

## Tinea Capitis at Charles Nicolle Hospital of Tunis (Tunisia)

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### Abstract

**Introduction:** Tinea capitis is an infection caused by dermatophytes which have a particular affinity for keratin. Its prevalence decreased significantly in developed countries due to the improvement of sanitary conditions and socio-economic level. However, they are still common in developing countries including Tunisia. The aim of our study was to evaluate the epidemiological, clinical and mycological profile of tinea capitis diagnosed at Charles Nicolle Hospital of Tunis.

**Methods:** This is a cross-sectional study of 167 mycological samples scalp performed during four years (2009-2012).

**Results:** Tinea capitis was diagnosed in 88 patients (52.69%). Their mean age was 7.62 years. The sex ratio was 2.82. The main dermatophytes isolated were *Microsporum canis* and *Trichophyton violaceum*. The annual distribution of the dermatophytes isolated showed a decrease of the frequency of tinea capitis caused by *Microsporum canis* (36.36% in 2009 vs. 60.71% in 2012).

**Conclusion:** The study of etiological profile of tinea capitis encountered in Tunis showed an increase in the frequency of microsporic tinea that exceeds in recent years trichophytic tinea and emergence of zoophilic species such as *Trichophyton verrucosum* and *Trichophyton mentagrophytes*.

**Keywords:** Tinea capitis; Children; *Microsporum canis*; *Trichophyton violaceum*; Tunisia

### Data collection

The age and gender of patients, the area where they live (urban/rural), the history of contact with animals, the presence of similar cases in family and the clinical data were all collected on a questionnaire.

### Introduction

Tinea Capitis (TC) are a contagious infection that affects mainly children and teenagers. It is a serious public health problem especially in developing countries including Tunisia. However, its epidemiology differs from one country to another over the years and even from one region to another within the same country. Therefore, the study of epidemiological and clinical features of these infections is important.

The aim of our study was to evaluate the epidemiological, clinical and mycological profile of TC encountered in the region of Tunis.

### Methods

A cross-sectional study was realized at the Laboratory of Parasitology-Mycology at Charles Nicolle hospital of Tunis during four years (January 2009-December 2012).

### Study population

The patients referred to the laboratory were from different regions of Tunis and consulting in dermatology for suspicion of ringworm of the scalp and having one or more plate's alopecia with or without inflammatory signs.

### Mycological study

The hair sample was carried out using tweezers or by scraping scales. All samples were tested by direct microscopic examination with 30% potassium hydroxide solution to determine the type of parasitism hair and culture on Sabouraud media agar. Cultures were incubated at 27°C and examined every week. They are considered negative after four weeks of incubation. The diagnosis of TC was confirmed when the direct microscopic examination and/or culture were positive. The identification of dermatophytes was based on macroscopic and microscopic appearance of colonies. In case of positive cultures with sterile hyphae on microscopy, we conducted subcultures on poor environments (water agar 2%) to stimulate fruiting.

### Statistical study

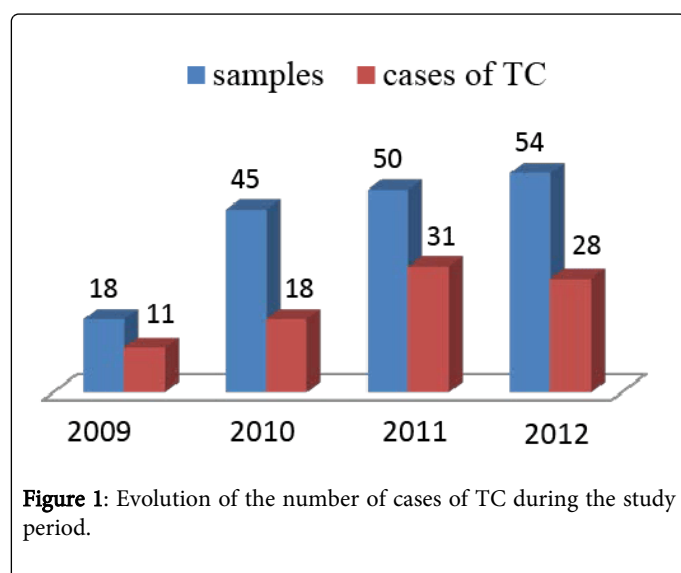
The data has been collected and processed using Epi-Info version 3.3.2. Chi2 test was used to compare qualitative variables. The level of significance was 0.05.

## Results

### Epidemiologically

During the study period, 167 hair samples were performed in our laboratory.

Eighty-eight cases of TC (52.69% of samples received) were diagnosed. The average annual incidence was 19 cases/year (Figure 1).



**Figure 1:** Evolution of the number of cases of TC during the study period.

The average age of infected patients was 7.6 years (range one year 3 months -50 years). The sex ratio (65 men/23 women) was 2.82.

The frequency of TC was higher among children younger than 10 years (82.9% of cases) mainly among boys (64.36% of cases) without statistically significant difference (Table 1). Adult's tinea was encountered in 5.68% of cases.

Age	Male		Female		P
	n	TC	n	TC	
< 5 years	27	16 (59.25%)	18	8 (44.44%)	0.3
5-9 years	60	40 (66.66%)	15	9 (60%)	0.6
10-15 years	17	6 (35.29%)	9	4 (44.44%)	0.9
> 15 years	10	3 (30%)	11	2 (18.18%)	0.9
Total	114	65 (57%)	53	23 (43.4%)	

n : total number

**Table 1:** Distribution of TC according to age and sex.

Concerning the origin of the patients, 46 were from a rural area and 42 patients were of urban origin.

Sixteen patients (18.18%) had a family member suffering from ringworm of the scalp. Contact with animals (cats, dogs, hedgehogs, cattle) was found in 51 patients (57.95% of cases).

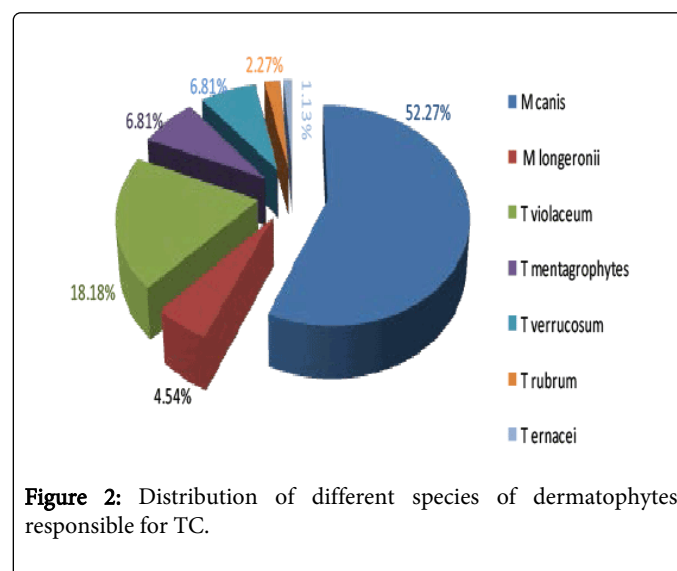
### Clinically

The lesions were small and large plate's alopecia, scaly and dry in 62 cases (70.5%). These moths were inflammatory with suppuration in 26 cases (29.5%).

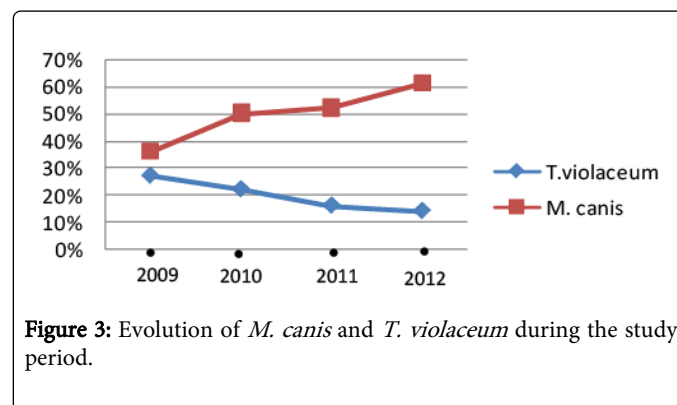
### Biologically

Direct microscopic examination was negative in 9 cases (10.22%). The culture was negative in 7 cases (7.95%) although a positive direct microscopic examination. The microsporic tinea with endo-ectothrix parasitism hair were found in 50 cases (54.54%) mainly due to *Microsporum (M.) canis*, while trichophytic tinea with endothrix parasitism hair in 22 cases (23.86%) due to *Trichophyton (T.) violaceum* (66.66%). Inflammatory TC were found in 5 patients and they were due to *T. verrucosum* (3 cases) and *T. mentagrophytes* (2 cases). No case of tinea favosa was diagnosed.

The main dermatophytes isolated were *M.canis* and *T. violaceum* found respectively in 52.27 and 18.18% of cases (Figure 2).



**Figure 2:** Distribution of different species of dermatophytes responsible for TC.



**Figure 3:** Evolution of *M. canis* and *T. violaceum* during the study period.

The distribution of isolated species was different over the years. In fact, we noted a downward trend in the frequency of *T. violaceum* (27.27% in 2009 vs. 14.28% in 2012) and an increasing of the frequency of *M. canis* (36.36% vs. 60.71% in 2009 to 2012) (Table 2) (Figure 3).

Species	2009	2010	2011	2012
<i>T.violaceum</i>	27.27	22.73	18.18	14.28
<i>M. canis</i>	36.36	50.00	52.27	60.71

	n(%)	n(%)	n(%)	n(%)
<i>T.violaceum</i>	3 (27.27)	4 (22.22)	5 (16.12)	4 (14.28)
<i>T.verrucosum</i>	-	-	6 (19.35)	-
<i>T.mentagrophytes</i>	2 (18.18)	1 (5.55)	1 (3.22)	2 (7.14)
<i>T.rubrum</i>	-	1 (5.55)	1 (3.22)	
<i>T.erinacei</i>	-	-	-	1 (3.57)
<i>T.schoenleinii</i>	-	-	-	
<i>M.canis</i>	4 (36.36)	9 (50)	16 (51.61)	17 (60.71)
<i>M.longeronii</i>	-	3 (16.66)		1 (3.57)
n : number				

**Table 2:** Annual incidence of different species of dermatophytes during the study period.

## Discussion

Tinea capitis remain a topical issue in many countries [1-3]. It affects children in preschool and school age [2-6]. In our study, children younger than 10 years old accounted for more 82% of the cases. Besides, adult's tinea were relatively rare. In fact, TC is considered to be almost exclusive to children and rarely occurs after puberty, probably due to changes in the pH of the scalp and an increase in fatty acids serving a protective role [7].

Men were more affected than women (73.86% vs. 26.13%) without statistically significant difference. Men are usually reported in epidemiological studies [3,5,8] despite the women reported in some studies [2,9]. The high rate of tinea capitis in male may be attributed to the easy implantation of spores because of short hair and frequency of sharing comb, brushes and cups.

Low standard of living and health education, overcrowding, poor hygiene, close personal and animal contacts are all favorable factors of TC [1]. In our series, the concept of animal contact was found in 51

patients, 16 patients had a family history of ringworm. In a Lybian study [10], 33.7% of children had at least another member in the family contaminated; in this reason, practitioner must examine all members of family including children.

Symptomatic tinea capitis has three main clinical forms: superficial tinea capitis with bald patches dry, inflammatory form and favosa tinea capitis [1]. In our study, lesions were dominated by bald patches dry in 70.5%, whereas inflammatory moths were found in 29.5%.

The distribution of dermatophytes as the causative agent changes in recent decades in many countries [11]. In our study, the two main dermatophytes found were *M. canis* and *T. violaceum*.

In Tunisia, although trichophytic moths caused by *T. violaceum* are frequent, there is a gradual decline in their incidence, which in our study increased from 27.27% in 2009 to 14.28% in 2012. Our results were similar to other Tunisian studies [8,9] and also Moroccan ones [3,12]. The regular health monitoring in schools, the improving hygiene and shaving habits of boys led to a decrease in trichophytic tinea caused by *T. violaceum*, which are anthropophilic and contagious mycoses. In contrast, the incidence of microsporic tinea due to *M. canis* showed an increase from 1% in 1950 when the first cases were reported [13] to 34.15% in 1997 [2]. This frequency has exceeded that of *T. violaceum* in a study reported by Belhadj [9] and Saghrouni [14]; this was found in our study where *M. canis* was the predominant species and its frequency is increased from 36.36% in 2009 to 60.71% in 2012 (Table 3). This increase of *M. canis*, also reported in other Mediterranean countries [15], can be explained by the frequent cohabitation with pets, particularly cats which are the main transmitter of *M. canis* [1].

Trichophyton verrucosum, zoophilic species present in the middle of breeding and *T. mentagrophytes* were present sporadically in previous studies [6,9,14]. In our study, these two species were found in 5 patients. All patients came from rural area and they were in close contact with animals. Moreover, *T. erinacei* was responsible for inflammatory ringworm in a child of 7 years living in a rural area in contact with animals, especially hedgehogs, the main reservoir of this species [16].

	Mebazzaa and al [9]	Belhadj and al [7]	Makni and al [6]	Saghrouni and al [14]	Our study
	1990-2005	1996-2005	1995-2007	1983-2008	2009-2012
<i>T. violaceum</i>	53.40%	51.30%	68%	66.70%	18.18%
<i>T. verrucosum</i>	-	-	0.70%	0.60%	6.81%
<i>T. mentagrophytes</i>	3.50%	0.41%	1.34%	1.10%	6.81%
<i>T. rubrum</i>	0.37%	0.82%	0.20%	0.20%	2.27%
<i>T. erinacei</i>	-	-	-	-	1.13%
<i>T. tonsurans</i>	0.09%	-	0.3%	0.20%	-
<i>T. schoenleinii</i>	2.50%	-	0.10%	1.60%	-
<i>T. soudanense</i>	-	-	-	-	-
<i>M. canis</i>	37.30%	47.07%	29.20%	29.30%	52.27%
<i>M. gypseum</i>	0.37%	-	0.04%	0.10%	-

<i>M. longeronii</i>	0.17%	-	-	-	4.54%
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**Table 3:** Etiologic agents of TC in Tunisia: results of the various investigations

*Trichophyton schoenleinii*, agent of favus was very common in 1950 [13], has seen a spectacular decline reaching 0.24% in Tunisia [9] and 0.1% in Sfax [6]. In our study, no case of tinea favosa was found.

*Trichophyton rubrum*, the most commonly isolated dermatophyte worldwide is responsible for tinea capitis in exceptional cases. In fact, in our study, it was diagnosed in two patients suffering from a dermatophytic disease.

Changes dermatophytic flora in recent years is due to a change in the behavior of the Tunisian population even urban low socioeconomic level by a complementary breeding animals (rabbits, cattle) as well the company of pets at home (cats, dogs).

## Conclusion

Tinea capitis remains a public health problem in Tunisia especially in children. The current etiologic profile study of TC confirmed the almost complete eradication of favus, the increasing frequency of microsporic tinea due to *M. canis* since recent years, which exceeds trichophytic tinea due to *T. violaceum* and the emergence of other zoophylic species: *T. verrucosum* and *T. mentagrophytes*.

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