

THE ROLE OF NATIVE PREPARATION IN THE DIAGNOSIS OF SUPERFICIAL DERMATOPHYTE INFECTIONS

 Feray Ferda Şenol

Elazığ Fethi Sekin Şehir Hastanesi Mikrobiyoloji ve Klinik Mikrobiyoloji, Elazığ

ABSTRACT




Objective: Superficial dermatophyte infections are classified according to the anatomical location and are named tinea. The factors of dermatophyte infections may vary depending on socioeconomic status, geographical region, climate, and lifestyles. The diagnosis of dermatophytosis is made by clinical findings and some laboratory tests. In our study, native preparation results of patients who were admitted to our dermatology clinic with a pre-diagnosis of dermatomycoses were evaluated retrospectively according to gender, age, and localization.

Material and Method: This study included 592 patients with dermatomycoses who were admitted to our clinic between the 1st of August 2018 and the 1st of December 2021. Swabs were taken from each of 592 patients. Swabs were placed in a drop of 10% potassium hydroxide (KOH) solution on a microscopic slide and covered with a coverslip. While nail and hair samples were kept on the slide for one hour, skin samples were kept on the slide for half an hour. The findings were evaluated retrospectively.

Results: In our study, 265 (48.71%) of 544 patients who applied to the dermatology clinic of our hospital with a preliminary diagnosis of dermatomycosis were female and 279 (51.28%) of them were male. As a result of direct microscopic evaluation with a native preparation, 272 (50%) patients were positive. While *Tinea corporis* was the most common reason for patients to apply to the hospital, the highest positive rate was determined as *Tinea cruris* with 58.97%. In the samples, the distribution of the highest positivity according to body sites was determined as 60% *tinea pedis* in children, and 60.60% *tinea cruris* in adults.

Conclusion: As a result, fungal infections have increased dramatically in recent years. The correct and early diagnosis together with early treatment initiation is extremely important in fungal infections. In addition, early diagnosis is very important in terms of minimizing the harmful effects of antifungal drugs that are prescribed unnecessarily. It has been emphasized that the native preparation method in superficial dermatophyte infections is cheap and practical, and it can quickly guide the treatment.

Keywords: Dermatophytosis, direct microscopic examination, superficial fungal infections.

	CORRESPONDING AUTHOR: Feray Ferda Şenol Elazığ Fethi Sekin Şehir Hastanesi Mikrobiyoloji ve Klinik Mikrobiyoloji laboratuvarı, Elazığ drferdasenol@yahoo.com
	FFŞ https://orcid.org/0000-0003-4705-5757
	DELIVERING DATE: 27 / 07 / 2022 • ACCEPTED DATE: 20 / 10 / 2022

DERİ YÜZEYEL DERMATOFİT ENFEKSİYONLARININ TANISINDA NATİV PREPARATIN YERİ

ÖZET

Amaç: Yüzeysel dermatofit enfeksiyonları anatomik olarak yerleştiği bölgeye göre sınıflandırılıp tinea olarak adlandırılır. Dermatofit etkenleri sosyoekonomik durum, coğrafik bölge, iklim ve yaşam tarzlarına göre değişebilmektedir. Dermatofitoz tanısı klinik bulgular ve bazı laboratuvar testleriyle konulur. Çalışmamızda hastanemiz dermatoloji kliniğine başvuran dermatomikoz ön tanısı olan hastaların yaş,cinsiyet ve örneğin lokalizasyonuna göre nativ preparat sonuçları retrospektif olarak değerlendirilmiştir.

Materyal ve Metot: 1 Ağustos 2018 ile 1 Aralık 2021 tarihleri arasında hastanemiz dermatoloji kliniğine dermatomikoz ön tanısıyla başvuran 544 hastadan lam üzerine alınan sürüntü örneklerinin üstüne %10-30 potasyum hidrokisit (KOH) solüsyonu damlatılıp lamelle kapatılan preparatlar tırnak ve saç örnekleri için bir saat,deri örnekleri için yarım saat bekletilip değerlendirilmiş, çıkan sonuçlara göre retrospektif olarak analiz edilmiştir.

Bulgular: Çalışmamızda hastanemiz dermatoloji kliniğine dermatomikoz ön tanısıyla başvuran 544 hastanın 265 (%48,71)' i kadın, 279 (%51,28)'u erkek hasta olarak tespit edilmiştir. Nativ preparatla yapılan direk mikroskopik değerlendirmenin sonucunda 272 (%50) hasta pozitif olarak değerlendirilmiştir. Hastaların hastaneye en sık başvuru sebebi Tinea corporis olurken en yüksek pozitiflik %58,97'lik oranla Tinea cruris olarak tespit edilmiştir. Çocuklarda pozitiflik %43,36 olarak tespit edilirken, yetişkinlerde %51,74 olarak tespit edilmiştir. Pozitif tespit ettiğimiz örneklerde en yüksek pozitifliği vücut bölgelerine göre dağılımı çocuklarda Tinea pedis %60, yetişkinlerde ise en yüksek pozitiflik Tinea cruris %60,60 olarak tespit edilmiştir.

Sonuç: Son yıllarda ciddi bir şekilde artan mantar enfeksiyonlarından dolayı bu enfeksiyonlara karşı doğru ve erken tanıyla tedaviye erken başlanması, tedaviye gereksiz başlanan antifungal ilaçların kesilerek zararlı etkilerinin en aza indirilmesi yönünden erken tanı çok önemlidir. Çalışmamızda yüzeysel dermatofit enfeksiyonlarının tanı yöntemlerinden olan nativ preparat incelenmesinin ucuz, pratik ve kısa sürede tedavide yol gösterici olduğu vurgulanmaya çalışılmıştır.

Anahtar kelimeler: Dermatofit, direkt mikroskopik inceleme, yüzeysel mantar enfeksiyonları.

INTRODUCTION

Skin is a barrier that protects our body from microorganisms, it also creates a living environment for some microorganisms.¹ Superficial dermatophytoses usually attach to the outer layers of the skin, hair and nails and do not penetrate living tissues, but they can hydrolyze keratin by producing keratinase. The source of infection is usually humans in superficial dermatophytosis but animals and soil may also be the source. Dermatophytoses, which mostly cause benign infections, do not induce cellular immune response because they colonize the dead tissue and cause little tissue damage.²

Among cutaneous fungal infections, superficial fungal infections are the most common. Superficial fungal infections are caused by three types of dermatophytes: Trichophyton, Microsporum and Epidermophyton. Less frequently, non-dermatophyte fungi such as Malassezia furfur and Candida species are seen as superficial skin infection agents.^{3,4} Trichophyton causes infection mostly in skin, hair and nails; Microsporum in skin and hair, and Epidermophyton in skin and nails. Trichophyton rubrum is the most common dermatophyte in the world. It is estimated

that approximately 10-20% of the world population is infected with this dermatophyte.⁵

Factors such as climate, geographical region, lifestyle, and socioeconomic status affect the dermatophyte flora.⁶ In recent years, changes in lifestyles and widespread use of immunosuppressive treatments and synthetic products have also affected the fungal flora. Detecting the flora of the regions can be a guide in determining the treatment.⁷ The diagnosis and treatment of these infections are important in terms of public health and the economy since superficial mycoses are contagious and frequently seen in our society.⁸ Accurate and early diagnosis of fungal infections is important in terms of both initiating antifungal therapy on time and minimizing the toxic effects of antifungal agents by discontinuing the antifungal agents if it is not necessary.⁹ The clinical manifestations of fungal infections can be confused with many skin diseases. Definitive diagnosis is made by clinical presentation and etiological diagnosis methods.¹⁰ Potassium hydroxide (KOH) is helpful in demonstrating hyphae with the microscope and confirming the diagnosis of dermatophyte infection. Wood's light, fungal culture, skin or nail biopsy are also among other diagnostic methods.¹¹

Table 1. Distribution of native preparation positive patients by body sites.		
Types of dermatophytosis	Total number of patients	Number of Positive Patients (%)
<i>Tinea pedis</i>	159	87 (54.71%)
<i>Tinea corporis</i>	189	94 (51.36%)
<i>Tinea capitis</i>	39	14 (35.89%)
<i>Tinea cruris</i>	39	23 (58.97%)
<i>Tinea unguium</i>	114	52 (45.61%)
<i>Tinea barbae</i>	4	2 (50%)
Total	544	272 (50%)

In this study, we think that the native preparation examination of the samples taken from the patients who applied to our hospital with the preliminary diagnosis of dermatophytosis will contribute to determining the prevalence and early diagnosis and initiation of treatment.

MATERIAL AND METHOD

The study included patients who applied to our hospital, between the 1st of August 2018 and the 1st of December 2021, with the complaint of superficial dermatophyte. The samples were taken from the squamous areas or the vesicular base on the edge of the lesion and macerated areas for skin samples; by clipping or scraping the nail for the nail samples; by pulling the mat, broken hair for scalp samples. The samples were spread on the slide, 10-30% KOH was dripped and covered with a coverslip. The preparation was placed in a moist petri dish with a prewetted filter paper. The petri dish was closed and incubated for half an hour for skin samples and one hour for nail and hair samples. The excess wetness of the samples was removed with gauze and examined under the microscope. In native preparation, Dermatophytes appear as clustered or individual hyphae of varying lengths, often septate hyphae which curve and bend like thin tree branches.

Ethics Committee Approval

Approval from the Firat University Faculty of Medicine Ethics Committee (Decision No: E-13281952-929-1433 Date:02.12.2021).

RESULTS

In the study, 544 patients with a preliminary diagnosis of dermatophytosis were evaluated. Of these patients, 265 (48.71%) were female and 279 (51.28%) were male. According to the native preparation evaluations of these patients, 272 (50%) of them were positive. The most common reason for admission was *Tinea*

corporis according to body sites while the highest positivity rate was 58.97% for *Tinea cruris*. The distribution of native preparation positivity according to the body sites of the patients is shown in Table 1.

In this study, the native preparation positivity was analyzed according to whether the patients were children or adults, positivity was found in 49 (43.36%) of 113 pediatric patients and 223 (51.74%) of 431 adult patients. Table 2 shows the distribution of native preparation positivity according to the body sites of children and adults.

DISCUSSION

Our skin is the largest organ and it covers our body all around against the external environment and is in constant contact with microorganisms unlike other organs.¹² Skin and soft tissue infections are one of the common causes of hospitalization and antibiotic usage.¹³ It can be seen as a localized infection or more severe life-threatening conditions.¹⁴ Superficial dermatophyte infections are the most common skin diseases. Although dermatophyte infections are very contagious and common, they have been ignored in previous years because they are generally not life-threatening. The importance of fungal infections, including dermatophytes, has gradually increased due to reasons such as the increase of immunocompromised patients, the use of broad-spectrum antibiotics, and the elderly population. Early diagnosis and treatment of dermatophyte infections are very important. Dermatophytosis is a group of superficial fungal infections that can grow by invading keratin in the skin, hair and nails to obtain nutrients.¹⁵ Dermatophytosis is related to age and lifestyle and has a long-term course. Transmission could occur by direct contact with the source of infection or by contaminated items such as combs, brushes, underwear, slippers, nails, hats and scissors.¹⁶

Many skin infections have a similar clinical presentation which causes confusion in diagnosis therefore early differential diagnosis is very important. Native preparation is important in diagnosis, as it gives quick results and is practical. In various studies conducted in our country using the native preparation, Özekinci *et al.* reported a positivity rate of 15.9%, Albayrak *et al.* 35.8%, Eryılmaz *et al.* 36%, Dilek *et al.* 42.9% Güdücüoğlu *et al.* found the highest rate (63%) of positivity in students of physical education department.^{6,17-20} In a nursing hospital in Nepal, 89 (44.5%) of 200 patients with suspected superficial mycosis were positive and *tinea corporis* was detected in 50 (25%) of them by native preparation examination.²¹ In our study, the native preparation positivity rate was determined as 50%, and there was no significant difference between

the patients in terms of gender. In several studies the distribution of dermatophyte infections was examined by body sites, Dash *et al.* found tinea cruris at 50% and tinea corporis at 47.47%; Ogbu *et al.* and George *et al.* found tinea capitis to be the most common.²²⁻²⁴ In another study, Albayrak *et al.* reported that 28.5% of hospital admissions were caused by toenail changes, followed by body lesions with 24.3% and non-nail skin lesions on the foot with 22.5%. They found that the most common age at presentation was 31-40 years in both genders and there was no significant difference in positivity between the genders.¹⁷

The prevalence of superficial fungal infections in children was found between 11.3% and 40.57% in different studies.²²⁻²⁵ Gandhi S *et al.* reported that superficial dermatophyte infection was detected in 100 of 521 (19%) children admitted to the hospital with skin lesions, the highest dermatophytosis rate was 56% in children aged 10-14 years, and the male/female ratio was 1.27/1 in males which is slightly higher. They also found that 72% of the patients were from rural areas, 64% of them were from low socioeconomic levels and 83% of the patients had a history of contact with family members. The most common source in the family was the mother, followed by siblings and fathers. They found that the most common type of accommodation with was joint family setup with 55% and the lowest rate was the hostel setup with 17%. Considering the clinical features of these patients in terms of distribution of dermatophytes according to body sites, they found that the most common dermatophytes were tinea corporis with 45% and the second most common was tinea cruris with 28%.²⁶ In our study, in children the positivity rate was 43.36% and 60% of them were tinea pedis in distribution according to body site. In adults, the positivity rate was 51.74% and 60.60% of them were tinea cruris.

Table 2. Native preparation positivity according to body sites in children and adults.			
	Tinea pedis	Number of Positive Patients	Percentage (%)
Child	10	6	60%
Adult	149	81	54.36%
	Tinea capitis	Number of Positive Patients	Percentage (%)
Child	35	12	34.28%
Adult	4	2	50%
	Tinea corpore	Number of Positive Patients	Percentage (%)
Child	51	24	47.05%
Adult	138	70	50.72%
	Tinea cruris	Number of Positive Patients	Percentage (%)
Child	6	3	50%
Adult	33	20	60.60%
	Tinea unguium	Number of Positive Patients	Percentage (%)
Child	11	4	36.36%
Adult	103	48	46.60%
	Tinea barbae	Number of Positive Patients	Percentage (%)
Child	-	-	-
Adult	4	2	50%

CONCLUSION

We think that the high positivity rates in our study suggested that direct microscopic examination with a native preparation, which is inexpensive and fast, prior to the treatment will provide a great advantage in planning the treatment method.

- This study was presented at the 3rd International Eurasian Mycology Congress held at Van Yüzüncü Yıl University on 7-9 September 2022. presented as a poster.

*The authors declare that there are no conflicts of interest.



REFERENCES

1. Tümbay E. Derinin mantar enfeksiyonları. Willke Topçu A, Söyletir G, Doğanay M, ed. Enfeksiyon Hastalıkları ve Mikrobiyolojisi. İstanbul Nobel: Tıp Kitapevleri 2002; 1785-1797.
2. Hay RJ, Moore M. Mycology, In: Textbook of Dermatology. Blackwell Scientific, Oxford. 1998; 1277-1376.
3. Kölemen F. Derinin mantar hastalıkları. Tüzün Y, Kotoğyan A, Aydemir EH, Baransu O (editörler). Dermatoloji. 2. Baskı, İstanbul: Nobel Tıp Kitapevleri. 1994; 81-96.
4. Weinstein A, Berman B. Topical treatment of common superficial tinea infections. Am Fam Physician 2002; 65: 2095-2102.
5. Buxton PK. Dermatoloji. ABCD Dizisi. BMJ Publ 1993; 44-52.
6. Özekinci T, Özbek E, Gedik M, et al. Dicle Üniversitesi Tıp Fakültesi Mikrobiyoloji Laboratuvarına Başvuran Hastalarda Dermatofitoz Etkenleri. Dicle Tıp Dergisi 2006; 33: 19-22.
7. Ergin Ç, Ergin Ş, Yaylı G, Baysal V. Süleyman Demirel Üniversitesi Tıp Fakültesi Dermatoloji Kliniğine Başvuran Hastalarda Dermatofitoz Etkenleri. Türk Mikrobiyol Cemiyeti Dergisi 2000; 30: 121-124.
8. Üstünsoy M. Derinin Yüzeysel Mantar Hastalıkları. Odtü Sağlık ve Rehberlik Merkezi.20011; http://www.mc.edu.tr/pdf/ODTU_SRM_brosur_mantar.
9. Birinci A, Tanrıverdi-Çaycı Y. Mantar enfeksiyonlarının serolojik tanısı. Türk Hij Den Biyol Derg 2016; 73: 175-182.
10. Kölemen F. Derinin mantar hastalıkları. Tüzün Y, Kotoğyan A, Aydemir EH, Baransu O (editörler). Dermatoloji. 2. Baskı, İstanbul: Nobel Tıp Kitapevleri. 1994; 81-96.

11. Hainer BL. Dermatophyte infections. *Am Fam Physician* 2003; 67: 101-108.
12. Gül Ü. Derinin Yüzeysel Bakteriyel Enfeksiyonları. Ankara: Türkiye Klinikleri Yayınevi. 2013.
13. May AK. Skin and soft tissue infections. *Surg Clin North Am* 2009; 89: 403-420.
14. Bisno AL, Stevens DL. Streptococcal infections of skin and soft tissues. *N Engl J Med* 1996; 334: 240-245.
15. Reiss E, Shadomy HJ, Lyon GM. *Fundamental Medical Mycology*. 1st ed. Hoboken, NJ, USA: Wiley-Blackwell 2012; 527-565.
16. Woo TE, Somayaji R, Haber RM, Parsons L. Diagnosis and Management of Cutaneous Tinea Infections. *Adv Skin Wound Care* 2019; 32: 350-357.
17. Albayrak H, Kurç M, Raimoğlu O, Yanık M, Topkaya A. Tekirdağ Bölgesi Dermatomikoz Hastalarının Klinik. Demografik ve Labotuar Sonuçları. *Namık Kemal Tıp Dergisi* 2020; 8: 234-239.
18. Eryılmaz E, Samadzada R, Maçın S, Fındık D. Konya Selçuk Üniversitesi Hastanesi'ne Başvuran Hastalarda Saptanan Dermatofitler. *Mantar Dergisi/The Journal of Fungus* 2019; 10: 84-88.
19. Dilek N, Yücel AY, Dilek AR, Saral Y, Toraman ZA. Fırat Üniversitesi Hastanesi Dermatoloji Kliniği'ne Başvuran Hastalardaki Dermatofitoz Etkenleri. *Türk Dermatoloji Dergisi* 2009; 3: 27-31.
20. Gündüçoğlu H, Akdeniz N, Bozkurt H, et al. Beden Eğitimi Bölümü Öğrencilerinin Yüzeysel Mantar Hastalıkları Açısından Değerlendirilmesi. *Van Tıp Dergisi* 2006; 13: 53-55.
21. Khadka S, Sherchand J, Pokharel D, et al. Clinicomycological Characterization of Superficial Mycoses from a Tertiary Care Hospital in Nepal. *Hindawi Publishing Corporation Dermatology Research and Practice*. 2016; Article ID 9509705, 7 pages <http://dx>.
22. Dash M, Panda M, Patro N, Mohapatra M. Sociodemographic profile and pattern of superficial dermatophytic infections among pediatric population in a tertiary care teaching hospital in Odisha. *Indian J Paediatr Dermatol* 2017; 18: 191-195.
23. Ogbu CC, Okwelogu IS, Umeh AC. Prevalence of superficial fungal infections among primary school pupils in Awk South local government area of Anambra state. *J Mycol Res* 2015; 2: 15-22.
24. George IO, Altraide DD. Dermatophyte infections in children: A prospective study from Port Harcourt, Nigeria. *Niger Health J* 2008; 8: 52-54.
25. Oke OO, Onayemi O, Olasode OA, Omisore AG, Oninla OA. The prevalence and pattern of superficial fungal infections among school children in Ile-Ife, South-Western Nigeria. *Dermatol Res Pract* 2014; 2014: 842917.
26. Gandhi S, Patil S, Badad A. Clinicoepidemiological study of dermatophyte infections in pediatric age group at a tertiary hospital in Karnataka. *Indian J Paediatr Dermatol* 2019; 20: 52-56.