capitis in south-west Nigeria revealed that tinea capitis is the most common form of dermatophytosis that affects the children of all ages before the pre-puberty. Tinea capitis affects hair shaft and scalp initially. As for the transmission of tinea capitis, it is known to be enhanced by contaminated brushes, hats, overcrowding and other objects. Even the same barbing equipment used by a local barber can be identified as a cause of the spread of infection. The studies reveal that there has always been a shift in trend of the most common causative organisms for tinea capitis.

The review of literature led us to importance of the study done to find the determinants of fungal infections. The clinical significance pertinent to these infections is very high. Studying the prevalence is extremely important for the proper diagnosis and timely management of the infection. The over use or in other words, misuse of the drugs such as those that suppress the immune system have weakened the system in general. There by providing an open ground for opportunistic pathogens to latch onto the host. Our study aims to study the prevalence of dermatophytes so that common trends can be watched out for. In addition to this measures can also be taken towards the prevention of rapidly spreading infections.[3]

This study aims to evaluate the prevalence and epidemiology of superficial skin infection caused by dermatophyte.

Methods

This is a cross–sectional study, carried out on 310 patients. Samples for the study were taken from Dermatology Department, Jinnah Postgraduate Medical Centre (JPMC), Karachi. All the specimens were processed for the diagnosis by potassium hydroxide mount and mycological culture.

All the patients suspected with clinical diagnosis of superficial fungal skin infection irrespective of age or genders referred by Dermatology Department JPMC were included. Self-made proforma was used for data collection. Proforma contained three sections. First section covered the demographic data including age, gender, education and residence. Second section contained family history, past history, personal and drug history. Third section includes the physical examination.

Processing of specimens was done for 1. Direct microscopy by KOH mounts: slides were microscopically evaluated for the presence of thread like branching structure (hyphae) or

beaded spherical structures (spores) 2. Mycological culture was done by using Sabouraud's dextrose agar (SDA) and dermatophyte test medium (DTM). Observation for growth was done periodically for 4 weeks. If there was growth, pathogen was identified by cultural characteristic and microscopy.

SPSS 22 was used for data analysis. P value less than 0.05 was considered as statistically significant.

Results

Data were stored and analyzed using IBM-SPSS version 22.0 count and percentages were reported for baseline characteristics. Bar chart was also used to gives the graphical presentation of the study outcomes.

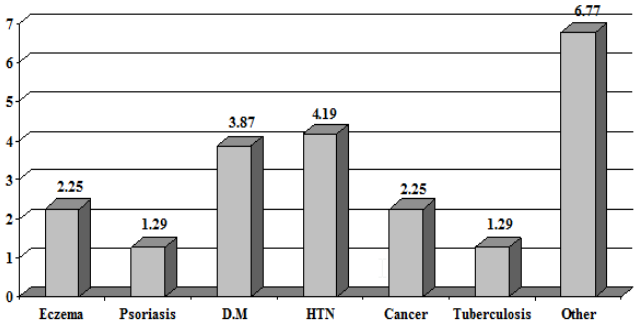
In the present study there were 310 samples. Distribution of age showed that 31.61% isolates came from patients aged 1-10 year; 17.41% were isolate came from patients aged between 21-30 year; 10.97% came from patients aged 41-50 year. According to this study 53.87% data received from female while 46.12% were from male.

Table 1 reports the prevalence of fungi in superficial skin infection that obtained from the 310 sample, 31.29% were dermatophytes, 7.4% were non dermatophytes, 25.16% were yeast and 2.5% were mixed growth. However no growth was found in about 33.54% of the individuals.

Figure 1 report the co morbidities of the studied samples, 2.25% had eczema and cancer, 3.87% had diabetes, 4.19% had hypertension, 1.29% had psoriasis and tuberculosis and 21% had reported other diseases such as asthma, arthritis, hypothyroidism, pemphigus valgeris, hepatitis C.

Table 1 Prevalence of fungi in superficial skin infections.

Fungi	*N*	*%*
Dermatophytes	97	31.29
Non dermatophytes	23	7.4
Yeast	78	25.16
Mixed	8	2.5
No growth	104	33.54
Total	310	100



Figuer 1 Comorbidities of study population.

Table 2 Prevalence of clinical types in superficial skin infections.

Clinical types	*N*	*%*
Tinea capitis	48	49.48
Tinea corporis	20	20.61
Tinea cruris	2	2.06
Tinea manuum	4	4.12
Tinea pedis	7	7.21
Tinea barbe	1	1.03
Tinea ungium	15	15.46
Total	97	100

Table 2 reports the prevalence of clinical type in superficial skin infections caused by dermatophytes, 49.48% were tinea capitis, 20.61% were tinea corporis, 15.46% were tinea ungium. Tinea cruris accounted for 2.06%, Tinea manuum for 4.12%, tinea pedis for 7.21%, and tinea barbe for 1.03% respectively.

Discussion

In this study, tinea capitis followed by tinea corporis and tinea ungium were the most common type of superficial skin infection cause by fungi, which is in agreement with those of Abd Elmegeed *et al*. Present result was also in contrast to the Eftekarjo *et al*. who reported tinea

cruris and tinea corporis were the most common clinical presentation in Tehran.

In our study, maximum number of patients was from the age group of 1-10 year. This finding is in accordance with the study conducted by Abd Elmegeed *et al*. The prevalence of tinea capitis as being the most common infection that is 49.48% is in accordance with the findings of the study done in south–western Nigeria.[15] Another study that focused on epidemiological trends in the skin mycoses worldwide revealed that in poorer countries, tinea capitis can be found as the more prevalent one.[11] A laboratory based study done in India found out that tinea corporis and tinea capitis were the most common infections that were laboratory confirmed.[5] The age group most commonly affected was 1-10 years as found in our study. The reason for the children being most affected can be a low socio economic status or other factors that can be associated with the overall socio economic status of a nation. Another predisposing factor in this case was overcrowding.[15] Tinea capitis is known to be an infection that affects the scalp and the hair. This study also agreed with our findings such as tinea capitis being the most common clinic type (49.48%) and the next common being the tinea corporis (20.61%). Our finding that children between the ages of 1-10 are most commonly affected was also seconded by the results of this study.[7]

Tinea pedis, that accounted for about 7.21% of the infections in our study is also known to have a great impact and is known to affect populations at a large scale. Studies found that tinea pedis can be regarded as the second most common disease affecting the population of the United States. This points out towards the rather great impact that tinea pedis has. Trichophyton, Microsporum, and Epidermatophyton were identified as the three most common genera of fungi causing tinea pedis.[2] The studies also suggest that the prevalence of tinea pedis or tinea unguium is higher in the patient with other co-morbidities.[16]

In a study done in Tripoli, Libya, the frequency of tinea corporis was found to be of 45% of cases. Our study also regards tinea corporis as the second most prevalent infection that is in 20.61% of the cases.[8] Co morbidities are an integral part when it comes to skin infections, people having conditions which cause immunosuppression such as those affected with HIV and conditions such as diabetes mellitus should also be tested for culture positivity. Our study found out that about 3.87% had diabetes and about 2.25% had eczema and cancer. So recommendations for obtaining a specimen for fungal culture should be considered and acted upon for early diagnosis, prevention, or treatment.[18]

The presence of dermatophytes in about 31.29% of the samples taken is an alarming situation. Out of 310 samples, 97 found dermatophytes. Our results are in accordance with other studies labeling dermatophytes as the most common fungi in every type of studied superficial fungal disease[14]. The findings of our study are also in agreement to the Danielle et.al. who reported that dermatophytosis is more prevalent in children rather than in adults as our study suggested, and especially the tinea capitis as found out by our study.[10]

Conclusion

The present study shows that studying and examining the different fungi prevalence is necessary for the appropriate treatment of superficial skin infections. This study also focuses on the comorbidities in such a manner that patient with cancer, diabetes mellitus and other immunosuppressive conditions should be examined for a possible fungal infection if

symptoms are present.

References

1. Abd Elmegeed A, Ouf S, Moussa T, Eltahlawi S. Dermatophytes and other associated fungi in patients attending to some hospitals in Egypt. *Brazil J Microbiol*. 2015;**46(3)**:799-805.
2. Al Hasan M, Fitzgerald S, Saoudian M, Krishnaswamy G. Journal search results - Cite This For Me. *Clin Mol Allergy*. 2004;**2(1)**:5.
3. Ayanlowo O, Akinkugbe A, Oladele R, Balogun M. Prevalence of Tinea capitis infection among primary school children in a rural setting in south-west Nigeria. *J Pub Health Africa*.2014;**5(1)**.
4. Bhatia V, Sharma P. Epidemiological studies on Dermatophytosis in human patients in Himachal Pradesh, India. *Springer Plus*.2014;3(1).
5. Das S, Goyal R, Bhattacharya S. Laboratory-based epidemiological study of superficial fungal infections. *J Dermatol*. 2007;**34(4)**:248-53.
6. Eftekarjo, Y., Balal, A., Taghavi, M., Rahimi, Z., Nikaein, D. Epidemiology and prevalence of superficial fungal infections among dormitory students in Tehran, Iran. J Mycol Res.2015;**2(1)**:49-54.
7. EI N. Dermatophytosis in Western Africa: A Review. *Pak J Biol Sci*.2010;**13(13)**:649-56.
8. Ellabib M, Khalifa Z, Kavanagh K. Dermatophytes and other fungi associated with skin mycoses in Tripoli, Libya. *Mycoses*.2002;**45(3-4)**:101-4.
9. Guarner J, Brandt M. Histopathologic Diagnosis of Fungal Infections in the 21st Century. *Clin Microbiol Rev*.2011;**24(2)**:247-80.
10. Hawkins, D., & Smidt, A. Superficial Fungal Infections in Children. *Pediatr. Clin. North Am*.2014;**61(2)**:443-55. doi: 10.1016/j.pcl.2013.12.003
11. Havlickova B, Czaika V, Friedrich M. Epidemiological trends in skin mycoses worldwide. *Mycoses*.2008;**51**:2-15.
12. Hay RJ, Ashby HR, fungal infections in Griffth CE, Barker JR leikerT, Chalmers R . Cremors D, eds rooks Text book of dermatology. 2016
13. Kaushik N, Pujalte G, Reese S. Superficial Fungal Infections. Primary Care: *Clinics in Office Practice*.2015;**42(4)**:501-516.
14. Kemna M, Elewski B. A U.S. epidemiologic survey of superficial fungal diseases. *J Am Acad Dermatol*.1996;**35(4)**:539-42.
15. Oke, O., Onayemi, O., Olasode, O., Omisore, A., & Oninla, O. The prevalence and pattern of superficial fungal infections among school children in ile-ife, south-western nigeria. *Dermatol Res Pract*.2014:1-7. doi: 10.1155/2014/842917
16. Perea, S., Jose Ramos, M., Garau, M., Gonzalez, A., R. Noriega, A., & del Palacio, A. Prevalence and Risk Factors of Tinea Unguium and Tinea Pedis in the General Population in Spain. J Clin Microbiol.2000;**38(9)**.
17. Rezaei-Matehkolaei A, Makimura K, Hoog SD, Shidfar MR, Zaini F, Eshraghian M, *et al*. Molecular epidemiology of dermatophytosis in Tehran, Iran, a clinical and microbial survey. *Med Mycol*.2013;**51(2)**:203–7.
18. Daalen FVV, Kallen MC, C. M. A. Van Den Bosch, Hulscher MEJL, Geerlings SE, Prins JM. Clinical condition and comorbidity as determinants for blood culture positivity in patients with skin and soft-tissue infections. Eur *J Clin Microbiol Infect Dis*. 2017; **36(10)**:1853–8.
19. White TC, Findley K, Dawson TL, Scheynius A, Boekhout T, Cuomo CA, *et al*. Fungi on the Skin: Dermatophytes and Malassezia. *Cold Spring Harb. Perspect. Med*.2014;**4(8):**a019802.