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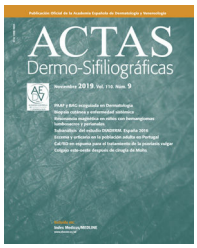

BRIEF COMMUNICATION

New Epidemiological Outcomes in Anthropophilic tinea capitis, a Case Series Study in Northwestern Spain

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Abstract Although zoophilic dermatophytes remain the predominant cause of tinea capitis in Spain, an increase due to anthropophilic species has been reported. We report a retrospective observational study that included twenty-four children, who were diagnosed with tinea capitis due to anthropophilic species between 2004 and 2019. 75% of the patients were males with a mean age of 4,88 years. We observed 83,3% of cases from Africa, 4,2% from South America and 12,5% from Spain. Clinically, 70,8% of the patients presented scaly patches and non-scaring alopecia. *Trichophyton soudanense* was the main dermatophyte of the series (45,8%), followed by *Microsporum audouinii* (20,8%), *Trichophyton tonsurans* (12,5%) and *Trichophyton violaceum* (12,5%). Although this pattern of infection appears to be linked to immigration from Africa, we saw three native cases. The easier transmission of anthropophilic rather than zoophilic dermatophytes could predict a rise in the incidence of tinea capitis and a public health problem.

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PALABRAS CLAVE
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Nuevos hallazgos epidemiológicos en la tinea capitis antropófila, un estudio de una serie de casos en el noroeste de España

Resumen Aunque los dermatofitos zoófilos son aparentemente aún la causa principal de tinea capitis en España, se está observando un repunte por especies antropófilas. Presentamos un estudio observacional retrospectivo de veinticuatro niños con tinea capitis antropófila, diagnosticados en nuestro centro entre 2004 y 2019. El 75% de los pacientes fueron varones con una media de edad de 4,88 años. El 83,3% eran africanos, el 4,2% de América del Sur y el 12,5% de España. Clínicamente, en el 70,8% de los casos se observaron parches descamativos con alopecia no cicatricial. *Trichophyton soudanense* fue el dermatofito más aislado (45,8%), seguido de *Microsporum audouinii* (20,8%), *Trichophyton tonsurans* (12,5%) y *Trichophyton violaceum* (12,5%). Aunque este patrón parece estar relacionado con la inmigración africana, observamos 3 casos nativos. La facilidad de transmisión de los dermatofitos antropófilos permite predecir un aumento en la incidencia de la tinea capitis y un potencial problema de salud pública.

Introduction

Dermatophytoses or tineas are superficial cutaneous infections caused by a group of fungi called dermatophytes, which invade keratinized tissues such as skin, hair or nails.

Epidermophyton, *Microsporum* and *Trichophyton* were the genera covering all dermatophytes, but in the last years, a new taxonomy was proposed and more genera were included: *Trichophyton*, *Epidermophyton*, *Nannizzia*, *Microsporum*, *Lophophyton*, *Arthroderma*, *Ctenomyces*, *Guarromyces* and *Paraphyton*[1]. These fungi can be divided into three major groups according to the reservoir and the transmission: anthropophilic, zoophilic or geophilic.

Tinea capitis is especially frequent in children and is caused by an invasion of dermatophytes, mainly *Trichophyton* and *Microsporum* genera, into the hair follicles and the skin of the scalp.

The epidemiology of the tinea capitis varies according to geographical and socioeconomic factors and evolves over time. In Europe and North America, anthropophilic *Microsporum audouinii*, *Trichophyton schonleinii*, *Trichophyton violaceum and Trichophyton tonsurans* were the most common species in the 19th century. It changed in the 20th because of using griseofulvin and hygiene improvement, so zoophilic *Microsporum canis* became the main tinea capitis species in Europe[2–4].

Although zoophilic dermatophytes still prevail, lately, a change has been noticed in the incidence of major causative agents[5,6]. An increase in tinea capitis due to anthropophilic African species (*Microsporum audouinii* and *Trichophyton soudanense*) and Caribbean species (*Trichophyton tonsurans*) of dermatophytes has been reported from the main capitals in Europe, North America and the Middle East[3]. This pattern of infection appears to be linked to immigration from Africa and the Caribbean[7,8].

The present retrospective study aimed to analyse the epidemiology, clinical and mycological features of anthropophilic tinea capitis in children of our health area. Our second objective was to evaluate the type of treatment used and the obtained response.

Materials and Methods

We designed a single-center retrospective observational study that included children who were diagnosed with tinea capitis at our hospital, in northwestern Spain, between 2004 and 2019. A retrospective database analysis was performed on the medical records of children with tinea capitis and positive mycologic cultures for anthropophilic species who were attended in the paediatric dermatology consultation of our department.

Samples were collected by scraping the infected area using a sterile scalpel. Specimens were examined by fluorescent microscopy using 20% potassium hydroxide and Calcofluor white stain (Remel, San Diego, CA, USA). Whenever ectothrix and endothrix phenomena were observed, it was used to help fungal identification. Clinical specimens were cultured on two different Sabouraud Dextrose Agar, one with chloramphenicol and cycloheximide and another one with chloramphenicol and gentamicin (BD, Franklin Lakes, NJ, USA), both incubated at 30 °C for at least four weeks. Isolates were subcultured on rice grains to demonstrate pigment formation. Urease activity was studied through Christensen's Urea Agar (BD), and *in vitro* hair perforation test was performed in sterile prepubertal human hair to analyse the presence of perforating organs. Final identification was achieved by combining the above mentioned with colony microscopic examination with Lactophenol cotton blue stain (Remel) by an experienced medical microbiologist. No genomic analysis was performed.

Data were coded and entered into the computer and analyzed using SPSS Statistics. We carried out a descriptive analysis of the variables included in the study; quantitative variables were expressed as a mean ± standard deviation (SD), and qualitative variables were reflected as the absolute value and percentage.

A narrative review was also performed. Potentially relevant studies were identified through a literature search for articles published until 26 July 2019 using PubMed database. The searches were limited to English and Spanish articles. References within retrieved articles were also

reviewed to identify missing information in the primary research.

Results

We included 24 children who were under 12 years, the minimum age was 1 year. The mean age was 4,88 years and +- SD 2,86.

Eighteen patients (75%) were males while only six (25%) were females. We observed a total of twenty (83,3%) cases in patients born in Africa or whose parents were from Africa (Ethiopia, Nigeria, Senegal, Equatorial Guinea and Burundi) in comparison with only one (4,2%) from South America (Dominican Republic) and three (12,5%) from Spain. A total of five patients (20,8%) were adopted and all of them were born in Africa.

Twelve children (50%) went on a trip to Africa a few months before the symptoms began. Only two cases had contact with other family members with tinea. There were not any animal contact. We found just one patient (4,2%) with a co-dermatophytose and it was tinea faciei.

Clinically, thirteen patients (54,2%) presented non-scarring alopecia, seventeen (70,8%) scaly patches, eight (33,3%) crusts and six (25%) pustules. Neither of the cases were diagnosed as kerion nor presented systemic symptoms.

Fungal cultures were positive for *Trichophyton soudanense* in eleven cases (45,8%), *Microsporum audouinii* in five patients (20,8%), *Trichophyton tonsurans* in three (12,5%), *Trichophyton violaceum* in also three (12,5%), *Trichophyton megnini* in one (4,2%) and *Trichophyton rubrum* in also one (4,2%).

Microsporum audouinii and *Trichophyton soudanense* were more common in patients with a recent trip to Africa.

Twenty-two patients (91,7%) received oral treatment. Griseofulvin was used in thirteen patients (54,2%), terbinafine in five (20,8%) and itraconazole in one case (4,2%). In three patients (12,5%), all with positive cultures for *Microsporum audouinii*, a treatment with terbinafine was initiated but after eight weeks without improvement it was changed to griseofulvin.

Twenty patients (83,3%) received topical antifungals (ketoconazole). Two cases (8,3%) only had topical treatment; in these patients, who were 3 and 5 years, topical antifungals were initiated empirically and achieved a complete clinical healing before the fungal culture result. No patient had a relapse during the follow-up that lasted more than 6 months.

Discussion

Tinea capitis, or scalp ringworm, is more common in children. It has been seen that incidence is highest in males between three and seven years, so as we found in our cases.

Although zoophilic dermatophytes remain the predominant cause of tinea capitis in Spain, an increase in tinea capitis due to anthropophilics *Microsporum audouinii*, *Trichophyton soudanense*, *Trichophyton violaceum* and *Trichophyton tonsurans* has been reported[2,9]. European capitals, like London or Paris, have reported *Trichophyton tonsurans* as the main responsible for tinea capitis[10,11], so did North America[12]. In contrast, *Microsporum audouinii* and *Trichophyton soudanense* were the most common in our series. This pattern of infection appears to be linked to immigration from Africa: *Trichophyton violaceum* is the major agent of tinea capitis in the North and East of Africa and *Trichophyton soudanense* and *Microsporum audouinii* predominate in the Western and Central regions of the African continent[13–15]. In our area, most of the immigration comes from Morocco and Senegal.

In our series, three children born in Spain of Spanish parents had tinea capitis due to anthropophilic species; in two cases *Trichophyton soudanense* was observed and *Trichophyton tonsurans* in one. We believe the infection in these native children probably occurred at their schools since there were similar cases in the area, in children of similar age and these patients had not taken any trips nor did they have any affected relatives. The situation was notified but there was not any follow-up in the schools.

Non-scarring alopecia and scaly patches were the predominant clinical presentation in our cases. None of the cases were diagnosed as kerion nor presented systemic symptoms. Delay in diagnosis in tineas caused by anthropophilic species may increase the risk of transmission to other family members[3] and spread to other areas of the skin. In our study, two cases were developed in siblings and one patient had tinea faciei and tinea capitis at the same time.

A 2016 Cochrane review of systemic antifungal therapy for tinea capitis in children reveals that although griseofulvin or terbinafine are both effective, complete healing is superior with griseofulvin (6-12 weeks) in those cases due to *Microsporum* species and with terbinafine (6 weeks) in those caused by *Trichophyton* species without differences in adherence and with reasonable safety profile[16]. In our study, griseofulvin and terbinafine were used in tinea capitis treatment in both *Microsporum* and *Trichophyton* cases with good results. In three patients with tinea capitis due to *Microsporum audouinii*, no improvement was obtained after eight weeks of terbinafine treatment, so it was changed to griseofulvin. This resistance to terbinafine of *Microsporum audouinii* infections is frequently encountered and underestimated[3]. Topical antifungals are useful as an adjuvant treatment to eradicate viable spores in the scalp and to reduce the risk of transmission at the start of systemic treatment; ketoconazole or ciclopirox olamine can be used[17].

To conclude, tinea capitis is more common in male children between three and seven years. Although zoophilic dermatophytes remain the predominant cause of tinea capitis in Spain, anthropophilic dermatophytes are becoming even more important in our community. *Trichophyton soudanense* and *Microsporum audouinii* were the most common in our series. Although this pattern of infection appears to be linked directly to immigration from Africa, we saw three native cases, two by *Trichophyton soudanense* and one by *Trichophyton tonsurans*, with probable transmission in schools. The easier transmission of anthropophilic rather than zoophilic dermatophytes could predict a rise in the incidence of tinea capitis, if diagnosis is poorly recognized or delayed, and it can become a public health problem.

References

1. Baert F, Stubbe D, D'hooge E, Packeu A, Hendrickx M. Updating the Taxonomy of Dermatophytes of the BCCM/IHEM Collection According to the New Standard: A Phylogenetic Approach. Mycopathologia. 2020;185:161–8.
2. del Boz-González J. Tendencias de la tinea capitis en España. Actas Dermosifiliogr. 2012;103:288–93.
3. Marcoux D, Dang J, Auguste H, McCuaig C, Powell J, Hatami A, et al. Emergence of African species of dermatophytes in tinea capitis: A 17-year experience in a Montreal pediatric hospital. Pediatr Dermatol. 2018;35:323–8.
4. del Boz J, Crespo V, Rivas-Ruiz F, de Troya M. A 30-year survey of paediatric tinea capitis in southern Spain. J Eur Acad Dermatol Venereol. 2011;25:170–4.
5. Veasey JV, Miguel BAF, Mayor SAS, Zaitz C, Muramatu LH, Serrano JA. Epidemiological profile of tinea capitis in São Paulo City. An Bras Dermatol. 2017;92:283–4.
6. Hay RJ, Robles W, Midgley G, Moore MK. European Confederation of Medical Mycology Working Party on Tinea Capitis. Tinea capitis in Europe: new perspective on an old problem. J Eur Acad Dermatol Venereol. 2001;15:229–33.
7. Arévalo Bérmudez MP, Fernández Torres RM, et al. Imported anthropophilic tinea capitis. Study of a series of 16 cases in A Coruna, Spain. J Am Acad Dermatol. 2015;72:AB136.
8. Ginter-Hanselmayer G, Weger W, Ilkit M, Smolle J. Epidemiology of tinea capitis in Europe: current state and changing patterns. Mycoses. 2007;50:6–13.
9. Colomina Rodríguez J, Pérez Gámir E. Análisis etiológico de las micosis cutáneas superficiales por dermatofitos en la Comunidad Valenciana (2008-2013). Piel. 2015;30:393–4.
10. Ferguson L, Fuller LC. Spectrum and burden of dermatophytes in children. J Infect. 2017;74:S54–60.
11. Gits-Muselli M, Benderdouche M, Hamane S, et al. Continuous increase of *Trichophyton tonsurans* as a cause of tinea capitis in the urban area of Paris, France: a 5-year-long study. Med Mycol. 2017;55:476–84.
12. Patel GA, Schwartz RA. Tinea capitis: still an unsolved problem? Mycoses. 2011;54:183–8.
13. Zhan P, Liu W. The Changing Face of Dermatophytic Infections Worldwide. Mycopathologia. 2017;182:77–86.
14. Coulibaly O, L'Ollivier C, Piarroux R, Ranque S. Epidemiology of human dermatophytoses in Africa. Med Mycol. 2018;56:145–61.
15. Hällgren J, Petrini B, Wahlgren C. Increasing tinea capitis prevalence in Stockholm reflects immigration. Med Mycol. 2004;42:505–9.
16. Chen X, Jiang X, Yang M, et al. Systemic antifungal therapy for tinea capitis in children: An abridged Cochrane Review. J Am Acad of Dermatol. 2017;76:368–74.
17. Vázquez-Osorio I, Mateo-Suárez S, Pereiro-Ferreirós M, Toribio J. Tratamiento de las tiñas del cuero cabelludo en la infancia. Piel. 2014;29:149–56.