

Are Dermatophytid Reactions in Patients with Kerion Celsi Much More Common Than Previously Thought? A Prospective Study

Filiz Topaloğlu Demir, M.D.,* and Ayse Serap Karadag, M.D.†

*Department of Dermatology, Van Regional Training and Research Hospital, Van, Turkey, †Department of Dermatology, Goztepe Training and Research Hospital, S.B Istanbul Medeniyet University, Istanbul, Turkey

Abstract: Dermatophytid reactions are secondary eruptions in response to dermatophytosis. Only a few cases demonstrating an association between dermatophytid reactions and tinea capitis have been reported. Dermatophytid reactions were evaluated in patients diagnosed with kerion celsi. Patients admitted to the dermatology clinic of Van Regional Training and Research Hospital between November 22, 2012, and July 1, 2013, diagnosed with kerion celsi were evaluated for dermatophytid reactions. Six girls (32%) and 13 boys (68%) were included in this study. Dermatophytid reactions were detected in 13 of the 19 patients (68%). Seven patients (36.84%) had eczematous patches or plaques and three (15.8%) had papules. Eczematous lesions, papules, and pustules were noted in two patients (10.5%) and one (5.3%) had signs of an angioedema-like reaction. Dermatophytid reactions in all patients were observed before the initiation of therapy. According to our clinical experiences, dermatophytid reactions in patients with kerion celsi were more common than reported. Eczematous scaly patches or plaques were the most frequently seen forms of dermatophytid in patients with kerion celsi. Dermatophytid reactions may occur before or after initiation of systemic antifungal therapy. Recognition of this reaction is important so that dermatophytids can be distinguished from drug reactions and the decision can be made whether to continue or to stop the systemic antifungal treatment.

Tinea capitis is a dermatophyte infection of the hair and scalp. It is most commonly seen in preadolescent children (1). The clinical presentation of tinea capitis varies depending on the causative species and other

factors such as the host's immune response. Tinea capitis presents in several ways, ranging from a scaly, uninfamed dermatosis resembling seborrheic dermatitis to an inflammatory disease with scaly, erythem-

Address correspondence to Filiz Topaloğlu Demir, M.D., Department of Dermatology, Van Regional Training and Research Hospital, Suphan Mah., Edremit Yolu 1. Km., Merkez/Van, Turkey, or e-mail: filizsvet@yahoo.com.

atous lesions and hair loss or alopecia that may progress to severely inflamed, deep abscesses termed kerion celsi (2). Id reactions are a type of secondary immunologic reaction, resulting from a variety of stimuli, including infectious and inflammatory skin diseases. A dermatophytid reaction is defined as an id reaction caused by dermatophytosis.

The differential diagnosis of id reactions depends on the clinical form of the reaction. The histopathologic findings of id reactions also vary depending on the lesion type, and these findings are not specific for id reactions. The most important point in the treatment is to identify this reaction and treat the underlying infection or dermatitis. Dermatophytid reactions are commonly related to tinea pedis (3,4). To our knowledge, no prospective study has examined dermatophytid reactions in patients with kerion celsi. Therefore we aimed to investigate dermatophytid reactions in a group of patients diagnosed with kerion celsi.

METHODS

Patients presenting to the dermatology clinic of Van Regional Training and Research Hospital between November 22, 2012, and July 1, 2013, clinically diagnosed with kerion celsi were included in the study. All patients with kerion celsi were evaluated for dermatophytid reactions. A potassium hydroxide examination was performed on all lesions defined as dermatophytid reactions; no fungal elements were found. Systemic antifungal therapy was prescribed for all patients according to their weight. If scalp lesions were severe and widespread, a systemic corticosteroid (1 mg/kg/day) was added to the antifungal therapy for 4 or 5 days. All patients were hospitalized and evaluated daily until inflammatory skin lesions and dermatophytid reactions had regressed. Patients were followed weekly after discharge until systemic antifungal therapy was stopped. All dermatophytid reactions regressed during the course of systemic antifungal therapy.

Descriptive and analytic statistics were determined using SPSS version 20 (SPSS, Chicago, IL). Chi-square analysis was used to compare the results; $p < 0.05$ was considered to be statistically significant.

RESULTS

Of the 19 patients with kerion celsi, 13 (68.42%) were male and 6 (31.58%) were female, with a male:female ratio of 2.17:1. All patients presented with typical clinical features of kerion celsi. The mean age of the patients with kerion celsi was 6.3 ± 2.9 years (range 2–12 yrs).

We found that 13 of the patients with kerion celsi (68%) had a dermatophytid reaction. They ranged in age from 2 to 12 years; 10 (76.92%) were male and 3 (23.08%) were female. We found no relationship between sex and dermatophytid reactions. Swabs from the wounds revealed *Staphylococcus aureus* in three patients, *Enterobacter cloacae* in one patient, and beta hemolytic *Streptococcus* in another patient. In 11 of the participants (84.6%), kerion celsi was caused by zoophilic species. All of these patients had a history of contact with animals. Lesions were frequently located in the parietal and temporal regions. Five had a solitary lesion and eight had lesions in multiple locations.

The clinical manifestations of dermatophytid reactions are presented in Table 1. Seven (36.8%) had eczematous eruptions (scaly patches or plaques), three (15.8%) had pruritic papules, two (10.5%) had eczematous eruptions and excoriated papules and pustules, and one (5.3%) had an angioedema-like reaction.

Dermatophytid reactions most commonly involved the face and ears. Eight patients' lesions were located on the face, ear, and neck and five presented with widespread involvement of the face and trunk (Table 1; Figs. 1–4).

All patients were diagnosed with a dermatophytid at the initial visit, before therapy was started, and all received systemic terbinafine at a dose of 125 mg/day for children weighing 20 to 40 kg, 62.5 mg/day for those weighing <20 kg, and the adult dose of 250 mg for children weighing > 40 kg. We observed increases in two patients' lesions 1 week after the systemic antifungal therapy was started (Fig. 4). All dermatophytid reactions resolved during the course of systemic antifungal therapy.

DISCUSSION

Id reaction, or autoeczematization, is a widespread, acute cutaneous reaction that results from a variety of stimuli, including infectious entities and inflammatory skin conditions. An id reaction, which is considered immunologic in origin, has been referred to as a dermatophytid or trichophytid when associated with a dermatophyte infection (5). Josef Jadassohn first reported a dermatophytid reaction in a patient with kerion celsi in 1918. He called this allergic manifestation "lichen trichophyticus" (6). In 1928, Bloch reported that the dermatophytid reaction appeared at the height of infection or shortly thereafter due to a large-scale release of antigens. He noted that dermatophytids often occurred after x-ray treatment, trich-

TABLE 1. Cases of Kerion Celsi with Dermatophytid Reactions

Age, years	Sex	Culture	Source	Location of kerion celsi	Dermatophytid location	Clinical appearance
7	Male	Negative	Zoophilic	Parietal, multiple	Forehead, eyebrow, ear	Ecematous eruptions (plaque)
10	Male	Negative	Zoophilic	Frontal, solitary	Infraorbital	Angioedema-like reaction (Fig. 1)
6	Female	<i>Enterobacter cloacae</i>	Zoophilic	Parietal, multiple	Ear	Pruritic papules
6	Male	<i>Staphylococcus aureus</i>	Zoophilic	Parietal, occipital, multiple	Widespread (face, neck, trunk, extremities)	Ecematous eruptions (patches), excoriated papules and pustules (Fig. 2)
8	Female	Beta hemolytic <i>Streptococcus</i>	Zoophilic	Temporal, solitary	Widespread (face, ear, trunk)	Pruritic papules
10	Male	Negative	Zoophilic	Parietal, temporal multiple	Ear	Ecematous eruptions (plaque)
2	Female	Negative	Zoophilic	Occipital, solitary	Face and neck	Ecematous eruptions (plaque)
7	Male	Negative	Zoophilic	Parietal, multiple	Widespread (face, trunk, extremities)	Pruritic papules
12	Male	Negative	Anthropophilic	Temporal, solitary	Ear	Ecematous eruptions (patches)
7	Male	<i>Staphylococcus aureus</i>	Zoophilic	Parietal, temporal, occipital, multiple	Widespread (face, ear, neck, trunk)	Ecematous eruptions (plaques and patches), excoriated papules and pustules (Fig. 3)
5	Male	Negative	Zoophilic	Temporal, multiple	Widespread (face, trunk)	Ecematous eruptions (plaques)
3	Male	Negative	Anthropophilic	Temporal, solitary	Ear	Ecematous eruptions (patches)
6	Male	<i>Staphylococcus aureus</i>	Zoophilic	Frontal, parietal, multiple	Face	Ecematous eruptions (patches) (Fig. 4)

**Figure 1.** Angioedema-like reaction in a patient with kerion celsi.

ophytin tests, or localized irritations (7). The exact mechanism of the dermatophytid reaction is still unknown but may occur as a local immunological response to systemically absorbed fungal antigens (5).

There is a vast difference in dermatophytid reaction incidence in the literature. In 1955, Dostrovsky et al (8) reported that only 0.2% of patients with tinea

capitis exhibited an id response. Grappel et al (9) noted that 4.2% of children and 4.6% of adults in a group of patients with dermatophytosis had dermatophytids. Dermatophytids have been most commonly reported in association with tinea pedis in adults (3,4). In one study, 37 of 213 patients with tinea pedis developed dermatophytids on their hands (3). The incidence of dermatophytids with tinea corporis and tinea incognito has been reported as 5% and 3%, respectively (10,11). Recently Cheng et al (12) reported a series of cases of five children with tinea capitis who developed dermatophytids. The authors suggested that dermatophytid reactions secondary to tinea capitis were much more common than reported. In the literature there were no prospective studies regarding dermatophytid reactions observed in patients with kerion celsi. Our study was the first, and we found that 68% of patients with kerion celsi had a dermatophytid reaction. Our study showed that dermatophytid reactions secondary to dermatophyte infections were much more common than previously reported.

Tinea capitis is the most common dermatophyte infection in children, with the highest incidence in children ages 3 to 7 years (1). Similar findings were noted in our study. The low incidence after puberty is believed to be because of the fungistatic properties of fatty acids in postpubertal sebum (13). The exact incidence of tinea capitis is unknown; it varies from place to place (1). Many factors affect these different



Figure 2. Scaly pruritic patches on the neck and widespread pruritic papules and pustules on the trunk.



Figure 3. Eczematous patches and plaques on the ear and face and widespread excoriated papules and pustules on the neck and back.

results, including socioeconomic characteristics, nutrition, and personal hygiene (14). The incidence was found to be high in developing countries due to factors such as poverty, overcrowding, improper hygiene, and illiteracy (14). Most of the patients in this series were from low socioeconomic backgrounds and had large families. Kerion celsi is an inflammatory type of tinea capitis, with a painful, crusty matted mass that is often associated with purulent drainage (2). Early diagnosis is important because a delay in treatment can lead to bacterial superinfection, resulting in cicatrization and permanent alopecia. Furthermore, from a public health standpoint, it is important to treat the infection since it is contagious.

In our study, kerion celsi was more common in boys than girls. The higher incidence in boys was associated with the presence of short hair in boys and the transmission method of spores, which reach the

scalp easily through shorter hair (13). Kerion celsi usually occurs as a single lesion (15). Although previous studies have reported the occipital area as the most favored site in tinea capitis (16), our patients had multiple lesions in several regions of the head, including the parietal and temporal areas.

Id reactions tend to occur at the height of the dermatophyte infection, slightly thereafter, or before or just after the initiation of systemic antifungal therapy, which can vary from 5 to 20 days (6,7,9,12). Cheng et al (12) and Castriota et al (17) reported that dermatophytid reactions appeared after systemic antifungal therapy. In our study, all dermatophytid reactions were determined at the initial visit, before treatment was begun. Our patients presented to our clinic over a period ranging from 2 weeks to 2 months after the dermatophyte infection began. We thought that such a long period without treatment might be



Figure 4. Eczematous patches on the face in a patient with multiple lesions before systemic antifungal therapy. Increases in lesions were seen a week after systemic antifungal treatment.

responsible for the id reaction. We observed that two of our patients' lesions increased 1 week after initiation of systemic antifungal therapy. The differential diagnosis of dermatophytid reactions includes many dermatologic conditions, such as drug eruptions. Recognition of this phenomenon is important in distinguishing dermatophytid from drug reactions and to decide whether to continue systemic treatment. The definitive diagnostic criteria to identify a dermatophytid reaction are as follows: proven dermatophyte infection, a distant cutaneous eruption free of fungal organisms, and lesions that spontaneously resolve after the primary infection is identified and eliminated (10). All of our patients presented with these diagnostic criteria.

Several clinical types of id reactions have been described. The clinical presentation can change according to the host's immunologic response. The reaction may be localized or generalized (3,12) and can present with widespread eczematous eruptions that vary from subtle 1- to 2-mm fine, scaly papules to larger papules with a predilection for analogous body sites (e.g., palms and soles) (18). Disseminated excoriated papules, vesicles, and pustules may develop as discrete or confluent, red, scaly patches and plaques in highly sensitized people. Other rare dermatophytid manifestations reported in the literature are migratory thrombophlebitis, erysipelas-like dermatitis, erythema nodosum, and erythema annulare centrifugum (19,20). In our study, eczematous lesions (scaly patches and plaques) and papules were the most commonly seen dermatophytid reaction, which was consistent with the literature. The lesions typically involved the face, neck, and trunk. Lesions on the ear were much more common than reported in the

literature (12). To our knowledge, there have been no reports of patients with an angioedema-like reaction secondary to kerion celsi before now; an angioedema-like reaction as a dermatophytid manifestation has therefore been described for the first time in our study. Limitations of our study include the inability to perform fungal cultures in our clinic.

In conclusion, dermatophyte infections accompanied by dermatophytid reactions are a common finding in kerion celsi. Id reactions can occur in many different clinical presentations, ranging from mild to severe reactions. Without close inspection, mild forms of id reactions can be overlooked. Furthermore, the variety of lesions makes it difficult to distinguish dermatophytid reactions from other diseases in the differential diagnosis. If this phenomenon is not recognized, patients can be misdiagnosed, undergoing unnecessary testing and improper treatment. Therefore it is important to remember the dermatophytid reactions associated with dermatophyte infections of the skin.

REFERENCES

1. Elewski BE. Tinea capitis: a current perspective. *J Am Acad Dermatol* 2000;42:1–20.
2. Gupta AK, Summerbell RC. Tinea capitis. *Med Mycol* 2000;38:255–287.
3. Veien NK, Hattel T, Laurberg G. Plantar *Trichophyton rubrum* infections may cause dermatophytids on the hands. *Acta Derm Venereol* 1994;74:403–404.
4. Romano C, Rubegni P, Ghilardi A et al. A case of bullous tinea pedis with dermatophytid reaction caused by *Trichophyton violaceum*. *Mycoses* 2006;49:249–250.
5. Kaaman T, Torssander J. Dermatophytid: a misdiagnosed entity? *Acta Derm Venereol* 1983;63:404–408.

6. Jadassohn J. Über die Trichophytien. *Klin Wochenschr* 1918;21:489–494.
7. Bloch B. Allgemeine und experimentelle biologie der dermatomykosen und trichophytide. In: Jadassohn J, ed. *Handbuch der Hunt und geschlechtskrankheiten*, Vol. 11. Berlin: Julius Springer, 1928:300–376, 564–606.
8. Dostrovsky A, Kallner G, Raubitschek F et al. Tinea capitis. An epidemiologic, therapeutic, and laboratory investigation of 6390 cases. *J Invest Dermatol* 1955;24:195–200.
9. Grappel SF, Bishop CT, Blank F. Immunology of dermatophytes and dermatophytosis. *Bacteriol Rev* 1974;38:222–250.
10. Gianni C, Betti R, Crosti C. Psoriasiform id reaction in tinea corporis. *Mycoses* 1996;39:307–308.
11. Romano C, Maritati E, Gianni C. Tinea incognito in Italy: a 15-year survey. *Mycoses* 2006;49:383–387.
12. Cheng N, Rucker WD, Cohen BA. Dermatophytid in tinea capitis: rarely reported common phenomenon with clinical implications. *Pediatrics* 2011;128:e453–e457.
13. Kanwar AJ, De D. Superficial fungal infections. In: Valia RG, Valia AR, eds. *IADVL textbook of dermatology*, 3rd ed. Mumbai: Bhalani Publishing House; 2008:252–297.
14. Babel DE, Baughman SA. Evaluation of the adult carrier state in juvenile tinea capitis. *J Am Acad Dermatol* 1989;21:1209–1212.
15. Arenas R, Toussaint S, Isa-Isa R. Kerion and dermatophytic granuloma. Mycological and histopathological findings in 19 children with inflammatory tinea capitis of the scalp. *Int J Dermatol* 2006;45:215–219.
16. Pai VV, Hanumanthayya K, Tophakhane RS et al. Clinical study of tinea capitis in northern Karnataka: a three-year experience at a single institute. *Indian Dermatol Online J* 2013;4:22–26.
17. Castriota M, Ricci F, Paradisi A et al. Erythema nodosum induced by kerion celsi of the scalp in a child: a case report and mini-review of literature. *Mycoses* 2013;56:200–203.
18. Bologna JL, Jorizzo JL, Rapini RP. Papulosquamous and eczematous dermatoses. In: Fritsch P, Reider N, eds. *Dermatology*. St. Louis, MO: Mosby; 2003:221–222.
19. Jillson OF, Hoekelman RA. Further amplification of the concept of dermatophytid. I. Erythema annulare centrifugum as a dermatophytid. *AMA Arch Derm Syphilol* 1952;66:738–745.
20. Zaraq I, Trojjet S, El Guellali N et al. Childhood erythema nodosum associated with kerion celsi: a case report and review of literature. *Pediatr Dermatol* 2012;29:479–482.