

EPIDEMIC OF MICROSPORIUM CANIS INFECTION IN THE REGION OF LJUBLJANA

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ABSTRACT

Background. In the last decades the incidence of *Microsporium canis* infection has been increasing in many European countries. In many regions of Slovenia microsporia has also aroused much epidemiological concern.

Materials and Methods. The patients infected with *Microsporium canis*, treated in the Department of Dermatology in Ljubljana during the period from 1995 to 1997 were evaluated. The diagnosis was confirmed by microscopic examination of skin and hair specimens and by culture on Sabouraud's medium with added chloramphenicol and actidion.

Results. During the above mentioned period 4109 positive cultures were assessed in patients, examined in our mycological laboratory. *Microsporium canis* has been the most frequently isolated dermatophyte. Tinea corporis was in 76% and Tinea capitis in 97% of cases caused by *Microsporium canis*. Patients were mostly children under 15 years of age with only one third of patients being adults. In younger patients scalp and face were involved most frequently compared to older patients in whom infection was commonly localized on the extremities. According to anamnestic data cats were the main origin of infection in our patients but they must have been asymptotically infected in many instances.

Conclusion. *Microsporium canis* infection remains a serious epidemiological problem in the region of Ljubljana. Consistent and integrated efforts of medical and veterinary services associated with health education are required in future to eliminate further spread of infection.

KEY WORDS

Microsporium canis infection, epidemiology, Ljubljana area

INTRODUCTION

During the last 30 years *Microsporium canis* infection became a serious epidemiological problem in many regions of the world (1,2), especially in the South

European Mediterranean countries (3). Before *Microsporium canis* infection was first registered in Slovenia, the incidence of this infection has been increasing

in Spain, South of France and Italy (4-12). In Slovenia, first cases were diagnosed in the year 1977 among the inhabitants near the Italian border and also in patients visiting aforementioned countries as tourists (13). That is why we suppose that this infection was imported to our country from those countries.

In Slovenia, *Microsporum canis* infection must be reported to National Institute of Public Health. During the last 20 years microsporia was diagnosed throughout the country. There have been great differences in the number of reported cases in each region. The largest numbers were reported in the regions of Ljubljana and Kranj during the whole period (14). One of the important questions is whether these differences reflect the real epidemiological situation or they are due perhaps to failures in diagnosing and reporting the disease. Some of the patients have been treated by general practitioners and not in all of them diagnosis has been confirmed by laboratory examination. Because of that, falsely positive cases could have been reported or, on the contrary, some of the patients with microsporia might have not been reported at all.

MATERIALS AND METHODS

In this article only data on patients, treated at the Clinical Center, Department of Dermatology in Ljubljana, in the period from 1995 to 1997, will be presented. In all of these patients diagnosis of microsporia was confirmed by laboratory identification of the dermatophyte by direct microscopic examination of skin or hair specimens and by culture on

Table 1. Localization of *Microsporum canis* infection, according to age groups.

Localization (%)	Age group (years)			
	0-5	6-10	11-14	>14
Scalp	22.3	8.9	4.0	0.0
Face	14.6	10.9	8.4	8.7
Trunk	24.4	37.8	30.0	19.2
Arm	19.6	19.8	30.9	48.8
Leg	9.4	10.7	15.4	29.4

Sabouraud's medium with added chloramphenicol and actidion. We collected data on patients' age, sex, and localization of microsporia as well as the anamnestic source of infection. In all cases the disease was reported.

RESULTS

Our previous epidemiological evaluations have shown an increasing incidence of microsporia during the 80-s. *Microsporum canis* has been the most frequently isolated dermatophyte since 1989. Each year 400 to 700 patients with *Microsporum canis* infection have been treated at the Department of Dermatology in Ljubljana.

Figure 1 shows the rates of yearly isolated dermatophytes in the Mycological laboratory of the Department of Dermatology in Ljubljana during the period from 1977 to 1997. Unlike increasing incidence of *Microsporum canis* infection, *Epidermophyton* species was isolated quite rarely and the frequency of *Trichophyton* species did not vary importantly within this period in our patients.

Figure 2 presents the proportion of different causative agents, isolated in our mycological laboratory in the period from 1995 to 1997. In these years 4109 positive cultures were isolated in patients examined. Dermatophytes represent 73% of all positive isolates, among them *Microsporum canis* was isolated in 59%, *Trichophyton rubrum* in 29%, *Trichophyton mentagrophytes* in 9% and other dermatophytes - *Microsporum gypseum*, *Trichophyton verrucosum*, *Trichophyton violaceum*, and some others only rarely (3%). Yeasts were isolated in 26% of patients with dermatomycosis and among them *Candida albicans* was predominant with 59%, other *Candida* spec. were isolated in 31% and *Trichosporon* spec. in 10%. *Microsporum canis* contributed up to 43% of all positive isolates.

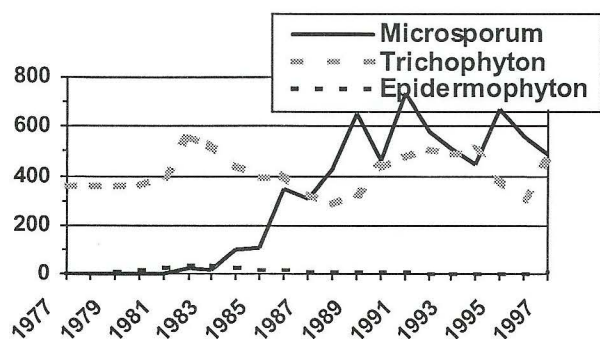


Figure 1. Dermatophytes, isolated in the period from 1977 to 1997 at the Department of Dermatology in Ljubljana.

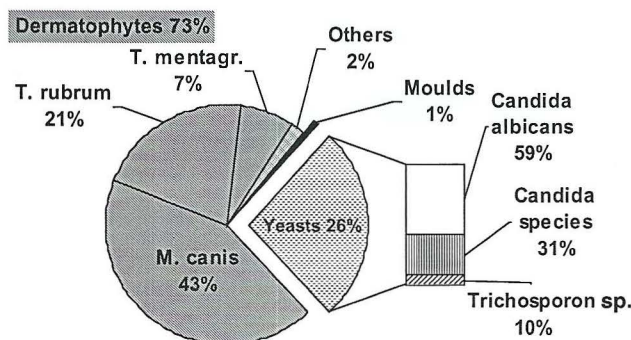


Figure 2. Distribution of fungi, isolated in the period from 1995 to 1997 at the Department of Dermatology in Ljubljana.

Great majority of patients with *Microsporum canis* infection were children under 15 years of age (Figure 3). Microsporia has higher prevalence in schoolchildren in the age groups from 6 to 10 years and from 11 to 14 years, as well as in preschool-age children. In older patients the infection was diagnosed in less than 10% in each age group. In all age groups microsporia was more frequent in females (Figure 4). Most of our patients were living in towns.

In 31% of patients the infection was disseminated on different parts of the body. In localized manifestations it was mostly observed on the upper extremity, especially on the forearm in 30%, on the face in 14%, on the lower extremity in 12%, on the trunk in 10% and on the scalp in 8% of cases. In younger children scalp and face were involved more often than in older children and adults, in whom

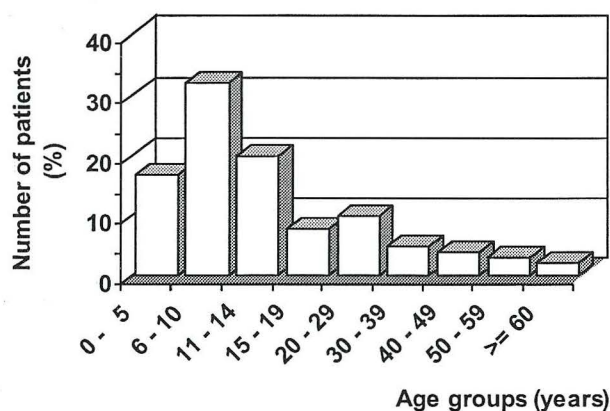


Figure 3. Distribution of patients with microsporia by age in the period from 1995-1997.

the infection was most commonly localized on the extremities and on the trunk (Table 1).

In our patients Tinea capitis was in 97% of cases caused by *Microsporum canis*. Only in 3% of patients with scalp infection *Trichophyton mentagrophytes* and *Trichophyton rubrum* were isolated. Tinea corporis was in 76% due to *Microsporum canis*, in 15% *Trichophyton rubrum* was isolated, in 7% *Trichophyton mentagrophytes*, and in 2% *Microsporum gypseum*.

Monthly distribution of patients within the last three years shows important seasonal variations. The number of patients was higher in the period between July and November. Most of the patients were infected during the summer and the epidemic was slowly decreasing in the autumn.

Figure 5 refers to anamnestic data on potential origin of infection. In 79% of patients the infection seemed to be transmitted by cats, especially by own cats or by cats in the neighborhood. In more than a half of instances the animals were symptomless. In only 1% contact with stray cats was mentioned. Dogs were mentioned as possible origin of infection in only 5% of patients. In 15% the origin of infection remained unknown.

DISCUSSION

The rise in frequency of *Microsporum canis* infection during the last two decades is in our opinion not only the result of better surveillance of the disease and health-consciousness of the population but also the reflection of real increase of the disease prevalence. *Microsporum canis* remained the most frequently isolated dermatophyte in our patients in recent years.

The results of the investigation confirm that microsporia has a higher prevalence during the prepubertal period. Our patients were mainly children under 14 years of age, which is in accordance with the reports by other authors (14-18). Like other authors we have also found a considerable prevalence of infection among females in all age groups (15,18). This sexual difference is probably the result of different behavior of both groups. We presume that girls are playing more often with pets than boys, and that women are coming more often in contact with animals than men (15).

Patient's age has some important influence on localization of *Microsporum canis* infection. Scalp and face were more frequently involved in younger children. This might be due to fungistatic properties of sebum which is not produced in significant amount

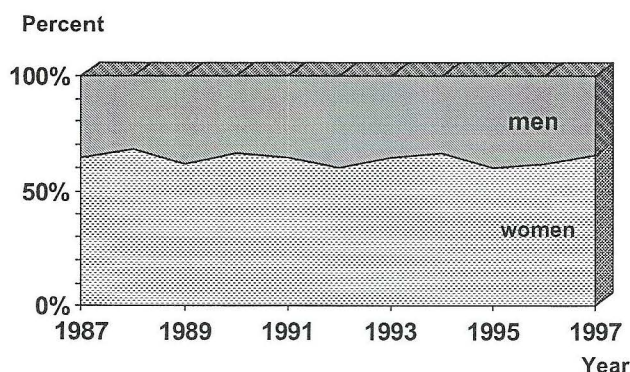


Figure 4. Distribution of patients with microsporia by sex at the Department of Dermatology in Ljubljana in the years from 1987 to 1997.

in younger children.

Microsporium canis has been reported to be the dominant agent of Tinea capitis in many regions of the world (1,2). During the last three years *Microsporium canis* was the dominant agent of Tinea capitis as well of Tinea corporis in our patients. Similar causative agents and their frequency of distribution in Tinea capitis and Tinea corporis as in our patients were noticed also in some regions of Italy and Spain (6,8,9,11,19).

The highest number of microsporia was registered during the autumn-winter period. Similar monthly variations were observed in neighboring countries with high disease prevalence (8,9). We assume that children are playing more often with young infected cats during summer holidays and that epidemic is continuing to spread at the time when schools reopen (8).

Our results showed that infected cats were the main source of infection but only minority of them seemed to be symptomatically affected. The possibility of the spreading of infection from asymptomatic

animal carriers is well known and should be taken into account when searching for the origin of infection (20,21). Contact with stray cat was mentioned only in 1% of patients. In spite of that we believe that stray cats remain an important reservoir for spreading of this infection (15,22). From epidemiological point of view interpersonal transmission from man to man seemed to be quite insignificant but it could be underestimated.

Microsporium canis infection is known to be one of the most resistant to treatment among dermatomycoses. There are no uniform therapeutic recommendations for treatment of this infection. The therapy of our patients was rather individual. Topical therapy was preferred only in patients with localized microsporia, with one or two lesions and in younger children. Most have been treated with both, systemic and topical antifungals (18). Griseofulvin has been the mainstay of treatment for many years. In recent years this drug was replaced by terbinafine because of more favorable dosage regimen, fewer side effects and its fungicidal activity. The average time of systemic treatment in Tinea corporis was 4 weeks, but it lasted longer in Tinea capitis (18,23). After the completion of systemic therapy topical therapy was continued until complete clinical cure was achieved and until two negative laboratory examinations (negative microscopy and negative culture) were established.

CONCLUSIONS

Microsporium canis infection remains a serious epidemiological problem in many regions of Slovenia, especially in the region of Ljubljana. Correct diagnosis and consistent reporting of disease are needed in all regions of Slovenia for further epidemiological evaluations. *Microsporia* is associated with many epidemiological, therapeutic, and economic as well as social challenges. The prevalence is very high among school-age children. The duration of treatment is long and the costs of treatment are high. Because of high degree of infectivity some of the children with disseminated microsporia have to absent from school at the beginning of therapy and to abstain from sports activities. Elimination of the infection source among animals is very difficult and the control of the stray cats inadequate. Preventive measures, including both medical and veterinary services as well as health education, are needed to restrain further spread of infection.

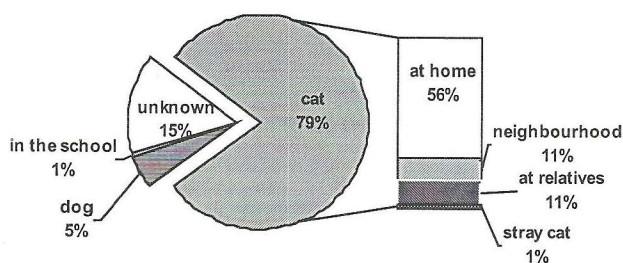


Figure 5. Anamnestic data on source of infection in patients with *Microsporium canis* infection.

REFERENCES

1. Aly R. Ecology and epidemiology of dermatophyte infections. *J Am Acad Dermatol* 1994; 31:S 21-5.
2. Rippon JW. The changing epidemiology and emerging patterns of dermatophyte species. *Curr Top Med Mycol* 1985; 1: 208-34.
3. Svejgaard EL. Epidemiology of dermatophytes in Europe. *Int J Dermatol* 1995; 34: 525-8.
4. Pereiro MM, Pereiro M, Pereiro M Jr: Review of dermatophytoses in Galicia from 1951 to 1987, and comparison with other areas of Spain. *Mycopathologia* 1991;113: 65-78.
5. Fortuno B, Torres L, Simal E, Seoane A, Uriel JA, Santacruz C. Dermatophytes isolated in our clinic. 5-year-study in Zaragoza. *Enferm Infecc Microbiol Clin* 1997; 15: 536-9.
6. Martinez-Roig A, Torres-Rodriguez M. Dermatophytosis in Children and Adolescents: Epidemiological Study in the City of Barcelona, Spain. *Mykosen* 1986; 29, 311-5.
7. Colomb D, Battesti MR, Cognat T. Time-related changes in dermatophytes and their agents in the Lyons region. *Ann Dermatol Venereol* 1987; 114: 515-21.
8. Caprilli F, Mercantini R, Palamara G, Belardi M, Crescimbeni E. Distribution and Frequency of Dermatophytes in the City of Rome between 1978-1983. *Mykosen* 1986; 30:86-93.
9. Difonzo EM, Palleschi GM, Guadagni R, Vannini P, Battini ML. Epidemiology of the Dermatophytoses in the Florence Area: 1982-84. I. *Microsporium canis* Infections. *Mykosen* 1986; 29: 519-25.
10. Sberna F, Farella V, Geti V et al. Epidemiology of the dermatophytoses in the Florence area of Italy: 1985-1990. *Trichophyton mentagrophytes*, *Epidermophyton floccosum* and *Microsporium gypseum* infections. *Mycopathologia* 1993; 122: 153-62.
11. Di Salverio A, Mosca M, Gatti M, Brandozzi G. Superficial mycoses observed at the Department of Dermatology of the University of Pavia. A 13-year survey. *Mycopathologia* 1989; 105:11-7.
12. Terragni L, Lasagni A, Oriani A. Dermatophytes and dermatophytoses in the Milan area between 1970 and 1989. *Mycoses* 1993; 36:313-7.
13. Lunder M. *Microsporium canis* Infection in Slovenia (Yugoslavia) 1952-1983. *Mykosen* 1984; 27:514-8.
14. Lunder M, Kraigher A, Simčič V, Marinič-Fišer N, Orožim E, Dolenc-Voljč M. Epidemija mikrosporije v Sloveniji. *Zdrav Var* 1996; 35:209-13.
15. Lunder M, Lunder M. Is *Microsporium canis* Infection about to Become a Serious Dermatological Problem? *Dermatology* 1992; 184:87-9.
16. Lunder M. Prispevek k epidemiologiji mikrosporije (*Microsporium canis*) v Sloveniji. *Zdrav Vestn* 1985; 54: 511-4.
17. Lunder M, Podrumac B. Epidemija mikrosporoze v Sloveniji. II. Kogojevi dnevi, Zbornik predavanj. Ljubljana: Univerzitetna dermatološka klinika KC 1988:75-80.
18. Lunder M, Podrumac B, Dragoš V, Smrkolj A, Lunder T. Naše izkušnje pri zdravljenju mikrosporije, 1985-1992. *Zdrav Vestn* 1995; 64: 21-3.
19. Aste N, Pau M, Biggio P. Tinea capitis in children in the district of Cagliari, Italy. *Mycoses* 1997; 40: 231-3.
20. Stantič-Pavlinič M, Grilc E, Marinič-Fišer N. An epidemiological survey of *Microsporium canis* - related infection in Ljubljana. *Alpe Adria Microbiology Journal* 1997; 6:165-8.
21. Beck W, Clark HH. Zoophile Dermatophyten als Epizoonoseerreger und ihre Bedeutung in der Dermatologie. *Hautarzt* 1998; 49:457-61.
22. Marinič-Fišer N, Hočevar- Grom A, Kraigher A, Lunder M, Simčič V. Mikrosporija - javnozdravstveni problem. *Zdrav Var* 1995; 34:321-4.
23. Dragoš V, Podrumac B, Bartenjev I, Kralj B, Dolenc-Voljč M. Terbinafine in Tinea capitis due to *Microsporium canis*. *Acta Dermatovenerologica APA* 1995; 4:195-7.

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