# REVIEW OF ADULT TINEA CAPITIS CASES PRESENTING TO SIRIRAJ HOSPITAL, BANGKOK, THAILAND

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**Abstract.** Tinea capitis (TC) is an uncommon infection in adults. In this study, we aimed to determine the epidemiology, pathogens, clinical presentation and laboratory findings of adults with TC presenting to Siriraj Hospital, Bangkok, Thailand during June 2007 – July 2016 in order to be used as information for diagnosis of TC adults in Thailand. The chart of each subject was retrospectively reviewed. A total of 46 subjects were included in the study, 39 females. The mean age of study subjects was 54 years old. The most common presenting symptom was pruritus (74%), followed by alopecia (33%) and scales (26%). Of the total of 46 subjects, 37% were also concurrently diagnosed as tinea corporis, followed by tinea faciei (20%) and tinea ungium of toenail (17%). The most common etiological organism identified was *Trichophyton rubrum* (37%), followed by *Trichophyton mentagrophytes* (28%) and *Microsporum canis* (24%). A comparison of demographic and clinical factors between subjects with anthropophilic and zoophilic fungi as the cause of their TC revealed TC caused by zoophilic dermatophytes had significantly more pain (46%, $p$=0.018) and more pustules (83%, $p$=0.012). In conclusion, adult TC mostly presented with pruritus and scaly alopecia patches. One-third of TC patients had concomitant tinea corporis. Thus, whole skin examination should be performed in adult patients with TC.

**Keyword**: adult tinea capitis, clinical manifestation, concomitant fungal skin infection

## INTRODUCTION

Tinea capitis (TC) is a fungal skin infection of the hair and scalp usually found in children but occasionally in adults (Elewski, 2000) as postpubertal sebum has fungistatic fatty acids that may reduce to incidence of TC in adults (Shy, 2007). Previous reports indicate the incidence of adult TC in France and Spain was approximately 11% of all TC cases (Cremer *et al*, 1997; Lova-Navarro *et al*, 2015). Postmenopausal women have a higher incidence of TC than men. Seventy percent of women with adult TC in Spain were postmenopausal women (Lova-Navarro *et al*, 2015). TC is often misdiagnosed in healthy adults with prolonged use of over-the-counter antifungal shampoo

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(Sombatmaithai *et al*, 2015). Due to a wide range of clinical presentation, some cases of TC are misdiagnosed as seborrheic dermatitis, contact dermatitis, alopecia areata or psoriasis capitis (Cremer *et al*, 1997). Use of topical steroids on TC lesions may make the presentation atypical (Ansar *et al*, 2011). When the presentation of TC is atypical, it may be misdiagnosed resulting in a delay in diagnosis (Sombatmaithai *et al*, 2015). The causative agents of TC vary by geographical area. In Europe, the most common etiological organism is *Microsporum canis* in Germany, Italy and Spain, and *Trichophyton violaceum* in Sweden and Greece (Seebacher *et al*, 2008). *T. violaceum* is also the most common organism in Palestine, Iraq and Ethiopia, while *T. tonsurans* is considered as the most common organism in USA (Seebacher *et al*, 2008). In Thailand, TC is the leading subcutaneous fungal infections in children (Ungpakorn, 2005) and commonly caused by *M. canis* (Ungpakorn, 2005).

Risk factors for adult TC were previously reported as a history of close contact with animals (Maleville *et al*, 1986; El-Khalawany *et al*, 2013; Zaraa *et al*, 2013), family history of TC (Maleville *et al*, 1986; Zaraa *et al*, 2013), extension from other sites of tinea infection (Khosravi *et al*, 2016) and underlying diseases such as diabetic mellitus, chronic kidney disease, liver cirrhosis (Khosravi *et al*, 2016), malignancy (Khosravi *et al*, 2016; Zaraa *et al*, 2013), and immunocompromised host (Khosravi *et al*, 2016).

The clinical presentation of TC may vary by causative agent, the inflammatory response of the patient and the type of hair invasion (Terragni *et al*, 1989). TC frequently presents with hair loss and scaling (Vidimos *et al*, 1991). Kerion and favus are uncommon (Vidimos *et al*, 1991). Because of its varying clinical presentations, adult TC may be difficult to diagnose, delaying treatment onset. Common presentations of TC range from non-inflammatory scaling to severe inflammation. The clinical presentations of non-inflammatory TC (gray patches, black dots on the scalp and diffuse scale on the scalp) are commonly seen with anthropophilic organisms, such as *T. tonsurans*, *M. audouinii* and *M. ferrugineum* (Kang *et al*, 2019). Inflammatory TC presentations such as kerion, follicular pustules, scarring alopecia, and posterior cervical lymphadenopathy, which need to be differentiated from other inflammatory disorders involving the scalp, are more commonly caused by zoophilic or geophilic pathogens, such as *M. canis*, *M. gypseum*, and *T. verrucosum* (Kang *et al*, 2019).

TC is diagnosed on the clinical presentation and the results of mycological investigations, such as finding branching septate hyphae without hair involvement on direct microscopic examination and Wood's lamp fluorescence (Kang *et al*, 2019). Fungal culture is usually performed to identify the fungal species (Kang *et al*, 2019).

The aim of this study was to determine the epidemiology, causative organisms, clinical presentations, and laboratory findings among adult TC patients presenting to the study institution during the study period.

## MATERIALS AND METHODS

We conducted a retrospective chart review of patients diagnosed with having TC following the British Association of Dermatologist guidelines (Fuller *et al*, 2014) at the Dermatology Clinic, Faculty of Medicine Siriraj Hospital, Bangkok, Thailand during June 2007 – July 2016. Inclusion criteria for study subjects were

age ≥ 18 years, having a positive microscopic exam for the presence of fungi, having a positive mycological culture for fungi, presenting to the study institution during the study period. Exclusion criteria for study subjects were patients with incomplete data or did not have mycological examination. Data collection from the medical record were: the results of the microscopy, results of fungal cultures, the history, the physical findings, patient past medical history, and family history.

Demographics, epidemiology, causative organisms, clinical manifestations and laboratory investigations were described using descriptive statistics. The association between demographics, clinical characteristics and types of causative organisms (common versus uncommon causative organisms and anthropophilic versus zoophilic dermatophytes) was analyzed by the chi-square test or Fisher's exact test. A $p$-value ≤ 0.05 was considered statistically significant. Statistical analysis was conducted using Predictive Analytics SoftWare for Microsoft Windows, version 18.0 (IBM, Armonk, NY).

## RESULTS

During the study period, 46 patients were diagnosed as having TC using both microscopy and fungal culture; 39 females (85%). Thirteen of our 46 study subjects (28%) were post-menopausal women. The mean age of subjects was 54 (range 18 – 87) years (Table1). At the time of diagnosis, the duration of TC symptoms ranged from 1 to 96 weeks.

Two subjects (4%) had a family member with TC and 19 subjects (41%) had a history of contact with animals (dogs, cats, and rabbits). There were 8 cases (17%) reported a prolonged use of systemic corticosteroids. None of the patients had positive human immunodeficiency virus serology.

Table1
Demographic and clinical characteristics among study subjects ($n$=46).

| Characteristics | $n$(%) |
|---|---|
| Mean(±SD) age in years | 54 (±18) |
| Age range in years | 18 - 87 |
| Female | 39 (85) |
| Not immunocompromised | 33 (72) |
| Raise pets | 19 (41) |
| Other tinea infections | |
| Tinea corporis | 17 (37) |
| Tinea faciei | 9 (20) |
| Tinea ungium (toenail) | 8 (17) |
| Tinea ungium (fingernail) | 6 (13) |
| Tinea pedis | 5 (11) |
| Tinea cruris | 2 (4) |
| Tinea manuum | 2 (4) |
| Presenting symptoms | |
| Pruritus | 34 (74) |
| Alopecia | 15 (33) |
| Pain | 12 (26) |
| Physical findings | |
| Alopecia | 44/44 (100) |
| Scales | 44/44 (100) |
| Erythema | 32/40 (80) |
| Pustules | 12/35 (34) |
| Potassium hydroxide prepared microscopy | |
| Hair involvement | 34 (74) |
| No hair involvement | 12 (26) |

SD, standard deviation.

On history, the most common presenting symptoms were pruritus ($n$=34, 74%) and alopecia ($n$=15, 33%). On physical examinations, the most common findings were alopecia ($n$=44/44, 100%) and scales ($n$=44/44, 100%). Among the 46 total cases, 17 (34%) had tinea corporis and 14 (30%) had onychomycosis. Nine

(20%) had concomitant tinea faciei, 2 (4%) subjects had tinea cruris and 2 (4%) had tinea manuum.

The hair was involved in 34 cases (74%), 10 (22%) had endothrix involvement and 24 (52%) had ectothrix involvement. The most common group of fungi isolated in this study were *T. rubrum* (*n*=17, 37%), followed by *T. mentagrophytes* (*n*=13, 28%), *M. canis* (*n*=11, 24%) and *T. tonsurans* (*n*=5, 11%).

When comparing TC caused by *M. canis* and *T. tonsurans* (common organism causeing TC in children) with TC caused by *T. rubrum* and *T. mentagrophytes* (uncommon organism causing TC in children), tinea corporis was significantly detected in TC caused by *T. rubrum* and *T. mentagrophytes* (*n*=15, 50%), compared to TC caused by *M. canis* and *T. tonsurans* (*n*=2, 13%; *p*=0.012). Potassium hydroxide prepared microscopy revealed TC caused by *M. canis* and *T. tonsurans* statistically had more hair involvement (*n*=15, 94%), compared to TC caused by *T. rubrum* and *T. mentagrophytes* (*n*=19, 63%; *p*=0.035). No significant differences in mean age, gender ratio, presenting symptom of findings on physical examination (Table 2).

A comparison of demographic and clinical features between subjects with anthropophilic and zoophilic fungi as the cause of their TC is shown in Table 3. TC caused by zoophilic dermatophytes caused significantly more pain (*n*=11, 46%), compared to TC caused by anthropophilic dermatophytes (*n*=3, 14%; *p*=0.018). Subjects with TC caused by zoophilic dermatophytes significantly had more pustules (*n*=10, 83%), compared to subjects with TC caused by anthropophilic fungi (*n*=2, 17%; *p*=0.012). There were no other significantly different factors between the two groups.

## DISCUSSION

In our study, more TC subjects were females than males, similar to previous studies (Terragni *et al*, 1989; Mseddi *et al*, 2005). Hormonal changes, child rearing, and hair treatments at a hairdresser have been previously reported to be reasons why TC is more common in females (Takwale *et al*, 2001; Sombatmaithai *et al*, 2015). A study from Sweden found dermatophytes in cultures from the combs and hair-trimming tools of families whose children had TC (Winge *et al*, 2009). In our study, none of the reviewed medical records mentioned hairdressers, combs, or hair-trimming tools as a cause of infection.

Post-menopausal women have lower estrogen levels, which are associated with involution of sebaceous glands. This might be a mechanism predisposing to TC among post-menopausal women (Takwale *et al*, 2001). Thirteen of our 46 study subjects (28%) were post-menopausal women.

Having a close contact with animals has been reported to be associated with risk factors for adult TC (Maleville *et al*, 1986; El-Khalawany *et al*, 2013; Zaraa *et al*, 2013). In this study, 19 subjects (41%) reported having a contact with animals. Immunocompromised hosts were reported to be one of the risk factors for adult TC (Khosravi *et al*, 2016). Eight subjects (17%) in our study were immunocompromised as they had a prolonged use of systemic corticosteroids. Bergson and Fernandes, (2001) found some cases of TC may act as asymptomatic carriers of tinea capitis. However, a familial history of TC was observed only in 2 subjects (4%) in this study.

Various clinical manifestations of adult TC related with several factors: the pathogens, type of hair invasion, and level of host inflammatory response (Fuller *et al*,

Table2
Demographic and clinical characteristics by type of organism isolated from study subjects.

| Characteristics | Uncommon organisms *(T. rubrum, T. mentagrophytes)* *n*(%) | Common organisms *(M. canis, T. tonsurans)* *n*(%) | *p*-value |
|---|---|---|---|
| Age in years | | | |
| < 60 | 17 (57) | 11 (69) | 0.424 |
| ≥ 60 | 13 (43) | 5 (31) | |
| Sex | | | |
| Females | 23 (77) | 16 (100) | 0.078 |
| Males | 7 (23) | 0 (0) | |
| Other types of tinea infection | | | |
| Tinea corporis | 15 (50) | 2 (13) | 0.012 |
| Tinea ungium (toenail) | 7 (23) | 1 (6) | 0.230 |
| Tinea faciei | 7 (23) | 2 (13) | 0.463 |
| Tinea ungium (fingernail) | 5 (17) | 1 (6) | 0.649 |
| Tinea pedis | 4 (13) | 1 (6) | 0.645 |
| Tinea cruris | 2 (7) | 0 (0) | 0.536 |
| Tinea manuum | 1 (3) | 1 (6) | 1.000 |
| Presenting symptoms | | | |
| Pruritus | 22 (73) | 13 (81) | 0.722 |
| Pain | 9 (30) | 5 (31) | 1.000 |
| Alopecia | 8 (27) | 7 (44) | 0.230 |
| Physical findings | | | |
| Alopecia | 28 (64) | 16 (36) | 0.536 |
| Scales | 29 (66) | 15 (34) | 1.000 |
| Erythema | 22 (69) | 10 (31) | 0.512 |
| Pustules | 7 (58) | 5 (42) | 0.726 |
| Potassium hydroxide prepared microscopy | | | |
| Hair involvement | 19 (63) | 15 (94) | 0.035 |
| No hair involvement | 11 (37) | 1 (6) | |

2014). In our study, almost all subjects (44 subjects) were presented with irregular shaped scaly alopecia patches. Similarly, previous studies reported noninflammatory TC was frequently presented with scaly patch causing delay in diagnosis (Terragni *et al*, 1989; Kang *et al*, 2019). The other presentation of tinea capitis in our study was an inflammatory TC, which presented with follicular pustule on erythematous alopecic patches; this appearance was noted in twelve patients in our study. The variable clinical presentations of adult TC strengthened our belief that more awareness and careful examination of scalp diseases are highly recommended, especially for conditions that do not respond to treatment.

Table3
Comparison of demographic and clinical manifestations between subjects anthropophilic and zoophilic causes of tinea capitis.

| Characteristics | Anthropophilic *n*(%) | Zoophilic *n*(%) | *p*-value |
|---|---|---|---|
| Age in years | | | |
| < 60 | 11 (50) | 17 (71) | 0.148 |
| ≥ 60 | 11 (50) | 7 (29) | |
| Sex | | | |
| Females | 17 (77) | 22 (92) | 0.234 |
| Males | 5 (23) | 2 (8) | |
| Other types of tinea infection | | | |
| Tinea corporis | 10 (46) | 7 (29) | 0.253 |
| Tinea ungium (toenail) | 6 (27) | 2 (8) | 0.128 |
| Tinea faciei | 4 (18) | 5 (21) | 1.000 |
| Tinea pedis | 4 (18) | 1 (4) | 0.178 |
| Tinea ungium (fingernail) | 2 (9) | 4 (17) | 0.667 |
| Tinea cruris | 2 (9) | 0 (0) | 0.223 |
| Tinea manuum | 1 (5) | 1 (4) | 1.000 |
| Raise pets | | | |
| No | 15 (68) | 5 (21) | |
| Yes | 7 (32) | 12 (50) | |
| Missing data | 0 (0) | 7 (29) | |
| Presenting symptoms | | | |
| Pruritus | 17 (77) | 18 (75) | 0.857 |
| Pain | 3 (14) | 11 (46) | 0.018 |
| Hair loss | 6 (27) | 9 (38) | 0.460 |
| Physical findings | | | |
| Alopecia | 21 (48) | 23 (52) | 1.000 |
| Scales | 21 (48) | 23 (52) | 1.000 |
| Erythema | 15 (47) | 17 (53) | 0.845 |
| Pustules | 2 (17) | 10 (83) | 0.012 |
| Potassium hydroxide prepared microscopy | | | |
| Hair involvement | 15 (68) | 19 (79) | 0.397 |
| No hair involvement | 7 (32) | 5 (21) | |

In this study, the common concurrent sites of tinea infection in our study were tinea corporis (37%), tinea faciei (20%) and tinea ungium of toenail (17%). This supports previous study of Khosravi *et al* (2016), which showed extension from other sites of tinea infection as a risk factor of TC.

A main limitation of this study was that it was retrospective and at times records lacked some information.

In conclusion, adult TC mostly presented with pruritus and scaly alopecia patches. One-third of TC patients had concomitant tinea corporis. Thus, whole skin examination should be a routine in

adult patients with TC.

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