

TINEA CAPITIS IN ADOLESCENT: A CASE REPORT

Debora Semeia Takaliuang

Dermatology and Venereology Clinic, Salak Hospital, Bogor, Indonesia

Email: deboratakaliuang@gmail.com

ARTICLE INFO

ABSTRACT

Received:
December, 26th
2021

Revised:
January, 17th
2022

Approved:
January, 18th
2022

Background: Tinea capitis is a dermatophyte infection of the scalp, eyebrows, and eyelashes with a propensity for attacking hair shafts and follicles. The treatment remains the same between child, adolescent and adult. Purpose: To understand the clinical manifestation and management of tinea capitis. Case management: A ninety-year-old girl, came to Dermatovenereology Outpatient Clinic Salak Hospital because of baldness on her head since 2 weeks before admission. Dermatological examination demonstrated alopecia with an elongated diameter from parietal dextra to sinistra along 40 cm broken off at the level of the scalp leave behind grouped black dots within patches of polygonal-shaped alopecia with finger-like margins. Wood's lamp examination not revealed bright green fluorescence. Potassium hydroxide 20% examination was found spores outside and inside the hair shafts. Patient was diagnosed with tinea capitis and was treated with oral griseofulvin 500 mg every 12 hours, cetirizine 10 mg every 24 hours, and ketoconazole 2% shampoo 3 times weekly. At 2 and 8 weeks of follow up, the lesion of her scalp was improved, hair has started to grow, the itchy was gone. Conclusions: Although most commonly seen in prepubescent children, tinea capitis can occur in adults. In adults, women are infected more frequently than men. Auxiliary examination for the diagnosis of tinea capitis can be done in various ways, Woods lamp, potassium hydroxide 20% examination, fungal culture is then performed to determine the species causing the infection. Therapeutic use of griseofulvin is still the main choice.

How to cite:

E-ISSN:

Published by:

Debora Semeia Takaliuang. (2022). *Tinea Capitis* in Adolescent: A Case Report. Journal Eduvest. Vol 2 (1): 55-63

2775-3727

<https://greenpublisher.id/>

KEYWORDS

Tinea Capitis, Griseofulvin, Wood`S Lamp



This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International

INTRODUCTION

Tinea capitis is a dermatophyte infection of the scalp, eyebrows, and eyelashes with a propensity for attacking hair shafts and follicles commonly affect children. The disease is a form of dermatophytosis which are classified into three genera namely Tricophyton, Microsporum, and Epidermophyton. Tinea capitis predominantly caused by Tricophyton or Microsporum species (Goldsmith et al., 2012).

Tinea capitis typically presents with single or multiple scaly patches of hair loss (gray patch), or in some cases with a bald patch with numerous short broken hair (black dots pattern), diffuse scaling without apparent hair loss, follicular pustules, or inflamed boggy mass (kerion) (Park, Park, Yun, Kim, & Park, 2019).

Even though the percentage of tinea among dermatophyte infections is small, it is considered as an important public health problem in many countries. The incidence of tinea capitis varies and is dependent upon region, age, ethnicity, socioeconomic conditions, climate, urbanization, hygiene, and population density, predominantly involves people who either belong to large families, or live in densely populated areas, or in places with poor hygiene (Sari, Widaty, Bramono, Miranda, & Ganjardani, 2012).

The distribution of tinea capitis is worldwide. One study at dr. Cipto Mangunkusumo (RSCM), Jakarta reported that the frequency of clinical forms of tinea capitis and kerion celsi was the most common form (65.21%), followed by gray patch (26.09%) and black dot type (8.70%).

Next, we will report a case of tinea capitis of black dot type in a 19-year-old woman with an initial assessment of itchy NRS 6 and also provide a review of available literature.

Case Report

A 19 year old girl, weight 58 kg, came to Dermatovenereology Outpatient Clinic Salak Hospital on June, 14th 2021 because of baldness on her head since 2 weeks before admission.

Before complaints of baldness arise, patient have long complained of itching in the area. Every time it itched, the patient will scratch, and every time it is scratched, it feels like a loose piece of the scalp followed by hair loss. The hair on the itchy part thins and left the bald area extending from the top of the left ear extending to the right. Complaints were not aggravated when exposed to sunlight. In addition to complaints of the scalp, she does not have skin abnormalities in other areas of the body. The patient said she did not use towels, combs, hats along with other family members. The patient does not have a pet. The patient have never experienced a complaint like this before. The previous history of skin diseases has been denied. The patient had applied for traditional medicine once a day and was used for five days, but the complaints did not improve. History often pulls out the hair on its own, cheeks appear reddish when exposed to the sun, and joint pain is denied. History of atopi (allergic rhinitis, asthma) is denied. The same complaint to family members of sufferers who live in the house is denied. The patient is the 2nd of two children, currently sitting in college. The patient said her college friend used to have complaints like patient, and patient often borrowed his com

b. However, her friend has been treated, and there are currently no complaints. The patient denied ever going to the salon in the last month before this complaint arise.

Based on general physical examination, respiratory rate 18 times per minutes, pulse rate 80 times per minute and body temperature 36.5 C, 56 kg There was no sign of anemic, icterus, cyanotic or respiratory distress. No abnormality on abdominal examination and no enlargement of lymphnode.

Dermatological examination in the parietal dextra et sinistra regio demonstrated alopecia with an elongated diameter from parietal dextra to sinistra along 40 cm. The hairs have broken off at the level of the scalp leaving behind grouped black dots within patches of polygonal-shaped alopecia with finger-like margins. (Figure 1.A-1.C). Hair pull test examination obtained hair regardless > 5 strands.



Figure 1A-C. Scalp leaving behind grouped black dots within patches of polygonal-shaped alopecia with finger-like margins

The patient was temporarily diagnosed with black dot type tinea capitis with a differential diagnosis of areata alopecia, trichotillomania, and seborrheic dermatitis. Wood's lamp examination not revealed bright green fluorescence (Figure 2). On examination of potassium hydroxide (KOH) 20% of the removal of head hair found arthroconidia on the inner surface of the hair shaft.

Management provided are medicamentosa and nonmedicamentosa. Medicamentosa therapy with griseofulvin 500 mg every 12 hours for two weeks is planned to be administered for 6- 8 weeks, cetirizine tablets every 24 hours, ketoconazole shampoo 2% three times for two weeks. Tinea capitis requires systemic therapy because the drug must hold penetration into the hair follicles and always do CIE (communication, information, and education) in order to take regular medication, maintain the cleanliness of the scalp by using shampoo according to the rules, do not use towels, hats, combs together with family members and college friends. Patients are advised to control two weeks later.



Figure 2. Wood's lamp examination not revealed bright green fluorescence

Follow-up observations of the second week obtained some hair grows along 1.5 cm - 3 cm, itching is reduced (NRS 2), no papul is found on the scalp. The existence of new lesions is denied. Hair pull test examination obtained hair detached one strand.



Figure 3.A-C. Some hair grows along 3-5 cm

Follow-up observation of the eighth week, the patient no longer complains of itching (NRS 0), obtained some hair grows along 3-5 cm, no papul found on the hair. The existence of new lesions is denied. A potassium hydroxide (KOH) 20% examination of the removal of head hair found arthroconidia on the inner surface of the hair shaft.



Figure 4.A-B. Eighth week follow-up: hair is already thick

RESULT AND DISCUSSION

Dermatophytes are keratinophilic fungi that can be pathogenic for humans and animals. There are three genera of dermatophytes: *Tricophyton*, *Microsporum* and *Epidermophyton*, which was then classified into the class of *Deuromycetes*. Out of 41 species currently recognized, approximately 17 species are the common causes of human infection; 5 *Microsporum* species infects skin, hair and nail; 11 *Tricophyton* species infects skin, hair and nail (Baldo et al., 2012) (Kurniati, 2008).

The incidence was higher in those who had pets (dogs and cats) at home and low socioeconomic profile, which may reflect poor hygiene, low educational level of the parents, and overcrowded housing. However, the prevalence in adults remains low because, as starting in adolescence, the amount of saturated fatty acids in sebum that serve as fungistatic compounds increases. Reports in this population are becoming more frequent and are associated with various comorbidities, including chronic diseases such as rheumatoid arthritis, human immunodeficiency virus (HIV), kidney failure, leukaemia, or diabetes mellitus. Other factors involved in the transmission of tinea capitis, for both adults and children, are direct contact with infected persons or asymptomatic carriers, such as primary care-givers who may carry the fungus on their scalp and transmit it to healthy children, and direct contact with domestic animals or breeding, and with fomites. Specific habits, such as hairstyling and traditional clothing, agricultural activities, and tourism, are also risk factors. It is important to clarify that there is no reported predisposition due to types of hair (Rodríguez - Cerdeira et al., 2021).

There are three steps of dermatophytes infection: adherence of dermatophytes, penetration to keratinocyte tissue, and immune response of the host. The possible route of

entry for the dermatophytes into the host body is injured skin, scars and burns. The first step is successful adherence of arthroconidia, asexual spores formed by fragmentation of hyphae, to the surface of keratinized tissues. Dermatophytes adhere to the surface of the keratinized tissue to reach the epidermis by germination of arthroconidia and then the hypha enters the stratum corneum. Arthroconidia adhesion on keratin tissue reached its maximum within 6 hours, mediated by dermatophytes outer wall fibers that produce keratinase (keratolytic) that can hydrolyze keratin and facilitate the growth of this fungus in the stratum corneum. Dermatophytes proteolytic and lipolytic activity by issuing a serine proteinase (urokinase and tissue plasminogen activator), which causes extracellular protein catabolism in invading the host. This process is influenced by the proximity of the wall of the cell and influence between arthrospor sebum and corneocytes facilitated by the process of trauma or lesion on the skin (Lakshmipathy & Kannabiran, 2010).

After adherence, arthroconidia (spores) must germinate and penetrate the stratum corneum at a rate faster than desquamation process. The ability of dermatophytes to degrade keratin is considered a major virulence attribute. The penetration process is accomplished by the secretions proteinase, lipase, and musinolitik enzymes, which become nutrients for fungi. During penetration, dermatophytes produce a variety of virulence factors for infection that include both enzymes (such as protease enzyme) and nonenzymes (such as xanthomegnin, melanin or melaninlike compounds) (Achterman & White, 2012).

There are three patterns of hair invasions: ectothrix, endothrix, and favus. Ectothrix infection is defined as fragmentation of the mycelium into conidia around the hair shaft or just beneath the cuticle of the hair with destruction of the cuticle. In endothrix infection arthroconidia formation occurs by fragmentation of hyphae within the hair shaft without destruction of the cuticle. Favus is characterized by production of hyphae, which are parallel to the long axis of the hair shaft. Once the hyphae degenerate, long tunnels are left within the hair shaft and may appear as airspaces within the hair shaft.

Many species of dermatophyte are capable of invading hair shafts, but some (e.g. *T. tonsurans*, *Trichophyton schoenleinii* and *T. violaceum*) have a predilection for this pattern of infection, whereas *Epidermophyton floccosum* and *Trichophyton concentricum* do not cause tinea capitis. All dermatophytes causing scalp ringworm can invade smooth or glabrous skin, and some can penetrate nails as well, e.g. *T. soudanense*. There are three main types of hair shaft invasion that, in part, determine clinical presentation (Sei, 2015) ,(Fuller et al., 2014).

- The ectothrix form In this type of infection, the hair shaft is invaded at the level of mid-follicle. The intrapillary hyphae grow down towards the bulb of the hair. The common causes are *Microsporum*

species, but *Trichophyton verrucosum* can cause a form of ectothrix infection the arthroconidia are larger. Fluorescence under filtered ultraviolet or Wood's light is characteristically present in most ectothrix infections caused by *Microsporum* species. In terms of clinical appearance, ectothrix infections are usually scaly and often inflamed. There is hair loss with hair shafts breaking 2–3 mm or more above the scalp level.

- The endothrix form The endothrix type of infection may be caused by *T. tonsurans*, *Trichophyton soudanense* and members of the *Trichophyton rubrum* of African

origin group, *T. violaceum*, or *T. rubrum* (rare). This type of infection is nonfluorescent under Wood's light. Hairs often break at scalp level leaving swollen hair stubs within the follicles (black dot ringworm).

- Favus The favic type of infection is caused by the anthropophilic dermatophyte *T. schoenleinii*. The affected hairs are less damaged than in the other types, and may continue to grow to considerable lengths. Air spaces in the hair shafts are characteristic and fungal hyphae form large clusters at the base of hairs where they

The manifestation found in this case, a alopecia extends from parietal dextra to sinistra along 40 cm. Hairs broken off at the level of the scalp leave behind grouped black dots within patches of polygonal-shaped alopecia with finger-like margins. Normal hairs also remain within patches of broken hairs. It is appropriate with the clinical appearance of blackdot type.

Clinical diagnosis of scalp infection can be difficult as presentation are wide ranging and variable, thus as definitive diagnosis can not be made on the clinical appearance alone. Examination with Wood's lamp is useful technique because it is inexpensive, accessible, and practical. It will be negative in cases of tinea capitis involving Tricophyton species. It is a useful screening procedure and can be combined with another examination (Khaled et al., 2007). In this case the Wood's lamp examination was negative and continued with potassium hydroxide 20% examination from the plucked hair stubs using sterile forceps to include the hair roots. A drop of potassium hydroxide 20% was placed next to the material and then thoroughly mixed then a cover slip was applied. The presence of fungal element (hyphae and/or spores) within and/or around hair shaft under microscope magnification was considered to be a positive test. In this case we can found spores outside and inside the hair shafts.

The differential diagnosis of tinea capitis includes all conditions capable of causing patchy baldness with inflammatory changes of the scalp. Seborrheic dermatitis is one of it. This condition is chronic, relapsing inflammatory skin disease with predilection for areas rich in sebaceous glands. This disorder is characterized by scalling and sharply demarcated erythematous patches with greasy scales, with large variation in extent and morphologic characteristic depending on area of skin involved. It is triggered by stress and exposure to the sunlight. The cause are incompletely understood, fungi from genus *Malassezia* have been considered potentially pathogenic agent for this disease (Alirezai, Jiryae, & Shabbak, 2019) (Stefanaki & Katsambas, 2010). In this case the disease appeared after the patient having contact with her friend, no relevance with sun exposure. The lesion was firstly revealed as an baldness and also itchy with dry scale.

The other differential diagnosis is alopecia areata. In alopecia areata may show erythema but it is not common showing scaly condition. It is a chronic inflammatory disease which affects the hair follicles and sometime the nails. Onset may be at any age, usually presents as patches of hair loss on the scalp but any hairbearing skin can be involved. Short broken hairs are frequently seen around the margins of expanding patches of alopecia areata. About 20% people with alopecia areata have family history in this disease (Breathnach, Burns, Cox, & Griffiths, 2010).

There are topical and oral therapy for tinea capitis. Although a small percentage of patients may clear with topical agents, topical therapy alone is not recommended for the management of tinea capitis, because topical agents are unable to penetrate in the hair follicle sufficiently to clear the infection. A small randomized trial found that topical treatment increases the rate of eradication which may reduce the transmissibility of the

organisms by reducing the shedding of fungal spores at the beginning of systemic treatment and may shorten the cure rate with oral antifungal. However, topical agents are used to reduce transmission of spores, such as povidone-iodine, ketokonazole 2% and selenium sulfide 1% shampoo. The shampoo should be applied to the scalp and hair for 5 minutes twice weekly for 2-4 weeks or three times weekly until the patient is clinically and mycology cured. Patients should be told to use the shampoo 3 times weekly and to leave it in contact with the scalp for at least 5 minutes before rinsing (Fuller et al., 2014).

Treatment for tinea capitis relies on the use of terbinafine, itraconazole, griseofulvin and fluconazole. There is no clinical evidence to support the use of other oral antifungals, including the newer azoles such as voriconazole or posaconazole. Griseofulvin was the first effective drug used of the treatment of tinea capitis and is still widely used in resource-poor settings as it remains effective. Griseofulvin is fungistatic, and inhibits nucleic acid synthesis, arresting cell division at metaphase and impairing fungal cell wall synthesis. It is also antiinflammatory. Terbinafine acts on fungal cell membranes and is fungicidal. Itraconazole exhibits both fungistatic and fungicidal activity depending on the concentration of drug in the tissues, but like other azoles, the primary mode of action is fungistatic, through depletion of cell membrane ergosterol, which interferes with membrane permeability. Fluconazole and ketoconazole have occasionally been assessed for tinea capitis but its use has mainly been limited by side effects.

In this case, after the diagnosis of tinea capitis was made, the patient was treated with combination oral griseofulvin 2x500 mg, cetirizine 1x10 mg, and ketoconazole 2% shampoo 3 times weekly. We use griseofulvin, because is still treatment of choice. Its efficacy is superior to that terbinafine, and although its efficacy and treatment duration is matched by that of fluconazole and itraconazole, griseovulfin is cheaper.

The definitive end point for adequate treatment must be mycological cure, rather than clinical response. Therefore, follow-up with repeat mycology sampling is recommended at the end of the standard treatment period and then monthly until mycological clearance is documented.¹⁶ In this case, clinical improvement is marked by improving signs such as itching disappears, there is already hair growth, hair is not easily pulled out. Mycological cure is achieved by the absence of arthroconidia on 10-20% KOH examination. At the second week of follow-up, itching had reduced (NRS 2) and hair growth was visible. At eight week, hair growth has begun to be dense and hair is not easily pulled out, and no more itching (NRS 0). Microscopic examination with 20% KOH on hair specimens was performed in the eighth week of therapy, and no hyphae and endothrix arthroconidia were found.

CONCLUSION

Tinea capitis should be considered in the differential diagnosis of any patient suffering from scalp disorders, especially in the adolescent population. The definitive end point for adequate treatment must be mycological cure, rather than clinical response. Therefore, an increased level of surveillance (e.g. screening in schools), and a highly effective interdisciplinary cooperation between general practitioners, mycologists, veterinarians and dermatologists are strongly recommended.

REFERENCES

- Achterman, Rebecca Rashid, & White, Theodore C. (2012). Dermatophyte virulence factors: identifying and analyzing genes that may contribute to chronic or acute skin infections. *International Journal of Microbiology*, 2012.
- Alirezaei, Pedram, Jiryae, Nasrin, & Shabbak, Ali Abbas. (2019). Comparison of Efficacy of Clotrimazole 1% Cream with Sertaconazole 2% Cream in Treatment of Adult Seborrheic Dermatitis. *Avicenna Journal of Clinical Medicine*, 26(2), 67–74.
- Baldo, Aline, Monod, M., Mathy, Anne, Cambier, Ludivine, Bagut, E. T., Defaweux, Valérie, Symoens, F., Antoine, Nadine, & Mignon, Bernard. (2012). Mechanisms of skin adherence and invasion by dermatophytes. *Mycoses*, 55(3), 218–223.
- Breathnach, Stephen M., Burns, David Anthony, Cox, Neil H., & Griffiths, Christopher E. M. (2010). *Rook's textbook of dermatology*. Wiley-Blackwell.
- Fuller, L. C., Barton, R. C., Mohd Mustapa, M. F., Proudfoot, L. E., Punjabi, S. P., Higgins, E. M., Hughes, J. R., Sahota, A., Griffiths, M., & McDonagh, A. J. (2014). British Association of Dermatologists' guidelines for the management of tinea capitis 2014. *British Journal of Dermatology*, 171(3), 454–463.
- Goldsmith, Lowell A., Katz, Stephen I., Gilchrest, Barbara A., Paller, Amy S., Leffell, David J., & Wolff, Klaus. (2012). Fitzpatrick's Dermatology in General Medicine, 8e. *McGrawHill Medical*, 2421–2429.
- Khaled, Aida, Mbarek, L. R., Kharfi, Monia, Zeglaoui, Faten, Bouratbine, Aida, Fazaa, Becima, & Barek, M. R. Kamoun. (2007). Tinea capitis favosa due to *Trichophyton schoenleinii*. *ACTA DERMATOVENEROLOGICA ALPINA PANONICA ET ADRIATICA*, 16(1), 34.
- Kurniati, Prakoewa C. R. S. (2008). Etiopatogenesis dermatofitosis. *Berkala Ilmu Kesehatan Kulit Dan Kelamin*, 20(3), 243–250.
- Lakshminpathy, Deepika T., & Kannabiran, Krishnan. (2010). Review on dermatomycosis: pathogenesis and treatment. *Natural Science*, 2(07), 726.
- Park, Su-Kyung, Park, Sang-Woo, Yun, Seok-Kweon, Kim, Han-Uk, & Park, Jin. (2019). Tinea capitis in adults: a 18-year retrospective, single-centre study in Korea. *Mycoses*, 62(7), 609–616.
- Rodríguez-Cerdeira, C., Martínez-Herrera, E., Szepietowski, J. C., Pinto-Almazán, R., Frías-De-León, M. G., Espinosa-Hernández, V. M., Chávez-Gutiérrez, E., García-Salazar, E., Vega-Sánchez, D. C., & Arenas, R. (2021). A systematic review of worldwide data on tinea capitis: analysis of the last 20 years. *Journal of the European Academy of Dermatology and Venereology*, 35(4), 844–883.
- Sari, Andina B., Widaty, Sandra, Bramono, Kusmarinah, Miranda, Eliza, & Ganjardani, Mardiaty. (2012). Tinea Kapitis di Poliklinik Kulit dan Kelamin RSUPN DR Cipto Mangunkusumo Jakarta Periode Tahun 2005-2010. *Departemen Ilmu Kesehatan Kulit Dan Kelamin, FK Universitas Indonesia, RSUPN Dr. Cipto Mangunkusumo Jakarta*, 113–117.
- Sei, Yoshihiro. (2015). 2011 epidemiological survey of dermatomycoses in Japan. *Medical Mycology Journal*, 56(4), J129-35.
- Stefanaki, I., & Katsambas, A. (2010). Therapeutic update on seborrheic dermatitis. *Skin Therapy Letter*, 15(5), 1–4.