

## Androgenetic Alopecia in Al-Qalyubia Governorate: A Comprehensive Review

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### ABSTRACT

**Background:** Androgenetic alopecia (AGA) is the most common non-scarring hair loss disorder, primarily affecting genetically predisposed men. It is characterized by the miniaturization of hair follicles, particularly in the frontotemporal area and vertex of the scalp. AGA has been associated with an increased risk of cardiovascular diseases, insulin resistance, metabolic syndrome, diabetes mellitus, and hypertension. Genetic and hormonal factors play significant roles in its pathogenesis.

**Objective:** This comprehensive review aims to highlight the etiology, clinical presentation, diagnostic approaches, and current treatment modalities for androgenetic alopecia in Al-Qalyubia Governorate, emphasizing the need for awareness and understanding of this common condition.

**Methods:** Data were gathered by searching and reviewing Medline databases (PubMed and Medscape) for literature on androgenetic alopecia up to 2024. Inclusion criteria were studies published in English in peer-reviewed journals discussing AGA. The quality of included studies was assessed based on ethical approval, eligibility criteria, controls, information, and evaluation methods. Relevant information was extracted independently from each qualifying study using a data collection form.

**Conclusion:** Current treatments for AGA are focused on modulating the signs and symptoms rather than curing the condition. These treatments can slow the progression of hair loss, prevent further hair loss, and potentially stimulate partial hair regrowth. However, patient response varies, and treatments require long-term commitment. AGA has significant social and psychological impacts, necessitating comprehensive management approaches including pharmacological therapy, cosmetic camouflage, and surgical options for severe cases.

**Keywords:** Androgenetic alopecia; Hair loss; Genetic predisposition.

### INTRODUCTION

Androgenetic alopecia (AGA), the most common non-scarring alopecia, is an androgen-induced disorder characterized by hair loss in genetically predisposed men. In AGA, androgens induce miniaturization of hair follicles, especially in the frontotemporal area and vertex of the scalp. AGA patients were found to be more susceptible to cardiovascular diseases, insulin resistance, metabolic syndrome, diabetes mellitus and hypertension [1].

Genetic predisposition and hormonal changes are involved in AGA pathogenesis; for instance, a genome-wide association study identified 624 genomic sites related to AGA [2].

Rexbye *et al.* [3] have shown that genetic factors are strong, while Gatherwright *et al.* [4] have shown that internal and external factors affect alopecia, suggesting the involvement of factors other than heredity. Environmental factors affecting the scalp include sebum and microorganisms.

*Cutibacterium acnes*, *Staphylococcus*, and *Malassezia* have been implicated in AGA and in dandruff production. *Malassezia* and *C. acnes* lipases hydrolyze sebum into triglycerides, which are then hydrolyzed into glycerine and free fatty acids. Moreover, *C. acnes* promotes lipogenesis in sebaceous glands [5].

This comprehensive review aims to highlight the etiology, clinical presentation, diagnostic approaches, and current treatment modalities for androgenetic alopecia in Al-Qalyubia Governorate,

emphasizing the need for awareness and understanding of this common condition.

### MATERIALS AND METHODS

**Data sources:** By searching and reviewing Medline databases (Pub Med and Medscape) and androgenetic alopecia available till 2024.

**Study selection:** All studies were independently assessed for inclusion. They were included if they fulfilled the following criteria: Published in English language, published in peer-reviewed journals, discuss androgenetic alopecia.

**Data extraction:** Studies were not included if they did not meet the inclusion criteria. The quality of a study may be determined by checking its ethical approval, eligibility criteria, controls, information and evaluation methods. Information relevant to our interested research outcomes was independently retrieved from each qualifying study utilizing a data collecting form.

### Review of literature

Androgenetic alopecia (AGA) is a common hair loss disease with genetic predisposition among men and women. It is characterized by nonscarring progressive miniaturization of the hair follicle accompanied by shortening of the anagen phase, leading to a gradual conversion of terminal hairs into vellus hairs with a pattern distribution. AGA may start at any age after

puberty and is affecting one's social aspects as well as quality of life [6].

### **Etiopathogenesis**

**The genetic role:** Heredity is responsible for 80% of the predisposition to baldness as shown in studies with twins. The variability of gene expression among individuals explain why some have premature hair loss while others will just show the signs of AGA near their 60s. AGA has been reported in prepuberal children (6 to 8 years old) and in these cases, the genetic predisposition is considered crucial [7].

**The androgen role:** Androgenetic alopecia develops as a response of the hair follicle cells to androgens in individuals with genetic predisposition, even though the androgen concentration in blood is normal [8].

**The micro-inflammation role:** Although the AGA pathophysiology is closely related to androgen metabolism, scientific evidences suggests that AGA is associated with dysregulation in the expression of inflammatory cytokines with the chronic micro-inflammation (slow and usually asymptomatic) being an aggravating factor. While mild perifollicular inflammatory signs can be seen in 76% of patients with AGA and also in 30% of normal controls, more advanced levels of inflammation with deposition of concentric layers of fibrotic collagen (perifollicular fibrosis) is seen in AGA patients but not in normal controls [9].

### **Clinical presentation**

**Male androgenetic alopecia:** Male androgenetic alopecia, also known as male pattern hair loss (MPHL), is clearly an androgen-dependent condition, and although the mode of inheritance is uncertain, a genetic predisposition is observed [10]. AGA involves the frontotemporal area and the vertex, following a pattern corresponding to the Hamilton–Norwood scale (HNS) [11].

**Female androgenetic alopecia:** Most women with androgenetic alopecia, also known female pattern hair loss (FPHL), present with a history of gradual scalp hair thinning, often over a period of several years. The hair loss can start at any age from puberty onward, with an average age of onset in their 30s. There is sometimes a history of an effluvium [12]. FPHL presentation shows a frontal hair thinning accentuation resulting in the 'Christmas tree' pattern [13]. The second most common pattern is characterized by central scalp involvement with the sparing of the frontal hairline (Ludwig pattern) [14].

### **Diagnosis**

Androgenetic alopecia is usually diagnosed clinically with a history of gradual onset, occurring after puberty, and often but not necessarily, a family history of baldness. A biopsy is usually not necessary unless the diagnosis is unclear [15].

### **Treatment**

As a genetic condition, the current available treatments for AGA are focused on the modulation of AGA signs and symptoms; they are not healing treatments. The efficacy of such treatments is intrinsically related to their maintenance. The self-medication with over-the-counter products, as shampoos and oral supplements, is an attitude adopted by several AGA patients. It explains the gap of 4-years between the onset of hair loss and the first visit to the hair clinic [7].

Patients should be aware that AGA treatments can have different types of outcomes. One of them is to slow the evolution of the balding process; another one is to prevent further progression of hair loss; however, the most desired is the regrowth of hair and the least expected is the non-responsive outcome, when the patient does not respond to therapeutics. The association of therapeutic strategies with complementary mechanisms of action may enhance the efficacy of the treatment for a better outcome [16].

### **Prognosis**

Early onset AGA may lead to faster progression of hair loss. There is no therapy that can cure AGA. This condition is progressive without therapy. However, the therapy provided can only slow the progression of hair loss by several years and stimulate partial hair growth. The response to therapy is generally slow and requires patience from patients and doctors. The cosmetic effects also need to be considered so that in addition to pharmacological therapy, cosmetic camouflage can also be considered and hair transplant surgical treatment can be an option for severe cases. This condition has a social and psychological impact on patients. Treatment can only prevent the progression of hair loss and there is no cure of AGA [17].

### **Future Prospective and Considerations**

The future of AGA management lies in advancing our understanding of its genetic and molecular underpinnings. With the identification of over 600 genomic sites related to AGA, [1] further research into specific genetic markers and their interactions with environmental factors could pave the way for personalized treatment approaches. The development of therapies targeting the molecular pathways involved in hair follicle miniaturization and inflammation holds promise for more effective management of AGA.

Advances in gene therapy and regenerative medicine also offer exciting prospects. Techniques such as CRISPR/Cas9 could potentially correct genetic predispositions, while stem cell therapy and tissue engineering might provide new avenues for hair follicle regeneration. Additionally, ongoing research into the role of androgens and micro-inflammation in AGA could lead to novel therapeutic targets that modulate these processes more precisely.

Considerations for future research should include a focus on the psychosocial impact of AGA. Understanding the quality-of-life issues faced by patients can guide the development of holistic treatment plans that address both physical and emotional aspects of hair loss. Furthermore, the long-term safety and efficacy of emerging treatments must be rigorously evaluated through well-designed clinical trials.

Collaborative efforts between dermatologists, geneticists, and researchers in related fields will be crucial in advancing our knowledge and treatment of AGA. Public health initiatives to raise awareness about the condition and available treatments can also help reduce the stigma associated with hair loss and encourage early intervention. By integrating scientific advancements with patient-centered care, the future of AGA management can achieve significant improvements in outcomes for those affected by this common condition.

## CONCLUSION

Based on the findings of this study, we conclude that current available treatments for AGA are focused on the modulation of AGA signs and symptoms; they are not healing treatments. AGA treatments can have different types of outcomes.

**Financial support and sponsorship:** Nil.

**Conflict of interest:** Nil.

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