



## FREQUENCY AND ETIOLOGIC AGENTS OF TINEA CAPITIS IN SARAJEVO, BOSNIA AND HERZEGOVINA

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### ABSTRACT

The progressive increase of zoophilic dermatophytes, especially *Microsporum (M.) canis*, in the aetiology of human dermatophytoses has been observed in many regions in Europe. The aim of our study was to assess the frequency and etiological agents of tinea capitis in Sarajevo area, Bosnia and Herzegovina, during a 10-year period (2009-2018). A total of 680 samples (skin scrapings and hairs) were collected from patients with suspected scalp dermatophytosis patients and cultured on Sabouraud agar. After three weeks of incubation 104 (15.3%) dermatophyte species were identified based on macroscopic and microscopic morphology. The main etiologic agent was *M. canis* (85.6%), followed by *T. mentagrophytes* (3.8%), *T. schoenleinii* (2.9%), and *T. violaceum* (2.9%). Infections prevailed in men (63.4%) and were significantly more frequent in the age group of 6-10 years (39.4%).

**KEYWORDS:** Tinea capitis, zoophilic, dermatophytes, *Microsporum canis*, epidemiology.

### INTRODUCTION

Dermatophytoses are fungal infections that affect about 4.8% of all dermatologic patients.<sup>[1]</sup>

Dermatophyte infection of the scalp (tinea capitis) is caused by a variety of anthropophilic, zoophilic and geophilic species limited to the genera *Microsporum* and *Trichophyton*.<sup>[2]</sup>

In recent two decades, studies conducted in many European countries revealed that, although anthropophilic species predominated overall, zoophilic species *M. canis* remains the dominant cause of tinea capitis in Europe.<sup>[3]</sup>

In this study, we aimed to determine the distribution and frequency of scalp dermatophytosis, according to its etiological agents, patients age and sex in Sarajevo area, Bosnia and Herzegovina in the period between 2009 and 2018.

### PATIENTS AND METHODS

This retrospective-prospective study was conducted at the Department of Dermatovenereology, University Clinical Centre in Sarajevo between January 2009 and December 2018. Fungal samples (scalp scrapings and hair fragments) were collected from 680 patients (aged

between 8 months and 77 years) with suspected dermatophyte infection of the scalp and examined in 20% KOH solutions directly under the microscope and cultivated on Sabouraud glucose agar supplemented with chloramphenicol and cycloheximide. The cultures were incubated at 27°C for up to 6 weeks and observed weekly for evidence of growth. The identification of fungi was based on macroscopic morphology (growth characteristics, colony morphology, formation of pigment) and microscopic characteristics of the colonies (formation of macroconidia, microconidia, chlamydospores).<sup>[4]</sup>

The study was approved by Ethics Committee of University Clinical Centre in Sarajevo.

### RESULTS

Among 680 clinical samples, 104 (15.3%) were found positive for scalp dermatophytosis by both microscopic examination and fungal cultivation.

Men were infected more frequently (60 patients) than women (44 patients) in the ratio of 3:2. Most frequently, dermatophyte infections were seen in age groups 6-10 years (39.4%) and 11-15 years (21.2%), followed in decreasing order by age groups 0-5 years, 16-20 years, 21-50 years and over 51 years (Table 1).

A vast majority of isolated dermatophytes were zoophilic (90.4%). Anthropophilic dermatophytes comprised 9.6% of isolates, while geophilic dermatophytes were not isolated. *M. canis* was the predominant etiological agent and was isolated from 89 samples (85.6% of all samples). The remaining infections were caused by species of genus *Trichophyton*: *T. mentagrophytes* (3.8%), *T. violaceum* and *T. schoenleinii* (2.9% each), *T.*

*verrucosum* (1.9%) and *T. tonsurans* (1.9%), and *T. rubrum* (1.0 %) (Table 2).

The incidence of *M. canis* infections in men was higher than in women, however the correlation between dermatophyte species and sex was not statistically significant ( $F=3.292$ ,  $p=0.921$ ).

**Table 1: Distribution of scalp dermatophytosis according to age group and sex.**

Age group (years)	Males	Females	Total	Percentage
0-5	9	10	19	18.3
6-10	26	15	41	39.4
11-15	14	8	22	21.2
16-20	7	7	14	13.5
21-50	3	3	6	5.8
>51	1	1	2	1.9
Total	60	44	104	100

**Table 2: Distribution of causative agents of scalp dermatophytosis according to sex.**

Dermatophyte species	Number of isolates		Total	Percentage
	Males	Females		
<i>M. canis</i>	53	36	89	85.6
<i>T. schoenleinii</i>	2	1	3	2.9
<i>T. violaceum</i>	1	2	3	2.9
<i>T. rubrum</i>	0	1	1	1.0
<i>T. mentagrophytes</i>	2	2	4	3.8
<i>T. verrucosum</i>	1	1	2	1.9
<i>T. tonsurans</i>	1	1	2	1.9
Total	60	44	104	100

## DISCUSSION

Tinea capitis is one of the most common superficial fungal infection worldwide and an issue of public health interest. Its incidence has been steadily increasing in the past 30 years, particularly in regions with unfavorable socioeconomic conditions and crowded living conditions.<sup>[5,6]</sup>

In some European countries, as well as in Bosnia and Herzegovina, the epidemiology of tinea capitis has changed dramatically in the last few decades with zoophilic species replacing anthropophilic as main etiological agents.<sup>[7]</sup>

Zoophilic species, *M. canis*, was not recorded as human pathogen in Bosnia and Herzegovina until 1998, when first three cases were described.<sup>[8]</sup> Since then, its prevalence increased remarkably and reached more than 90% in last decade.<sup>[9]</sup> This phenomenon was also observed in Slovenia (91.1%), Italy (90.5%), and Greece (84.5%).<sup>[10-12]</sup> The high prevalence of *M. canis* infections in Bosnia and Herzegovina is probably related to the increase in the number of stray and semi-stray animals, particularly cats living outside of homes.<sup>[13]</sup> Accordingly, the prevalence of anthropophilic dermatophytes decreased and accounted for only a few percent of isolates.<sup>[14]</sup>

Within the timeframe of this study (2009-2018), *M. canis* remained the predominant etiological agent of scalp dermatophytosis, albeit at comparatively lower incidence (85.6%). Previously dominant endemic dermatophytes, *T. violaceum*, *T. schoenleinii*, and *T. tonsurans*, were isolated only sporadically, and likely reflect the migration of rural population to the city. We also observed that incidence of scalp dermatophytosis was steadily decreasing. The reason behind this decrease is likely the mass neuter campaign involving stray animals in the urban setting. Future research will show whether this trend will continue.

The results of this study point to the higher incidence of tinea capitis and other scalp dermatophytosis among men compared to women in the ratio of 3:2, a notion previously attributed to shorter hair in men.<sup>[15]</sup> The peak incidence was between 6 and 10 years, the period of life which coincides with higher parent independence but not with sexual maturation and protective sebum production, which starts at age 12.<sup>[16]</sup> Besides, children at this age are prone to close personal contact with friends and have inadequate knowledge about fungal infections.

In conclusion, we observed that the distribution and frequency and etiological agents of tinea capitis is similar to epidemiological patterns in European countries. The most prevalent dermatophyte remains a

zoophilic species *M. canis*. Previously dominant endemic dermatophytes belonging to genus *Trichophyton* were isolated sporadically and likely reflect migration of rural population to the city. Data collected and analyzed in this study are important for public health measurement and control of spread of dermatophytoses.

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