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Case Report

Integrated Therapeutic Approaches in the Treatment of Female Androgenetic Alopecia: A Case Report

Lara Soares Junqueira [1*], Larissa Mota Barros Pessoa[2], Thaina Candido de Souza[2]

[1]Laboratory of Pharmaceutical Industrial Technology, Faculty of Pharmacy, Federal University of Rio de Janeiro (UFRJ) RIode Janeiro, RJ, Brazil
[2]Clinic Larissa Pessoa Integrative Trichology, Rio de Janeiro, RJ, Brazil

***** Correspondence: lamptricologia@gmail.com

Abstract

Introduction: Female Androgenetic Alopecia (FAA) is a clinical condition characterized by hair loss, primarily due to the action of androgens, which leads to the progressive miniaturization of hair follicles. The pathophysiology of FAA is multifactorial, with genetic and hormonal factors playing crucial roles, although the disease can develop even without significant elevations in androgen levels. The traditional treatment for female androgenetic alopecia includes the use of minoxidil, which has been shown to be effective in preventing disease progression. However, treatment should be personalized, considering the patient's history and clinical condition. This case study aimed to evaluate the effectiveness of a multimodal treatment for FAA, combining topical, oral therapies, and active ingredient microinfusion.

Case Report: The treated patient showed significant results, with continuous hair growth, improvement in hair density, and no observed hair loss. The multimodal treatment, which included the use of minoxidil, baicapil, capilia longa, actrisave, chelated zinc, and saw palmetto, in addition to microinfusion with KGF, copper peptide, and trichoxidil, was effective in stabilizing the condition and promoting hair growth, proving to be an efficient and sustainable alternative.

Conclusion: The personalized approach, considering the clinical characteristics of the patient, as well as the combination of different treatment modalities, may provide more effective and long-lasting results for patients with FAA. However, further studies are needed to validate the efficacy of combined therapies and the long-term psychological impact of the treatment.

Keywords: Female androgenetic alopecia; individualized treatment; multimodal treatment.

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1. Introduction

Female pattern alopecia (FPA), also known as female androgenetic alopecia (FAA), is a clinical condition characterized by hair loss, primarily caused by the action of androgens, leading to the progressive miniaturization of hair follicles. In this scenario, the hair fibers become shorter and finer with each hair cycle. The pattern of hair loss in females is more diffuse, typically occurring at the top and center of the head, with thinning of the hair along the parting line, while preserving the frontal hairline[1]. FAA has a high prevalence, and its incidence increases with age, with 55% of women at 70 years old presenting this clinical condition[2]. FAA

is associated with psychoemotional symptoms, as hair holds significant symbolic value in social relationships and individual self-esteem. It is often linked to physical attractiveness stereotypes and self-perception[3]. Therefore, patients with FPA may develop psychosocial symptoms such as anxiety, decreased self-esteem, and depression, which in turn can lead to stress and dissatisfaction with their own image, resulting in a decline in quality of life.[4].

The pathophysiology of FAA is not completely elucidated, but there is evidence suggesting it is multifactorial, involving genetic predisposition, follicular sensitivity to androgens, and local microinflammation present in the scalp[2]. Women have low levels of testosterone and are more susceptible to hormonal changes. The role of androgens in FAA is less clear compared to male androgenetic alopecia. Follicular miniaturization observed in women occurs due to the action of androgens, where testosterone is converted into dihydrotestosterone (DHT) by the enzyme 5-alpha reductase. DHT, in turn, has a high affinity for androgen receptors located in the hair follicles of the scalp, and its action triggers a hair cycle with an increasingly shorter active hair growth phase (anagen phase)[5]. FAA can develop even without a significant alteration in androgen levels, suggesting that other factors are involved in its etiology[6]. This scenario highlights the genetic role, where even with normal levels of androgens, follicles can have high sensitivity to these hormones. The genetic predisposition in women is polygenic, with the influence of environmental factors. The main factors involved in the pathophysiology of FAA are described in Figure 1[2].

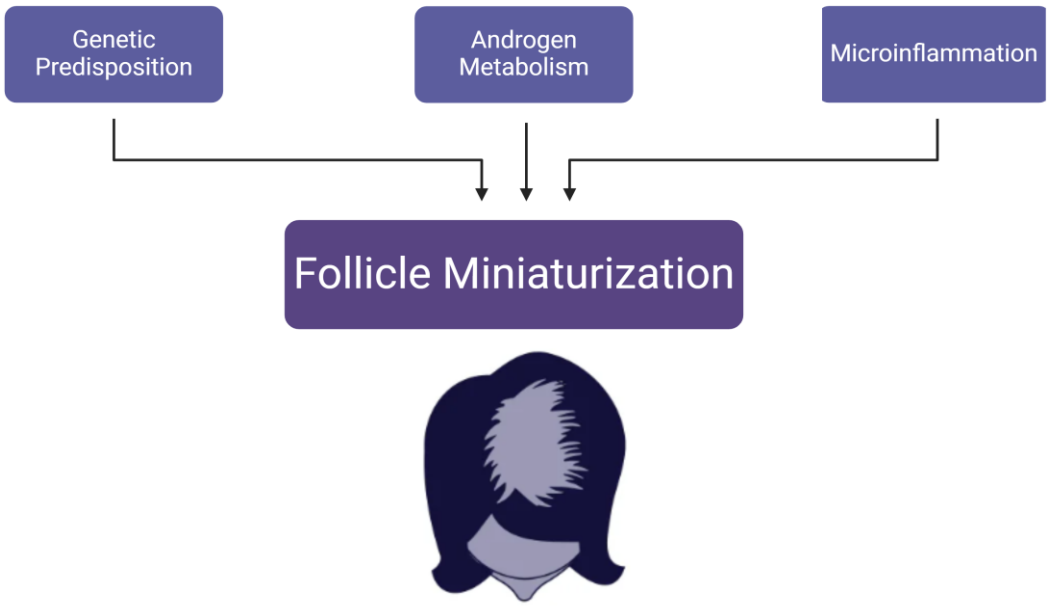

Figure 1. Illustration of the main factors contributing to the development of androgenetic alopecia: genetic predisposition, androgen metabolism, and local microinflammation[7].

In general, the treatment of FAA is carried out using topical minoxidil (2% to 5%), which shows good efficacy in preventing the progression of the clinical condition. However, discontinuation of the treatment may result in an increase in hair loss. In some cases, other treatments such as oral finasteride, dutasteride, or hormonal treatments are indicated, depending on the severity of the condition and the individual characteristics of the patient[8]. Given the multifactorial nature of the pathophysiology of FAA, clinical management requires a multimodal approach. Understanding this multifactoriality is crucial, as isolated treatments are often not sufficient to prevent the progression of alopecia. The combination of therapies such as minoxidil, finasteride, and active ingredient microinfusion has shown benefits, but efficacy can be enhanced with personalized approaches that consider the individual response of each patient[9]. It is essential that FAA treatment is approached in an integrated and multidisciplinary manner, considering the combination of topical, oral, and innovative therapies to achieve successful outcomes. In this context, the aim of this study is to evaluate the positive effects of combining topical treatments, oral therapies, and active ingredient microinfusion in controlling hair loss and stimulating hair growth in a patient with FAA, focusing on a personalized

and integrated approach, with an emphasis on multimodal treatment and long-term results. The presented case study demonstrates the clinical variability observed in FAA, and the patient's response to the proposed treatment may provide new insights for clinical practice.

2. Case Report

A 69-year-old woman presented with excessive hair loss one month prior to starting treatment due to a dental complication, which led the patient to take corticosteroids, antibiotics, and anti-inflammatory drugs. The patient reported no comorbidities. The tricoscopy, along with the clinical presentation, suggests that the patient has female androgenetic alopecia (Figure 2).

Figure 2. Tricoscopy before treatment, showing hair miniaturization, empty follicles, increased spacing between hairs, and reduced hair density.

The treatment consisted of three sessions of microinfusion of active ingredients with keratinocyte growth factor (KGF), copper peptide, and trichoxidil. The patient underwent red laser therapy prior to the microinfusion of active ingredients and later received blue LED therapy. In addition, home care was carried out with the application of a tonic composed of minoxidil, Baicapil, and Capilia Longa, once a day. Finally, the oral treatment included Actrisave 250 mg, chelated zinc 20 mg, and Saw palmetto 300 mg. The results obtained after three treatment sessions with a 45-day interval are shown in Figures 3, 4, and 5.

Figure 3. View of the vertex area before (A) and after (B) treatment.

Figure 4. Right lateral view before (A) and after (B) treatment.

Figure 5. Left lateral view before (A) and after (B) treatment.

The patient showed continuous hair growth and a notable improvement in the coverage of areas affected by alopecia, as demonstrated in the comparative images shown in Figures 3, 4, and 5. In the before-and-after photos, a significant improvement in hair density is observed, with bald areas visibly filled and thicker hair fibers. Additionally, the patient reported increased hair volume and thicker strands, indicating a successful treatment. The multimodal treatment, involving oral, topical, and microinfusion therapies, was effective in promoting hair growth and preventing the progression of the condition, proving to be an effective strategy with long-lasting results in the treatment of FAA. No significant adverse effects, such as irritation or scalp sensitivity, were observed during the treatment.

3. Discussion

The multimodal approach in the treatment of FAA has demonstrated success, providing more sustainable and long-lasting results. The combination of topical therapies, oral treatments, and microinfusion of active ingredients allows for a more personalized treatment, tailored to the needs of each patient.

The topical use of minoxidil in combination with Baicapil and Capilia Longa plays a key role in promoting hair health. Minoxidil, a medication approved by the Food and Drug Administration (FDA), is known for its vasodilatory action, improving blood circulation in the scalp and stimulating hair follicles. Although its exact mechanism of action is not yet fully understood, studies suggest that minoxidil also has anti-inflammatory effects and acts on the Wnt/β-catenin signaling pathway, which is involved in the regulation of the hair cycle[10]. Literature reports have demonstrated the efficacy of minoxidil in increasing total hair density, with a well-tolerated safety profile and adverse effects[11]. Baicapil is a patented complex combining extracts of Scutellaria baicalensis, Glycine max, and Trifolium pratense. The main active component of Baicapil, baicalin, is a flavonoid derived from Scutellaria baicalensis, and plays a crucial role in activating the Wnt/β-catenin signaling pathway, as well as increasing alkaline phosphatase activity in dermal papilla cells[12,13]. This contributes to the differentiation of these cells, which is essential for the regeneration and maintenance of the hair follicle. Baicalin's action is associated with the transition from the telogen phase to the anagen phase of the hair cycle, indicating that hair growth stimulation is mediated by the regulation of dermal papilla cell activity. Capilia Longa is an active ingredient extracted from plant stem cells of *Curcuma Longa* (curcumin)[14]. Turmeric is a polyphenol widely known for its anti-inflammatory and antioxidant properties, and also plays an important role in promoting blood circulation in the scalp[15]. Improved blood circulation in hair follicles is essential for hair growth, as

increased blood flow ensures an adequate supply of nutrients and oxygen to the follicles, thereby stimulating the hair growth phase[16].

The oral treatment included the use of Actrisave, chelated zinc, and Saw palmetto. Actrisave is a combination of extracts from *Oryza Sativa L.* (black rice) and *Opuntia Ficus Indica L.* (prickly pear cactus flowers). This compound showed a positive impact on hair growth, promoting increased hair density, an extended anagen phase, as measured by phototrichogram, in addition to a visually perceptible improvement and a positive patient evaluation. Although the exact mechanism of action of Actrisave is not fully understood, it is believed to involve antioxidant properties, anti-inflammatory effects, benefits in microcirculation, and endothelial protective effects, mitigating damage caused by oxidative stres[17]. Zinc, in turn, plays a crucial role in the cellular functions of the hair follicle and is a potent inhibitor of hair cycle regression, as well as aiding in follicle recovery[18]. Saw palmetto, an herbal remedy with increasing relevance in androgenetic alopecia, is known for its anti-androgenic and anti-inflammatory properties. It acts non-selectively, inhibiting the type I and type II isoenzymes of the enzyme 5α-reductase[19]. Furthermore, Saw palmetto may promote the maintenance of the anagen phase and normalization of the catagen phase through the activation of estrogen receptors, which activate adenylate cyclase and stimulate mitosis in the hair follicle matrix cells.[20].

The active ingredient microinfusion used in the treatment included KGF, copper peptide, and trichoxidil. KGF is a member of the fibroblast growth factor family, with the ability to induce the proliferation of various epithelial cells, including keratinocytes in the hair follicle. Studies in the literature demonstrate that KGF is effective in promoting hair growth, being responsible for inducing the anagen phase, increasing the proliferation of follicular keratinocytes, and also for its cytoprotective effect.[21,22]. These effects significantly contribute to hair regeneration. Furthermore, KGF was found to have reduced expression in women with AGA, indicating its influence in the development of this condition[23]. Copper peptide, in turn, stimulates cellular regeneration and fibroblast proliferation in the dermis. It also increases the production of vascular endothelial growth factors, promoting the proliferation of dermal papilla cells and reducing the number of apoptotic cells in this region. Additionally, copper peptide exerts an anti-inflammatory action and contributes to increased microcirculation[24]. Trichoxidil is a phyto-complex derived from specific fractions of essential oils that promotes the activation of fibroblasts, positively regulates the expression of growth factor mRNAs related to hair growth, such as insulin-like growth factor 1, keratinocyte growth factor, and vascular endothelial growth factor. The use of trichoxidil has shown an increase in the anagen phase, a reduction in the telogen phase, and an increase in follicular units when compared to treatment with minoxidil[25].

The multimodal treatment of AGA has shown efficacy in providing positive and lasting results. However, therapeutic success does not depend solely on the combination of oral, topical therapies, and active ingredient microinfusion. The selection of active ingredients for each route of administration must be carefully personalized, considering the clinical presentation of the condition, the patient's medical history, and the individual's expectations. Although current results suggest significant benefits, further studies are needed to confirm and expand these findings. The combination of different therapeutic approaches opens promising new perspectives for the treatment of female androgenetic alopecia, offering solid solutions with prolonged effects.

4. Conclusion

Female androgenetic alopecia (AGA) remains a challenging condition, with significant implications for the quality of life of patients. The multimodal treatment, combining oral, topical therapies, and active ingredient microinfusion, has shown promising efficacy in promoting hair growth and stabilizing hair loss, offering a personalized and comprehensive approach. The use of minoxidil, Baicapil, Capilia Longa, Actrisave, chelated zinc, Saw Palmetto, copper peptide, KGF, and Trichoxidil, applied through different routes, may represent an effective long-term solution when adapted to the profile and specific needs of each patient. Despite the positive results observed, it is essential that further clinical studies are conducted to consolidate the efficacy of these therapeutic combinations and explore new personalized approaches in the treatment of AGA. Additionally, understanding the multifactorial nature of the condition, including its hormonal, genetic, and psychological aspects, is crucial for even more effective and long-lasting treatment, aiming not only at hair growth but also at improving the quality of life of patients.

5. Patient Consent and Anonymity

The patient signed a written consent form authorizing the publication of data and images in this report. Approval from an Institutional Review Board was not sought or required, given the retrospective description of the clinical findings in the patient's routine treatment.

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