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Trichoscopy as a Useful Tool to Diagnose the Telogen Effluvium

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Author`s Contribution

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ABSTRACT

Objective: To determine the efficacy of Trichoscopy in diagnosing telogen effluvium (TE) at a tertiary care Hospital.

Methodology: This cross-sectional study was conducted in Dermatology department, PNS Shifa Hospital, Karachi from December 2022 to May 2023. Overall 100 individuals with clinically confirmed telogen effluvium of either gender were included. Individuals with TE underwent trichoscopic imaging of the frontal, vertex, temporal, and occipital scalp using the HEINE DELTA 20T dermoscope without liquid media. High-resolution images and videos were captured and independently evaluated by two expert dermatologists to ensure diagnostic utility. The SPSS version 26 statistical analysis program was used for data entry and analysis.

Results: The mean age of the patients was 32.7 ± 8.4 years, with mean disease duration of 4 ± 2 months. Among the 100 patients, 47 (47%) were men, and 53 (53%) were women. Perifollicular scaling (95%) was the most frequent trichoscopic finding in our study, followed by hair diameter diversity (48%), vellus hair (42%), perifollicular pigmentation (33%), and yellow spots and scalp discoloration (27%). Trichoscopic findings in telogen effluvium showed significant differences between frontal and occipital regions. Vellus hair, HDD, yellow dots, perifollicular pigmentation and Perifollicular scaling were significantly more common in the frontal area, while scalp discoloration was significantly higher in the occipital region (p=<0.05).

Conclusion: Trichoscopy has proven to be an effective, non-invasive diagnostic tool for identifying telogen effluvium. Comparing trichoscopic findings between the frontal and occipital regions helps differentiate telogen effluvium from androgenetic alopecia, enabling early and accurate diagnosis while minimizing the need for invasive procedures.

Keywords: Alopecia, Dermoscopy, Hair diameter diversity, Hair loss, Non-scarring, Telogen effluvium, Trichoscopy.

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Introduction

Telogen effluvium (TE) is a scalp condition characterized by non-scarring, diffuse hair loss, often resulting in noticeable hair shedding.[1] This condition can occur at any age and typically begins with a sudden increase in hair loss. Common triggers for telogen effluvium include physical or emotional stress, surgery, fever, childbirth, iron deficiency, chronic illnesses, dietary modifications, and other significant physiological or psychological stressors.[2]

TE is the most common cause of hair loss and is typically a self-limiting condition that rarely leads to visible baldness. In contrast, other hair disorders are often progressive, resulting in significant reductions in hair density and thickness over time.[3] During the early stages, distinguishing TE from other hair conditions can be challenging due to overlapping clinical features. For a definitive diagnosis, a combination of clinical history, laboratory investigations, and, in some cases, scalp biopsy may be necessary to rule out other underlying hair disorders.[4] The term "trichoscopy" refers to the dermoscopy of the hair and scalp, a non-invasive diagnostic technique used to evaluate various hair loss conditions and identify specific diagnostic markers.

Trichoscopy plays a vital role in differentiating telogen effluvium from other types of hair loss, providing valuable insights into the condition's underlying causes. Conducting a trichoscopic analysis can greatly enhance the understanding and management of telogen effluvium, aiding in accurate diagnosis and appropriate treatment planning.[5] Trichoscopy, a relatively new and innovative technique, involves the use of dermoscopy to examine the hair, scalp, eyebrows, and eyelashes at high magnification. This method allows for the visualization and quantification of hair characteristics, enabling

detailed analysis that aids in diagnosing various types of hair loss.[6]

The term "trichoscopy" was introduced in 2006 by Ross et al., who applied it to hair and scalp videodermoscopy for use in the diagnostic evaluation of hair loss conditions. However, the technique itself gained recognition earlier when Lacarrubba et al provided the first detailed description of the videodermoscopic features associated with alopecia areata.[7] The analysis of follicular, interfollicular, and perifollicular hair shaft patterns and hair signs forms the basis of trichoscopic evaluation of the scalp. The trichoscopy-assisted diagnosis helps to avoid unwanted biopsies or identify the optimal location for a biopsy and may also be useful to see patient's response towards treatment.[8-10] Few international studies have highlighted the value of trichoscopic findings in diagnosing non-scarring alopecia, demonstrating their superiority over other diagnostic methods. However, despite the prevalence of telogen effluvium, no studies have specifically focused on the role of trichoscopy in its diagnosis. As a result, TE remains largely a diagnosis of exclusion. Establishing a reliable trichoscopic method for identifying TE would significantly contribute to both patient care and the existing body of literature. Such advancements could improve diagnostic accuracy, reduce the need for invasive procedures, and streamline management strategies.

Furthermore, addressing this gap in research specifically at local level would provide valuable data for developing future guidelines and therapeutic approaches for patients with telogen effluvium.

Methodology

A cross-sectional study was conducted over a six-month period from December 2022 to May 2023. Study was done following the approval of the study protocol by the ethical committee (ERB NO.ERB/2022/DERMA/33) at PNS Shifa Hospital, Karachi. Overall a sample of 100 individuals with clinically confirmed telogen effluvium of either gender, were included. The sample size was computed using the Openepi calculator using the prevalence of TE 2.7%[1], a margin of error of 5%, and a level of confidence of 95%. The calculated sample size was 41 however we included 100 TE cases. Each patient got thorough systemic, dermatological, and general physical exams. Pregnancy, hair loss treatment in the previous three months, and chronic incapacitating illnesses were among the exclusion criteria. Other conditions affecting the scalp, such as trichotillomania, alopecia areata, tinea capitis, seborrheic dermatitis, or psoriasis, were also excluded from the study. Before the data collection, informed consent was obtained from each participant to ensure their voluntary participation and understanding of the research objectives and procedure.

Strict measures were implemented to maintain the confidentiality and privacy of participant data throughout the study. All individuals diagnosed with telogen effluvium (TE) underwent trichoscopic imaging of the frontal, vertex, temporal, and occipital scalp regions to ensure a comprehensive evaluation of hair and scalp conditions.

Trichoscopic examinations were conducted using the HEINE DELTA 20T handheld dermoscope without the application of liquid media, ensuring clear visualization of scalp and hair structures. High-resolution images and videos of the evaluated areas were captured using an iPhone 13 Pro for precise documentation.

Subsequently, the trichoscopic photographs were independently assessed by two dermatologists with extensive training and expertise in dermoscopic analysis. This structured and standardized approach facilitated a comprehensive evaluation of trichoscopic patterns in TE, contributing valuable insights into its diagnostic utility.

The data was acquired and entered using MS Excel. IBM SPSS for Windows, version 26.0 was used. To compare the trichoscopic results between the frontal and occipital regions, the chi-square test was applied.

Results

The overall mean age of the patients was 32.7 ± 8.4 years, with a mean disease duration of 4 ± 2 months. The highest incidence of telogen effluvium (TE) was observed in the 18–30 years age group, accounting for 74% (n = 74) of the cases. Among the 100 patients included in the study, 47% (n = 47) were male, and 53% (n = 53) were female.

The most common cause of TE identified was psychological stress, reported in 37% (n = 37) of patients. Other causes included dietary deficiencies in 20% (n = 20), febrile illness in 12% (n = 12), childbirth and drug intake in 9% (n = 9) each, topical applications in 6% (n = 6), chronic blood loss in 5% (n = 5), and surgical procedures in the remaining cases. A detailed breakdown of these causes is presented in Table I.

In terms of trichoscopic findings, the most prevalent

Table I: Demographic Details of the Patients (n=100)	
Demographics	**Statistics**
Age (Mean ± SD)	32.7± 8.4 years
18-30	74 (74.0%)
31-40	20 (20.0%)
>40	6 (6.0%)
Duration of illness (Mean ± SD)	4± 2 months
Gender	**N(%)**
Male	47 (47.0%)
Female	53 (53.0%)
Probable etiological causes	**N(%)**
Febrile illness	12 (12.0%)
Psychological Stress	37 (37.0%)
Child Birth	09 (09.0%)
Diet	20 (20.0%)
Surgery	02 (02.0%)
Chronic Blood loss	05 (05.0%)
Drug intake	09 (09.0%)
Topical application	06 (06.0%)

feature was perifollicular scaling, observed in 95% (n = 95) of patients. Other common findings included hair diameter diversity (HDD) in 48% (n = 48), vellus hair in 42% (n = 42), perifollicular pigmentation in 33% (n = 33), and both yellow dots and scalp discoloration in 27% (n = 27) of patients. These findings are illustrated in Figure I.

Vellus hair, hair diameter diversity (HDD), yellow dots, and perifollicular pigmentation were more frequent in the frontal region, while scalp discoloration was higher in the occipital region. Perifollicular scaling was observed in both areas but was more common in the frontal region. Black dots, scalp erythema, and pigtail hair were absent in both regions. The findings showed significant difference p=< 0.05, as shown in table II.

Table II: Descriptive analysis for demographic and clinical variables. (n=51)			
Trichoscopic Findings in Telogen Effluvium	**AREA**		**p-value**
	Frontal	**Occipital**	
Vellus hair			
Yes	27	15	
No	73	85	0.037
HDD			
Yes	31	17	
No	69	83	0.020
Yellow dots			
Yes	27	0	0.000
No	73	100	
Perifollicular pigmentation			
Yes	33	0	
No	67	100	0.000
Black dots			
Yes	0	0	NA
No	100	100	
Scalp discoloration			
Yes	06	21	0.001
No	94	79	
Perifollicular scaling			
Yes	55	40	0.033
No	45	60	
Scalp erythema			
Yes	00	00	NA
No	00	00	
Pigtail hair			
Yes	00	00	
No	00	00	NA

Discussion

Dermatologists frequently encounter patients with various hair-related issues, which, while typically having minimal physical impact, can lead to significant psychological consequences, such as elevated anxiety and diminished self-esteem. Among females, the most common form of alopecia is telogen effluvium, followed by female pattern hair loss (FPHL) and alopecia areata.[12] The primary aim of our study was to assess the role of trichoscopy in the diagnosis of TE and the incidence of telogen effluvium was highest in the 18–30 years age group, accounting for 74 (74%) cases. Our findings

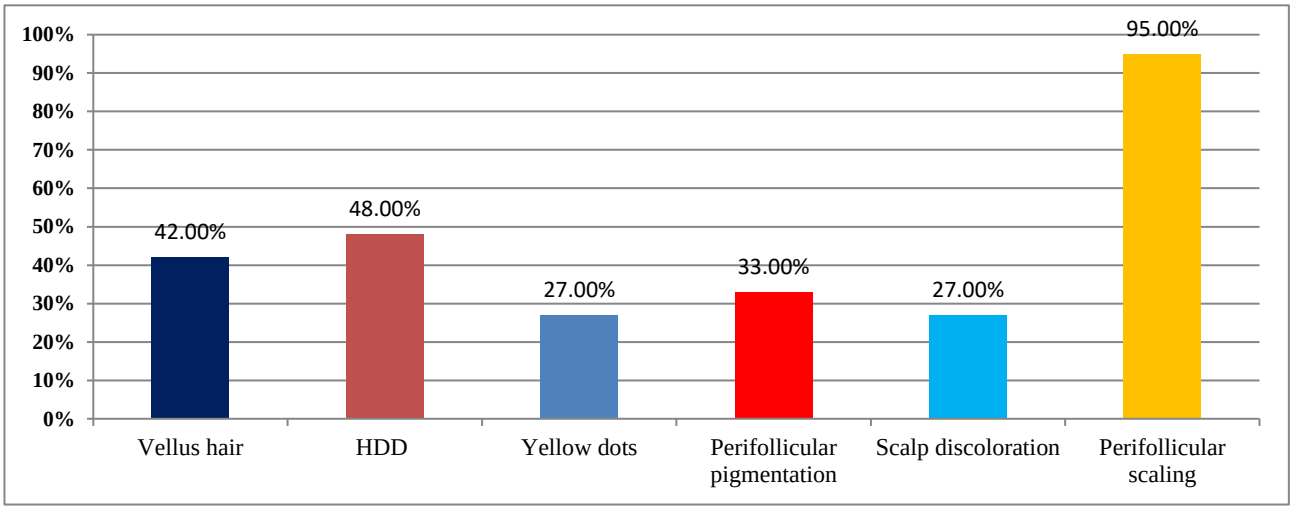

Figure 1. Trichoscopic Findings in Telogen Effluvium. (n=100)

contrast with those of Malkud et al[13] who reported the highest incidence of TE in the 21-30 age range, whereas in our study, the peak incidence occurred in the 18-30 age group (74%). This difference may be attributed to variations in regional factors or sample demographics, suggesting that age-related trends in TE could vary in different populations. The most frequent trigger for TE in our study was psychological stress, accounting for 37% of cases. This finding aligns with studies by Rustom et al[14] and Malkud et al[13] who also identified psychological stress as the predominant cause in their cohorts of 50 and 116 patients, respectively. In contrast, Jain et al. found that febrile illness was the leading underlying cause of TE in 33% of cases among 100 individuals with diffuse hair loss.[15] All TE patients exhibit hair diameter diversity, or anisotrichosis, in the afflicted scalp area[16]. It is brought on by the hair follicles' gradual and asynchronous shrinking in the genetically susceptible scalp regions, which results in the vellus hairs' replacement of the terminal hairs. This highlights the potential role of systemic factors in TE, underscoring the importance of a comprehensive clinical evaluation to determine the specific triggers for each patient.

In the frontal region, hair diameter diversity (HDD) greater than 10% was observed in 30% of patients with telogen effluvium. This finding contrasts with Hu et al.'s study, which reported HDD greater than 10% in all TE cases.[17] In our research, a statistically significant difference in HDD was noted between the frontal and occipital regions of TE patients, further highlighting the distinctive patterns of hair thinning in these areas. Similarly, Nagar et al[1] found a significant association between anisotrichosis and the frontal scalp in TE patients when compared to controls.[1] Tawfik et al[2] also observed higher percentages of HDD in the frontal and temporal regions compared to the occipital region, suggesting that the pattern of hair shaft variability may differ across scalp regions in TE. These findings are consistent with those of Nagar et al,[1] who reported a statistically significant difference in HDD between the frontal and occipital areas, supporting the notion that regional differences in HDD could be a valuable diagnostic indicator for TE.[1]

In our study, an increased presence of vellus hair was observed in both the frontal and occipital regions of patients with telogen effluvium. Notably, the frontal region exhibited a statistically significant higher proportion of vellus hair compared to the occipital region. This shift toward vellus hair in both regions aligns with findings by Rakowska et al[18] who also reported a similar trend in TE patients. Likewise, Nagar et al[1] found significant hair diameter diversity between the frontal and occipital scalp regions in TE patients, further supporting the regional differences in hair characteristics in this condition. Perifollicular pigmentation was observed in the frontal region of 33% of TE patients in our study, while it was absent in the occipital area. Perifollicular pigmentation is less commonly noted in studies of Asian populations compared to those of Caucasian descent, likely due to the masking effect of darker skin tones in Asians.[19,20] Studies on white patients have reported a much higher detection rate of perifollicular pigmentation, with up to 90% of cases showing this feature.[21,22] In contrast, Nagar et al[1] found that only 18.7% of cases in their Indian cohort exhibited perifollicular pigmentation, which is consistent with our findings.

Our research demonstrates a significantly higher percentage of perifollicular discoloration in the frontal region compared to the occipital region. Rakowska et al[18] proposed that a ratio of frontal to occipital perifollicular discoloration greater than 3:1 is highly suggestive of TE, a pattern we also observed in our study, emphasizing the potential diagnostic value of this feature. Yellow dots are indicative of empty follicular ostia, which occur due to persistent sebaceous glands following severe follicle shrinkage or androgen-induced sebaceous gland hyperplasia.[19] In our study, YD was present in the frontal region in all cases of telogen effluvium (TE). The prevalence of YD varies widely across different studies, ranging from 1.67% to 66%. For example, Kibar et al[18] reported a YD incidence ratio of 25:143 in TE cases, while Deloche et al[21] found a ratio of 13:50, and Inui et al[23] reported 1:6. Rakowska et al. observed a higher frequency of YD in patients with female-pattern androgenetic alopecia (FAGA) compared to those with TE, whereas Zhang et al. concluded that YD was not a significant feature in TE patients.[17,18] Our study found a statistically significant difference in the number of yellow spots between the frontal and occipital regions in TE patients, suggesting regional variation in this trichoscopic feature. This finding reinforces the potential diagnostic value of YD in distinguishing TE from other hair disorders, particularly when observed in the frontal scalp.

This was a single-center study, and biopsies were not performed since the diagnosis of telogen effluvium was made clinically, as invasive procedures were deemed unnecessary. Though, the future research could benefit from multicenter studies with larger sample sizes to

enhance the endorsement of the findings. Additionally, incorporating biopsies in some cases could provide further insights into the underlying pathology of TE. To improve the understanding of trichoscopy as a tool for diagnosis for TE, longitudinal research studies examining long-term outcomes and the effectiveness of trichoscopic features in monitoring disease progression would also be valuable.

Conclusion

This study demonstrates that trichoscopy is an effective, safe, and non-invasive diagnostic tool for telogen effluvium (TE). The findings suggest that TE can be reliably differentiated from other causes of non-scarring alopecia using specific trichoscopic criteria. Comparative analysis of the occipital and frontal scalp regions enhances the ability to distinguish TE from other common hair loss disorders, such as androgenetic alopecia. Key trichoscopic features indicative of TE include an increased proportion of thin and vellus hairs, hair diameter diversity, perifollicular discoloration, and the presence of yellow dots. The integration of trichoscopic findings with clinical evaluation facilitates the early and accurate diagnosis of TE, thereby reducing the need for invasive procedures such as scalp biopsies. This approach not only improves diagnostic precision but also supports timely intervention, ultimately benefiting patient outcomes.

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