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# A COMPREHENSIVE REVIEW OF HAIR FALL: ETIOLOGY, CLINICAL PATTERNS, DIAGNOSIS, AND EMERGING THERAPEUTIC TRENDS.

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**Abstract:**

Hair fall (alopecia) is a common dermatological condition with diverse etiologies and significant psychosocial impact. It encompasses non-scarring forms such as androgenetic alopecia, telogen effluvium, and alopecia areata, as well as scarring alopecias that cause irreversible follicular damage. Hair loss results from disruption of the hair growth cycle, follicular miniaturization, immune-mediated injury, nutritional deficiencies, hormonal imbalance, and mechanical or inflammatory factors. Accurate classification based on pattern and scarring status is essential for effective diagnosis and management. Androgenetic alopecia remains the most prevalent form, while telogen effluvium is often stress-induced and reversible. Alopecia areata represents an autoimmune disorder with variable prognosis. Current management focuses on identifying triggers and providing individualized therapy using agents such as minoxidil, antiandrogens, and supportive measures. Emerging treatments, including low-dose oral minoxidil, platelet-rich plasma, and Janus kinase inhibitors, are expanding therapeutic options. Early detection, particularly of traction and scarring alopecias, is crucial to prevent permanent hair loss and improve outcomes.

**Keywords:** Hair fall, Clinical pattern, review, trends

## INTRODUCTION

Hair fall (alopecia) is a common clinical complaint with multiple causes, so evaluation starts by classifying the pattern as diffuse, patterned, or focal/patchy, and then distinguishing non-scarring from scarring alopecia (Dakkak et al., 2024). This approach matters because non-scarring causes (e.g., androgenetic alopecia, telogen effluvium, alopecia areata) often have reversible or controllable pathways, while scarring alopecias involve permanent follicular destruction and require early recognition to prevent irreversible loss (Wang et al., 2022)

**Review on Hair Fall**

The Hair growth cycles through anagen (growth), catagen (transition), and telogen (rest/shedding). “Hair fall” becomes noticeable when follicles shift prematurely into telogen, when follicular miniaturization reduces density over time, or when inflammation/traction damages follicles. Clinically, history focuses on timing (sudden vs gradual), triggers (illness/fever, childbirth, weight loss, stress, new drugs), hair practices (tight hairstyles/chemical treatments), associated symptoms (itching, pain, scaling), and systemic clues (thyroid disease, autoimmune disease, iron deficiency), followed by scalp and hair-shaft examination and targeted tests (Dakkak et al., 2024; Hughes et al., 2024).

Androgenetic alopecia (AGA) is the most frequent cause of patterned thinning. It is driven by genetic susceptibility and androgen signaling, with increasing attention to perifollicular micro-inflammation, fibrosis, and metabolic signaling within the follicle as contributors to progressive miniaturization (Chen et al., 2025). First-line therapy remains topical minoxidil, which can slow loss and stimulate regrowth but requires consistent long-term use to maintain benefit (Dakkak et al., 2024; Mayo Clinic, 2024). “Low-dose oral minoxidil” is increasingly used off-label; a randomized clinical trial in men found oral minoxidil (5 mg daily) improved hair measures over 24 weeks but was not clearly superior to topical 5% overall, with both generally well tolerated in that study context (Penha et al., 2024). A broader systematic review/meta-analysis suggests oral minoxidil can be beneficial for alopecia, while emphasizing that dose–risk balance and stronger evidence are still needed (Liu et al., 2025).

Telogen effluvium (TE) typically presents as diffuse shedding that begins weeks to months after a trigger; it is often self-limited if the trigger resolves, though chronic TE can occur. Reviews highlight that diagnosis relies heavily on careful timeline reconstruction (trigger → shedding), hair-pull testing, and excluding patterned AGA when the presentation overlaps (Hughes et al., 2024; Yin et al., 2021). Management prioritizes correcting triggers (nutritional deficits, endocrine disturbance, medication effects) and reassurance when appropriate; pharmacologic hair-growth agents used for AGA may not fit all TE subtypes, so treatment should be individualized rather than automatic (Yin et al., 2021; Dakkak et al., 2024). A classic clinical review also summarizes TE mechanisms and practical diagnostic reasoning, especially where laboratory confirmation is limited (Grover, 2013).

Alopecia areata (AA) is an immune-mediated, non-scarring alopecia that often causes well-circumscribed patches and can relapse. Contemporary reviews emphasize its autoimmune associations, psychosocial impact, and the evolving therapeutic landscape (Sibbald, 2023). In severe AA, Janus kinase (JAK) inhibitors have become a major modern development, with recent clinical overviews describing how approved JAK inhibitors are changing expectations for regrowth in appropriately selected patients (Lebwohl et al., 2025).

Traction alopecia results from repetitive mechanical tension (tight braids, ponytails, weaves, occupational hairstyles). Early disease is potentially reversible, while longstanding traction can become scarring and permanent; therefore, prevention and early change in hair practices are central (Syed & Kaliyadan, 2025).

Primary cicatricial (scarring) alopecias (e.g., lichen planopilaris, frontal fibrosing alopecia, central centrifugal cicatricial alopecia) are defined by inflammatory destruction of follicular stem-cell regions with fibrosis and irreversible loss; current treatments are often inconsistent, and mechanistic work suggests shared dysregulated pathways across subtypes (Wang et al., 2022). Because comorbid autoimmune/endocrine conditions can cluster in these disorders, a recent systematic review/meta-analysis highlights the value of clinician vigilance and targeted screening when clinical clues are present (Yongpisarn et al., 2025).

Procedural/adjunct trends for AGA include platelet-rich plasma (PRP). Meta-analyses suggest PRP can increase hair density, though protocols vary and evidence certainty differs by study design (Li et al., 2024). When PRP is combined with minoxidil, pooled analyses report higher hair density than minoxidil alone, but the certainty of evidence is often low to very low in some timepoints/outcomes, so conclusions should be cautious (Yao et al., 2024)..

## CONCLUSION:

Hair fall is best approached as a pattern-based differential diagnosis rather than a single condition: AGA (progressive miniaturization), TE (triggered shedding), AA (immune patchy loss), traction alopecia (mechanical damage), and scarring alopecias (irreversible inflammatory destruction) each require different priorities in evaluation and management (Dakkak et al., 2024; Wang et al., 2022). Current trends include broader, evidence-guided use of oral minoxidil in selected patients, expanding systemic options for severe alopecia areata (notably JAK inhibitors), and continued refinement of PRP protocols—while reinforcing that early recognition of traction and scarring disease is essential to prevent permanent loss (Penha et al., 2024; Lebwohl et al., 2025; Syed & Kaliyadan, 2025).

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