



ORIGINAL ARTICLE

Low But Continuous Occurrence of *Microsporum gypseum* Infection in the Study on 198 Cases in South Korea from 1979 to 2016

Weon Ju Lee, Jun Hong Park, Jun Young Kim, Yong Hyun Jang, Seok-Jong Lee, Yong Jun Bang¹, Jae Bok Jun¹

Department of Dermatology, School of Medicine, Kyungpook National University, Kyungpook National University Hospital, ¹Institute of Medical Mycology, Catholic Skin Clinic, Daegu, Korea

Background: *Microsporum gypseum* has been isolated from South Korea since 1966. However, the incidence of *M. gypseum* infection is very low. **Objective:** The aim of this study is to add massive data on *M. gypseum* to the literature and to provide useful information on clinical and mycological characteristics of *M. gypseum*. **Methods:** We retrospectively analyzed data of 198 cases infected with *M. gypseum* from 1979 to 2016. The identification of *M. gypseum* was done with mycological examination using 15% KOH preparation and potato corn meal tween 80 agar culture media. **Results:** The incidence of *M. gypseum* infection was very low in South Korea, showing a tendency to decrease. Out of 198 cases, men were 94 cases (47.5%) and women were 104 cases (52.5%). Mean age of all patients was 29.83 years old: 24.97 years old in men and 34.22 years old in women. *M. gypseum* infection occurred most frequently in September (16.7%) and August (16.2%). The most common clinical type of *M. gypseum* infection was tinea corporis (38.4%). **Conclusion:** *M. gypseum* infection shows very low incidence but still remains around us until recent years. We should keep in mind

the characteristics of *M. gypseum*. (Ann Dermatol 30(4) 427 ~ 431, 2018)

-Keywords-

Epidemiology, *Microsporum gypseum*, Tinea

INTRODUCTION

With immunocompromising hosts, the elderly, international exchange and economic development, the epidemiology of dermatophytosis has been changing worldwide. The epidemiological data on dermatophytosis in Korea also showed enormous changes. *Trichophyton schoenleinii* was the most important causative fungus of tinea capitis in Korea in 1950s. However, it has not been found in Korea since 1980s. On the contrary, *Trichophyton tonsurans* has been found as one of the causative factors of dermatophytosis in Korea since 1990s¹. Therefore, it is important to investigate the epidemiological and mycological changes of dermatophytosis for improving the personal health and storing the medical data. *Microsporum gypseum* is a cosmopolitan geophilic dermatophyte, frequently found in contaminated soil. It usually causes an inflammatory superficial dermatophytosis in the scalp and glabrous skin in humans and rarely develops onychomycosis. However, its prevalence among dermatophyte infections is very low^{2,3}. Infection with *M. gypseum* accounts for less than 0.19% of superficial dermatophytosis in Korea⁴. In addition, there are few reports on the infection due to *M. gypseum* in the literature. The aim of this study is to add massive data on *M. gypseum* to the literature and to provide useful information on clinical and mycological characteristics of

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Corresponding author: Weon Ju Lee, Department of Dermatology, School of Medicine, Kyungpook National University, Kyungpook National University Hospital, 680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Korea. Tel: 82-53-420-5838, Fax: 82-53-426-0770, E-mail: weonju@knu.ac.kr
ORCID: <https://orcid.org/0000-0001-5708-1305>

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M. gypseum.

MATERIALS AND METHODS

The medical records of 198 cases with *M. gypseum* infection were retrospectively investigated. This study was approved by Institutional Review Board of Kyungpook National University Hospital (IRB no. 2017-11-001). Most patients included in this investigation had lived in the southeastern area of South Korea. *M. gypseum* infection was diagnosed at Kyungpook National University Hospital and the Catholic Skin Disease Clinic from 1979 to 2016. The identification of *M. gypseum* was done with mycological examination using 15% KOH preparation and potato corn meal tween 80 agar culture media. The culture media were kept at 24°C to 26°C from 2 to 4 weeks. KOH-positive patients were 171 out of 198 (86.4%) who were culture-positive. *M. gypseum* grown on the culture media showed brownish, powdery or granular colony (Fig. 1A). Lactophenol cotton blue stain showed fusiform symmetrical thin-walled macroconidia with 3 to 6 cells (Fig. 1B).

RESULTS

Incidence of *M. gypseum*

The incidence of *M. gypseum* infection is very low in

South Korea. In addition, Fig. 2 shows a tendency to decrease in the incidence of *M. gypseum*. However, *M. gypseum* infection still remains around us until recent years. From 1980s to 2000s, *M. gypseum* infection was much more frequent in young children (0~9 years old) than any other age group (Table 1). They accounted for 22.6% to 39.7% of all patients with *M. gypseum* infection. However, the fifties showed the highest incidence in 2010s (25.0%) (Table 1). *M. gypseum* infection was most common in September in 1980s (21.3%) and in August in 1990s (17.5%) (Table 2). Tinea faciei was the most com-

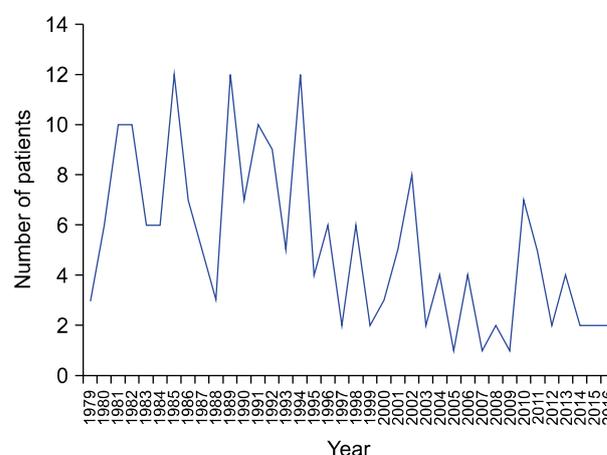


Fig. 2. Annual incidence of *Microsporium gypseum* infection.

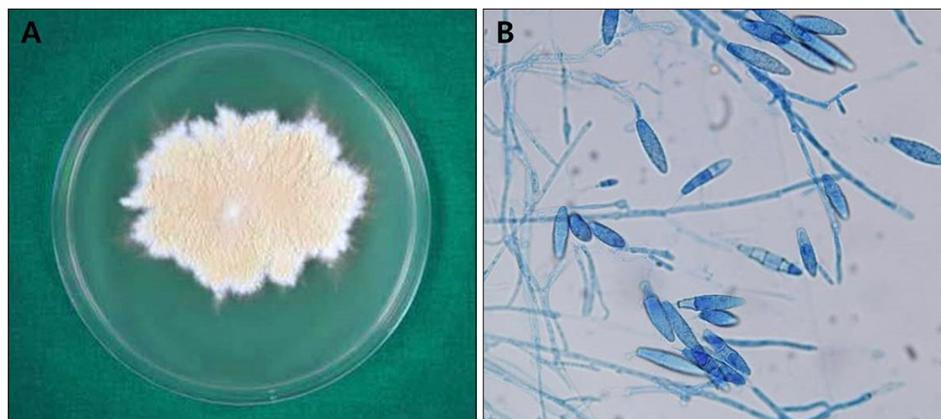


Fig. 1. (A) Brownish, powdery or granular colony. (B) Fusiform symmetrical thin-walled macroconidia with 3 to 6 cells (Lactophenol cotton blue, ×200).

Table 1. Chronological distribution of *Microsporium gypseum* infection according to age

Period	Age group (yr)								
	0~9	10~19	20~29	30~39	40~49	50~59	60~69	70~79	80~89
1980s	27	18	11	6	9	8	1	0	0
1990s	25	8	3	9	6	7	2	2	1
2000s	7	3	2	1	3	7	5	2	1
2010s	3	1	0	0	3	6	5	4	2
Total	62	30	16	16	21	28	13	8	4

Table 2. Chronological distribution of *Microsporium gypseum* infection according to month

Period	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1980s	7	9	2	4	3	2	9	9	17	5	9	4
1990s	7	4	1	1	3	3	4	11	4	7	8	10
2000s	1	1	3	2	1	1	1	7	9	1	3	1
2010s	1	0	0	1	0	0	4	5	3	3	5	2
Total	16	14	6	8	7	6	18	32	33	16	25	17

Table 3. Chronological distribution of *Microsporium gypseum* infection according to topography

Period	Tinea manus	Tinea pedis	Tinea unguium	Tinea capitis	Tinea faciei	Tinea corporis	Tinea cruris
1980s	4	3	0	2	31	23	17
1990s	5	1	2	3	15	25	12
2000s	1	2	1	0	9	12	6
2010s	3	1	1	0	3	16	0
Total	13	7	4	5	58	76	35

Table 4. Sexual distribution of *Microsporium gypseum* infection according to topography

Sex	Tinea manus	Tinea pedis	Tinea unguium	Tinea capitis	Tinea faciei	Tinea corporis	Tinea cruris	Total
Male	8	1	1	4	25	27	28	94
Female	5	6	3	1	33	49	7	104
Total	13	7	4	5	58	76	35	198

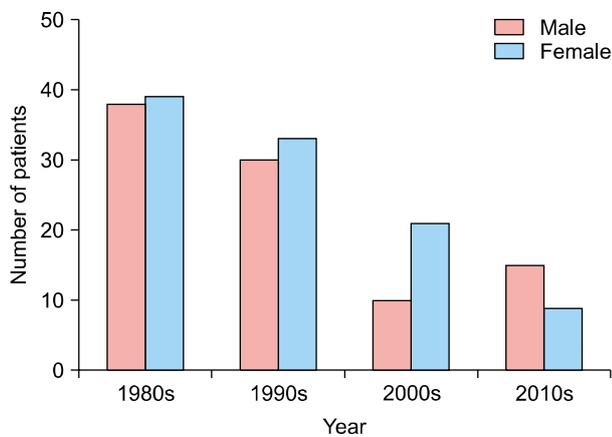


Fig. 3. Chronological distribution of *Microsporium gypseum* infection according to sex.

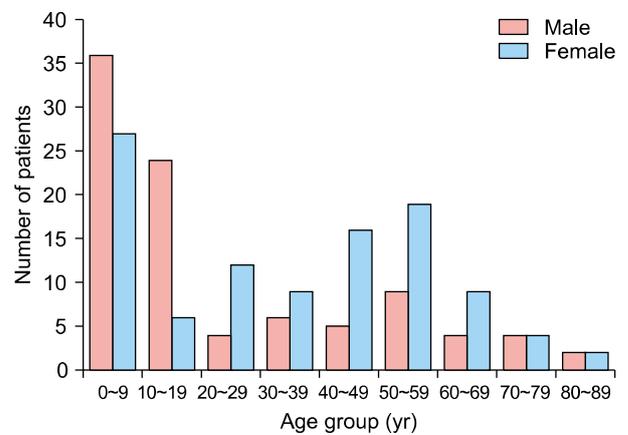


Fig. 4. Age distribution of *Microsporium gypseum* infection according to sex.

mon clinical type in 1980s (38.8%) (Table 3). Tinea corporis became most common clinical type from 1990s (39.7%) to 2010s (66.7%) (Table 3).

Sex and age

Out of 198 cases, men were 94 cases (47.5%) and women were 104 cases (52.5%) (Table 4). *M. gypseum* infection was more frequent in women than in men until 2000s (Fig. 3). After then, it was more frequent in men (Fig. 3). Mean age of all patients was 29.83 years old: 24.97 years

old in men and 34.22 years old in women. The most common age group with *M. gypseum* infection were young children (0~9 years old, 31.3%) followed by teenagers (15.2%) and fifties (14.1%) (Table 1). Men were more common than women in the age group of 0 to 19 years old (Fig. 4). On the contrary, women were more common than men in the age group of above 20 years old (Fig. 4). Furthermore, young children (0~9 years old) were most common and the fifties was the next in the incidence of *M. gypseum* infection in women (Fig. 4).

Seasonal variation

M. gypseum infection occurred most frequently in September (16.7%) and August (16.2%) (Table 2). Tinea faciei was most common in February, tinea corporis in August, and tinea cruris in September (Table 5).

Topographical distribution

M. gypseum usually caused dermatophytosis on the glabrous areas. The most common clinical type of *M. gypseum* infection was tinea corporis (38.4%), followed by tinea faciei (29.3%), tinea cruris (17.7%) (Table 3). However, the most common *M. gypseum* infection of men was tinea cruris followed by tinea corporis and tinea faciei (Table 4). In addition, the most common *M. gypseum* infection of young children (0~9 years old) was tinea faciei (Table 6). Furthermore, the most common *M. gypseum* infection of teenagers was tinea cruris (Table 6).

DISCUSSION

M. gypseum has been isolated from infected animal and

especially contaminated soil worldwide. This has also been isolated from South Korea since 1966. However, the incidence of *M. gypseum* infection is very low. *Trichophyton rubrum*, *Trichophyton interdigitale*, *T. tonsurans* and *Microsporum canis* have become the major species of dermatophytosis globally⁵. Especially, *T. rubrum* is the most common dermatophyte, accounting for 80% to 90% of all isolated dermatophytes^{6,7}. Romano et al.³ reported that the incidence of dermatophytosis caused by *M. gypseum* in Siena was 6.8% of all dermatophytic infections. They investigated 14 cases of *M. gypseum* infection between 2004 and 2005. Sei² also conducted an epidemiological survey of dermatophytosis. The survey showed *M. gypseum* was isolated from only 3 outpatients out of 36,052 outpatients. Only a few cases with *M. gypseum* infection have also been reported in South Korea. The first two cases of *M. gypseum* infection were published by Kim and Suh⁸ in South Korea in 1976. After then, eight cases were investigated by Jun and Suh⁹ in 1980. We retrospectively analyzed big data of 198 cases from 1979 to 2016. As reported in Italy and Japan, the annual incidence of *M. gypseum* infection was very low.

Table 5. Monthly distribution of *Microsporum gypseum* infection according to topography

Month	Tinea manus	Tinea pedis	Tinea unguium	Tinea capitis	Tinea faciei	Tinea corporis	Tinea cruris
Jan.	1	1	0	0	6	4	4
Feb.	0	0	0	1	12	0	1
Mar.	0	0	0	0	5	0	1
Apr.	2	0	0	0	4	0	2
May	1	0	0	0	4	2	0
Jun.	2	0	1	0	2	0	1
Jul.	2	3	1	0	1	10	1
Aug.	3	1	1	0	3	21	3
Sep.	0	0	0	1	5	16	11
Oct.	0	0	0	0	4	8	4
Nov.	1	2	1	2	6	10	3
Dec.	1	0	0	1	6	5	4
Total	13	7	4	5	58	76	35

Table 6. Age distribution of *Microsporum gypseum* infection according to topography

Age group (yr)	Tinea manus	Tinea pedis	Tinea unguium	Tinea capitis	Tinea faciei	Tinea corporis	Tinea cruris
0~9	0	0	0	4	33	15	10
10~19	0	0	0	1	8	7	14
20~29	2	4	0	0	5	3	2
30~39	4	0	0	0	0	10	2
40~49	0	2	1	0	3	12	3
50~59	4	1	0	0	3	18	2
60~69	1	0	2	0	4	4	2
70~79	2	0	0	0	1	5	0
80~89	0	0	1	0	1	2	0
Total	13	7	4	5	58	76	35

Although the incidence of *M. gypseum* infection showed a decreasing tendency, it still remained around us.

When we began this study, it was expected that middle-aged adults living in rural area were most frequently infected, because they had always been working in the yards or gardens as farmers. On the contrary to our expectation, *M. gypseum* was most frequently isolated in young children. Especially in 1980s, the incidence of *M. gypseum* infection in young children was highest. Jun and Suh⁹ also reported young children was the most common age group of *M. gypseum* infection. In recent years, young adults were most frequently infected by *M. gypseum*. Improvement of hygiene and easy accessibility to hospitals might lead the decrease in incidence of *M. gypseum* infection in young children in recent years. On the other hand, Lee et al.⁶ reported *T. rubrum* was most frequently infected in the middle-aged group. It is written in the literature that *Trichophyton mentagrophytes* was also most frequently infected in the middle-aged group¹⁰. However, *M. canis* infection was usually developed in young children in South Korea¹¹. In addition, this report was published that *T. tonsurans* infection occurred most frequently in the teenager group¹¹. Furthermore, it was reported that anthropophilic dermatophytes, such as *Trichophyton violaceum*, *T. tonsurans* and *Microsporium audouinii* are causing outbreaks of small epidemics of tinea corporis and tinea capitis in young children and teenagers¹². The incidence of *M. gypseum* infection was higher in women than in men out of our expectation. However, men were higher than women in the young children group.

Although tinea corporis was the most common clinical type of *M. gypseum* infection, tinea cruris was most common in men. In addition, tinea faciei was the most common clinical type of *M. gypseum* infection in young children and tinea cruris in teenagers. According to annual incidence, tinea faciei was most common clinical type of *M. gypseum* infection in 1980s, but tinea corporis became the most common clinical type of *M. gypseum* infection from 1990 to 2016. Improvement of hygiene, interest in beauty and health, and easy accessibility to hospitals might decrease in incidence of tinea faciei caused by *M. gypseum* in recent periods. On the other hand, *Trichophyton rubrum* usually causes tinea pedis and tinea unguium⁵. *Trichophyton mentagrophytes* also usually causes tinea pedis⁹. *M. canis* is a major cause of tinea capitis⁵. *T. tonsurans* is also an important cause of tinea capitis⁵.

The incidence of *M. gypseum* infection was highest in hot season including September and August. Interestingly, the incidence of tinea faciei caused by *M. gypseum* was highest in February. It is found in the literature that *M. canis*

showed higher incidence in winter than in any other seasons¹⁰. *T. tonsurans* occurs commonly in the spring¹¹. However, *T. rubrum* and *T. mentagrophytes* usually develop dermatophytosis in hot season^{8,9}.

In conclusion, our study, including a lot of patients for a long period, will provide very useful information on dermatophytosis caused by *M. gypseum* in the field of medical mycology.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

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