



EVALUATING TRICHOSCOPIC FEATURES FOR DIFFERENTIATING TINEA CAPITIS AND ALOPECIA AREATA IN CHILDREN

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ABSTRACT

Pediatric hair loss, particularly in the form of alopecia areata (AA) and tinea capitis, presents unique diagnostic challenges. Early and accurate identification of the underlying cause of hair loss is essential for appropriate management and treatment. This study aimed to investigate the trichoscopic features of alopecia areata and tinea capitis in pediatric patients. A total of 20 patients, aged 12 years or older, with patchy scalp hair loss, were analyzed using clinical examinations, trichoscopic imaging, and laboratory tests. The study found distinct trichoscopic features for both conditions: comma-shaped hairs, zigzag hairs, black dots, and short broken hairs were predominant in tinea capitis, while exclamation mark hairs, yellow dots, and short vellus hairs were common in alopecia areata. Trichoscopy proved to be a non-invasive and highly effective diagnostic tool, providing a quick means of differentiating between these two conditions. Laboratory results confirmed fungal infection in 32.5% of tinea capitis cases, while all alopecia areata cases tested negative for fungal involvement. The findings highlight the importance of trichoscopy in diagnosing pediatric alopecia and tinea capitis, enabling clinicians to distinguish between the conditions based on characteristic hair patterns. These results underscore the growing significance of trichoscopy in clinical dermatology as a first-line tool for diagnosing scalp disorders.

Keywords :- Trichoscopy, Alopecia Areata, Tinea Capitis, Pediatric Hair Loss, Black Dots, Exclamation Mark Hairs, Zigzag Hairs, Short Broken Hairs, Yellow Dots, Hair Loss Diagnosis.

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INTRODUCTION

The patient and their family often face significant psychological and emotional strain, which can severely impact the self-esteem of children who are responsible for their care [1]. To address the issues caused by hair loss, it is crucial to identify the underlying cause early on and implement appropriate treatment [2]. Common causes of hair loss in pediatric patients include trichotillomania, traction alopecia, and alopecia areata. For effective treatment, it is essential for clinicians to distinguish between hair loss resulting from primary

dermatologic conditions and that caused by systemic diseases [3]. The condition may affect the entire skin surface or deeper layers, which differs significantly from the clinical presentation observed here [8]. Trichoscopy is a useful diagnostic tool for assessing hair and scalp disorders. Although it is not commonly employed for managing such conditions, dermatologists can readily, diagnose anogenetic alopecia, scarring alopecia, and alopecia areata using this method [9].

In pediatric patients with localized patches of hair loss, it is important to evaluate the different trichoscopic characteristics of tinea capitis and alopecia areata. Tinea capitis is a fungal infection of the scalp caused by the dermatophytes *Trichophyton* and *Microsporum*, leading to one or more areas of hair loss accompanied by inflammation, scaling, pustules, and itching [4]. On the other hand, alopecia areata (AA) is characterized by hair loss from multiple areas of the body, commonly the scalp [5]. The affected areas often show small bald patches, which typically have a normal-appearing skin surface beneath them. These patches can take various shapes, though they are usually round or oval [6].

In addition to examining the hair loss patches for fungal involvement, it may be possible to diagnose the underlying cause of focal hair loss. If the cause remains unclear, a scalp biopsy may be recommended [7]. Trichoscopy allows for the detection of morphologic structures not visible to the naked eye in a non-invasive manner. While the trichoscope is user-friendly, it is more advanced than a simple magnifying glass, as it enables the visualization of skin layers. However, histopathological images provide a more detailed view, allowing for the observation of finer structural details.

METHODOLOGY

A statistical analysis was performed on 20 patients presenting with patchy hair loss on the scalp, either singular or multiple, without any gender preference, and aged 12 years or older, diagnosed with either alopecia areata or tinea capitis. Patients with the following conditions were excluded from the study: (1) those having concurrent dermatological disorders, and (2) those who had received topical treatment for tinea capitis or alopecia areata within the past month, or systemic treatment within the past three months.

A 16MP Panasonic LUMIX S5 camera was used to capture images of the hair loss patches after the patient's medical history was obtained, a clinical examination was performed, and skin scrapings were collected. The plucked hairs were examined under a microscope with a 10% KOH solution, fungal cultures were cultured, and trichoscopic examination was carried out.

Laboratory Examination

To obtain sufficient specimens, samples were collected from the periphery of the affected areas of hair loss (including scales or plucked hairs). A 10% potassium hydroxide solution was used to prepare hair roots and skin scrapings for examination. The spores were then observed microscopically on a heated slide. Sabouraud's agar medium was utilized for culturing the specimens, which were incubated at 30°C for four weeks,

with regular inspections throughout the incubation period.

Trichoscope Examination

In this study, an immersion gel-free hand-held trichoscope was employed to prevent light reflection from the skin surface. The DermLite DL3 trichoscope, with two magnifications (20x and 40x), was used. The device included LED lighting, rechargeable lithium batteries (replaceable), and separate handle and head components.

To examine the lesion, the trichoscope was placed gently on the lesion after applying a gel coating, with the device switched on and positioned about 1 cm above the lesion. In most cases, the focus only needed to be adjusted once (the examiner should position their eyes as close to the eyepieces as possible). To prevent infection transmission, the lens was disinfected with a cotton swab soaked in alcohol. The DermLite DL3 Gen Trichoscope was also used to capture digital images of the lesion(s). The findings were evaluated by two dermatologists.

Statistical Analysis

Its performed to verify the accuracy and completeness of the data collected. Statistical analysis was conducted using pre-coded data entered into SPSS software, version 15 (SPSS).

Clinical Data

Alopecia areata affected 13 female and 7 male subjects, accounting for 65% and 35%, respectively. The average age of the group ranged from 1.5 to 11 years, with a median age of 5.25 years (Interquartile Range [IQR] = 3.3, 8.0). The duration of lesions varied from 2 to 12 weeks, with a median of 4.00 weeks (IQR = 2.3, 11.0). The number of lesions ranged from 1 to 2, with a median of 1.0 lesion (IQR = 1.0, 2.0). The size of the lesions ranged from 0.5 to 3 cm, with a median size of 2.0 ± 0.6 cm by 1.5 ± 0.7 cm.

For the tinea capitis group, the study included 15 male subjects (75%) and 5 female subjects (25%). Their ages ranged from 2 to 11 years, with a median age of 5.0 years (IQR = 3.5, 7.1). The duration of the lesions ranged from 2 to 12 weeks, with a median of 4.00 weeks (IQR = 2.3, 11.0). The number of lesions varied from 1 to 2, with a median of 1.0 lesion (IQR = 1.0, 1.0). The lesion sizes ranged from 1 to 3 cm, with a median size of 2.1 ± 0.8 cm by 1.6 ± 0.8 cm.

Laboratory Data

All patients underwent direct microscopic examination after specimens from the lesions were collected and mounted in a 10% KOH solution. Among the tinea capitis cases, the test yielded positive results in 32.5% of the cases (13 patients), while false negative

results were observed in 17.5% of the cases (7 patients). In contrast, all cases of alopecia areata tested negative. The fungal species identified included *Trichophyton violaceum* (present in 6 patients, 15%), *Microsporum desjudensis* (6 patients, 15%), *Trichophyton rubrum* (3 patients, 7%), and *Trichophyton verrucosum* (5 patients, 13%).

Trichoscopic Data

In patients with tinea capitis, 18 individuals exhibited short broken hairs, while 13 patients (65%)

showed black dots. Additionally, 11 patients (55%) had comma-shaped hairs, 9 patients (45%) displayed corkscrew hairs, and 5 patients (25%) presented with zigzag hairs (see Table 1).

In the alopecia areata group, black dots were observed in 12 patients (60%), yellow dots in 11 patients (55%), and exclamation marks in 11 patients (55%). Other notable trichoscopic findings included white hairs in 9 patients (45%), short vellus hairs in 8 patients (40%), short broken hairs in 8 patients (40%), and pigtail regrowing hairs in 3 patients (15%).

Table 1: Tinea capitis features on a trichoscopic level

Frequency (N= 20)	Percent (%)
Comma shaped hairs	
Present	11
Absent	9
Zigzag shaped hairs	
Present	5
Absent	15
Black dots	
Present	13
Absent	7
Short broken hairs	
Present	18
Absent	2
Corkscrew hairs	
Present	9
Absent	11

Table 2: The different characteristics of alopecia areata based on trichoscopic findings

Frequency (N= 20)	Percent (%)
Black dots	
Present	12
Absent	8
Yellow dots	
Present	11
Absent	9
Microexclamation mark	
Present	11
Absent	9
Short vellus hairs	
Present	8
Absent	12
Pig tail regrowing hair	
Present	3
Absent	17
Short broken hairs	
Present	8
Absent	12
White hairs	
Present	9
Absent	11

DISCUSSION

Hair loss patches on the scalp in pediatric patients are most commonly attributed to alopecia areata and tinea capitis [10]. In particular, the nonscaly type of tinea capitis can closely resemble alopecia areata. Given the time it may take to obtain laboratory results, such as fungal cultures or biopsies, the recent advancement in trichoscopy has significantly improved the diagnostic process for both alopecia areata and tinea capitis [13, 14]. Previous studies on tinea capitis have generally involved a limited number of patients, with unique trichoscopic findings reported [13]. Ekiz et al. [14] noted that comma-shaped hairs, zigzag hairs, corkscrew hairs, and black dots were common trichoscopic features among patients with tinea capitis.

In the current study, 55% of patients exhibited comma-shaped hairs, a finding that aligns with other studies involving fewer subjects [14–16]. These comma-shaped hairs may occur due to fungal infections, which can result in ectothrix and endothrix types of hair invasions, causing the hairs to curve slightly and break. The bending and cracking of the hair shafts can likely be explained by the presence of hyphae filling the hair shaft [15].

Among the 20 patients studied, 25% exhibited zigzag hairs, and 45% had corkscrew-shaped hairs. Similar results were observed in other studies [14, 16]. According to one study, individuals of Black ethnicity showed a tendency to have zigzag or corkscrew hairs, which is similar to the presence of comma-shaped hairs [16].

Short broken hairs were observed in 90% of the tinea capitis patients, which is consistent with previous research [13, 14]. These broken hairs are characteristic of tinea capitis but may also indicate other conditions of more severe nature. In our study, black dots were found in 65% of tinea capitis patients (13 out of 20), similar to the findings of Sandoval et al. [17]. Black dots are caused by dystrophic or broken hairs [18].

A pattern of comma-shaped and corkscrew hairs has been frequently associated with zoophilic infections in various studies [16]. In our patients, *T. paniculatum*, *M. canis*, and *T. species* were isolated, likely due to their farming environments and socioeconomic conditions.

In summary, the most common findings in tinea capitis patients were short broken hairs, followed by black dots, comma-shaped hairs, and corkscrews. Tinea capitis shares trichoscopic features with other conditions such as trichotillomania, where short dystrophic hairs can also indicate more severe symptoms. Several large-scale studies have detailed trichoscopic findings for alopecia areata (AA), including exclamation marks, yellow dots, black dots, and broken hairs.

For alopecia areata, 55% of patients (11 out of 20) exhibited yellow dots, a finding also reported in other studies [20, 21]. These yellow dots are round or

polycyclic in shape and vary in size. They are easier to observe with video trichoscopy compared to handheld devices [18]. Yellow dots are often considered a characteristic of AA incognita, though their presence may also indicate other conditions such as trichotillomania, hypotrichosis simplex, or tinea capitis [23].

In this study, 55% of alopecia areata patients presented with exclamation mark hairs, which has also been reported in previous studies [14, 18, 20]. However, the term "exclamation mark hair" may not be entirely accurate; tapering hairs would be a more appropriate description due to the narrowing of the hair shaft near the follicle. This feature is more easily detected with trichoscopy than by the naked eye, as it highlights the hair shaft's tapering towards the follicle [12, 14, 19].

The presence of yellow dots, short vellus hairs, and pigtail regrowing hairs in alopecia areata patients are all associated with higher diagnostic sensitivity. These features can indicate active disease at the perimeter of lesions. In our study, short vellus hairs were present in 55% of alopecia areata patients, a finding consistent with previous research [14, 19, 20]. Short vellus hairs may not always be visible on the surface of affected areas but are an important diagnostic feature for alopecia areata. The appearance of these hairs may suggest a favorable prognosis, such as spontaneous remission or a positive response to treatment, though our study involved untreated cases, and remission may have occurred naturally.

Interestingly, pigtail hairs were found in 15% of alopecia areata patients (3 out of 20), which also aligns with previous studies [19]. The presence of pigtail hair is suggestive of spontaneous remission in alopecia areata and may serve as a valuable trichoscopic marker. Short broken hairs were seen in 40% of alopecia areata patients, a feature that is often regarded as a clinical marker for active disease [18]. Other studies [14, 18, 19] have noted that broken hairs are not specific to alopecia areata, as they can also appear in tinea capitis cases. Finally, white hairs were observed in 45% of alopecia areata patients, which could serve as an additional trichoscopic diagnostic sign, indicating spontaneous remission of the disease.[20-23]

In conclusion, trichoscopy remains a powerful tool in diagnosing and assessing the severity of both alopecia areata and tinea capitis. The findings from this study emphasize that certain trichoscopic features, such as yellow dots, short vellus hairs, and exclamation mark hairs, are particularly sensitive for detecting alopecia areata. Likewise, short broken hairs, black dots, and comma-shaped hairs are vital for diagnosing tinea capitis. Further clinical and histopathological evaluations are necessary when trichoscopic features are unclear or non-diagnostic.

CONCLUSION

Due to its distinct features, tinea capitis is more likely to present zigzag or corkscrew hairs compared to alopecia areata. This method allows for the differentiation between hairs affected by alopecia areata

and tinea capitis. Additionally, yellow dots and exclamation marks are typical indicators of alopecia areata but are not observed in tinea capitis. Trichoscopy has become an indispensable tool for dermatologists, akin to a stethoscope in clinical practice.

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