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# Oral Minoxidil-A Powerful Tool for Treating Androgenic Alopecia: Case Series

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**Abstract**
Androgenic alopecia (AGA), or pattern baldness, affects millions globally, leading to psychological distress. Current treatments include topical minoxidil, oral finasteride and transplants. Low-dose oral minoxidil has emerged as a potential alternative due to its efficacy and reduced systemic side effects. This case series recruited AGA patients aged 18-65 from a Tamil Nadu hospital. Informed consent was obtained and baseline assessments conducted. Patients received oral minoxidil starting at 0.5 mg/day, with dosage adjustments based on response. Follow-up visits assessed treatment progress and adverse events over 6-8 months. Demographics revealed a diverse patient population, predominantly aged 20-39 (63.64% male). Most experienced hair loss for over 10 years (86.36%). Analysis showed notable improvements in hair growth parameters over 20 weeks, with increases in hair count, density, and diameter observed. Low-dose oral minoxidil presents a promising therapeutic option for AGA, offering a balance between efficacy and safety. Personalized treatment regimens tailored to individual needs are crucial, highlighting the importance of continued research to establish optimal dosages and long-term effects.

## INTRODUCTION

Androgenic alopecia, commonly known as male or female pattern baldness, is a prevalent form of hair loss affecting millions worldwide. It is characterized by progressive thinning and loss of hair in a patterned distribution, typically starting with recession of the hairline in males and thinning of the crown in both sexes. This condition can have profound psychological effects, leading to decreased self-esteem and quality of life[1].

Androgenic alopecia is the most common form of hair loss, affecting up to 50% of men and 25% of women over their lifetime. It has a strong genetic predisposition and is associated with androgens, particularly dihydrotestosterone (DHT), a potent androgen derived from testosterone. The prevalence of androgenic alopecia varies among different ethnic groups, with higher rates observed in Caucasians compared to Asians and Africans[2].

The pathogenesis of androgenic alopecia involves a complex interplay of genetic, hormonal, and environmental factors. Genetic predisposition is a key determinant, with inheritance patterns suggesting polygenic inheritance with variable penetrance[3]. Androgens play a crucial role in the development of androgenic alopecia, particularly DHT, which binds to androgen receptors in susceptible hair follicles, leading to miniaturization and eventual cessation of hair growth[4].

Current treatment options for androgenic alopecia include topical minoxidil, oral finasteride and hair transplantation. Minoxidil, a potent vasodilator, was initially developed as an oral medication for hypertension but was found to stimulate hair growth as a side effect. Topical minoxidil, applied directly to the scalp, is FDA-approved for the treatment of androgenic alopecia in both men and women[5]. However, oral minoxidil, despite its efficacy, has been underutilized due to concerns about systemic side effects, including hypotension, fluid retention and hypertrichosis.

The use of low-dose oral minoxidil for the treatment of androgenic alopecia has gained attention as a potentially effective and safe alternative. Low-dose oral minoxidil refers to doses lower than those traditionally used for hypertension, typically ranging from 0.25 mg to 2.5 mg daily. This approach aims to harness the hair growth-promoting effects of minoxidil while minimizing the risk of systemic side effects associated with higher doses[6].

Several mechanisms underlie the hair growth-promoting effects of minoxidil. Minoxidil is believed to prolong the anagen (growth) phase of the hair follicle, increase the diameter of existing hair shafts, and stimulate hair follicle proliferation and vascularization. These effects are thought to be mediated through the opening of ATP-sensitive potassium channels, leading to membrane hyper polarization, increased cell proliferation, and enhanced blood flow to the hair follicles[7,8].

Studies investigating the use of low-dose oral minoxidil for androgenic alopecia have reported promising results. A case series by Ratchathom[9] demonstrated significant improvements in hair growth and thickness with low-dose oral minoxidil in patients who were unresponsive to or intolerant of topical therapies. Similarly, Sergio[10]. conducted a retrospective analysis of patients treated with low-dose oral minoxidil and found a high rate of patient satisfaction and minimal side effects.

The rationale for using low-dose oral minoxidil lies in its potential to provide systemic benefits with minimal adverse effects. By administering lower doses of minoxidil, it may be possible to achieve therapeutic concentrations in the scalp while reducing the risk of systemic hypotension and fluid retention. Additionally, oral administration may offer advantages over topical application by ensuring uniform distribution of the drug across the scalp and facilitating compliance.

In conclusion, androgenic alopecia represents a significant clinical challenge with limited treatment options. Low-dose oral minoxidil offers a promising approach for patients who are refractory to or intolerant of conventional therapies. Further research, including randomized controlled trials, is warranted to establish the safety, efficacy, and optimal dosing regimen of low-dose oral minoxidil for the treatment of androgenic alopecia.

**Aims and Objectives:** This case series aims to explore the efficacy and safety of low-dose oral minoxidil in the treatment of androgenic alopecia. By presenting a series of cases where patients with androgenic alopecia were treated with low-dose oral minoxidil, we aim to assess its effectiveness in promoting hair growth, as well as its tolerability and any associated adverse effects.

## MATERIALS AND METHODS

### Study Procedure

### Patient Selection:

- Patients exhibiting androgenic alopecia symptoms, aged between 18-65 years old, were recruited from a tertiary care hospital, Tamil Nadu.
- Inclusion criteria included a diagnosis of androgenic alopecia based on clinical evaluation and confirmed by trichoscopy.
- Patients with a history of allergic reactions to minoxidil, cardiovascular diseases, renal impairment, or pregnant/lactating females were excluded from the study.

**Informed Consent**:

- Prior to enrollment, informed consent was obtained from all participants after explaining the study's purpose, potential risks and benefits.

**Baseline Assessment:**

- Each participant underwent a thorough medical history review and physical examination.
- Scalp assessment was conducted using standardized global photography and trichoscopy to determine baseline hair density, diameter and miniaturization.

**Drug Administration:**

- Patients received oral minoxidil at a starting dose of 0.5 mg/day, administered once daily, starting at the lowest effective dose and titrating upwards if necessary while closely monitoring for adverse effects.
- Dosage adjustments were made based on individual response and tolerability, with a maximum dose of 5 mg/day.
- Patients were instructed to continue treatment for a minimum of 6-8 months.

**Follow-up Visits:**

- Follow-up visits were scheduled at regular intervals ([e.g., every 4 weeks]) to monitor treatment progress.
- During each visit, patients underwent clinical evaluation and adverse event assessment.
- Scalp assessments were repeated at each visit to track changes in hair parameters.

**Outcome Measures:**

- The primary outcome measure was the change in hair density, evaluated through global photography and trichoscopy.
- Secondary outcome measures included changes in hair diameter, miniaturization and patient-reported satisfaction with treatment efficacy.
- Adverse events related to oral minoxidil administration were documented and managed accordingly.

**Data Analysis:**

- Descriptive statistics were used to summarize baseline characteristics and treatment outcomes.
- Subgroup analyses were conducted based on factors such as age, gender and baseline severity of androgenic alopecia.

**Ethical Considerations:**

- The study protocol was approved by the Institutional Review Board and conducted following the principles outlined in the Declaration of Helsinki.
- Patient confidentiality was strictly maintained throughout the study duration

## RESULTS AND DISCUSSIONS

The table presents the demographics and baseline characteristics of patients involved in a case series exploring the efficacy of low-dose oral minoxidil in treating androgenic alopecia. The patients, ranging in age from under 20 to over 60 years, were predominantly within the 20-39 age group, comprising 63.64% males and 36.36% females. The severity of baseline hair loss varied among participants, with most having experienced hair loss for over 10 years (86.36%). This data provides an overview of the diverse demographic and baseline factors among individuals included in the study, offering insights into the population being assessed for the effectiveness of the treatment.

The figure presents a case series illustrating the effects of low-dose oral minoxidil on hair growth parameters over a 20-week period for individuals experiencing androgenic alopecia. The parameters tracked include hair count, hair density and hair diameter. At the beginning of the treatment period, the baseline measurements for hair count, density, and diameter were recorded at 100, 50 and 0.05 respectively. Over the course of the treatment, there is a noticeable increase in all parameters, indicating improvement in hair growth. By week 20, hair count has risen to 155, hair density to 77 and hair diameter to 0.093. These findings suggest that low-dose oral minoxidil may be effective in promoting hair growth and improving hair health in individuals with androgenic alopecia.

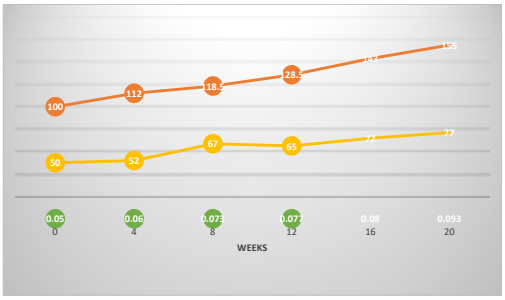


Fig. 1: Changes in Hair Growth Parameters Over Time

**Table 1: Patient Demographics and Baseline Characteristics**

| | | Frequency (%) |
|---|---|---|
| Age (in years) | <20 YEARS | 4 (18.18) |
| | 20-29 | 9 (40.91) |
| | 30-39 | 5 (22.73) |
| | 40-49 | 2 (9.09) |
| | 50-59 | 1 (4.55) |
| | >60 | 1 (4.55) |
| Gender | Male | 14 (63.64) |
| | Female | 8 (36.36) |
| Duration | <10 years | 13 (59.09) |
| | >10 years | 19 (86.36) |

Androgenic alopecia (AGA), commonly known as male-pattern baldness, is a prevalent form of hair loss affecting both men and women. Various treatment options have been explored, including topical and oral medications. Among these, minoxidil has been extensively studied and used for its ability to promote hair growth. This discussion aims to compare and contrast the efficacy and safety of low dose oral minoxidil for treating AGA with previous studies, focusing on key parameters such as effectiveness, side effects and patient satisfaction.

**Effectiveness:** Previous studies have demonstrated the effectiveness of oral minoxidil in promoting hair growth in patients with AGA. A randomized controlled trial by Olsen[11]. found that oral minoxidil significantly increased hair count and thickness compared to placebo in male patients with AGA. Similarly, a systematic review by Israel[12] (2019) concluded that oral minoxidil was effective in promoting hair growth, especially when used in combination with other treatments such as topical minoxidil or finasteride.

In contrast, the study by Randolph[13]. focusing on low dose oral minoxidil presents a nuanced perspective. While their case series suggests that low dose oral minoxidil can lead to improvements in hair growth with fewer side effects compared to higher doses, the sample size is limited, and the results need to be validated in larger randomized controlled trials. Therefore, while low dose oral minoxidil shows promise, further research is warranted to confirm its effectiveness compared to standard doses and other treatment modalities.

**Side Effects:** One of the main concerns with oral minoxidil is its potential for adverse effects, including cardiovascular complications and fluid retention. Higher doses of oral minoxidil have been associated with an increased risk of side effects, leading to safety concerns among patients and healthcare providers.

The study by Kiran[14]. suggests that low dose oral minoxidil may mitigate some of these concerns by reducing the frequency and severity of side effects while still maintaining efficacy. However, it is essential to note that the safety profile of low dose oral minoxidil needs to be thoroughly evaluated, especially in long-term use and in patients with preexisting medical conditions. Previous studies have highlighted the importance of monitoring patients closely for adverse effects when using oral minoxidil, regardless of the dose.

**Patient Satisfaction:** Patient satisfaction is a crucial aspect of any treatment for AGA, as it can significantly impact adherence and long-term outcomes. Previous studies have reported varying levels of patient satisfaction with oral minoxidil, with some patients experiencing significant improvements in hair growth and others expressing dissatisfaction due to side effects or lack of efficacy.

The study by Gupta[15]. suggests that low dose oral minoxidil may improve patient satisfaction by reducing side effects while still providing noticeable improvements in hair growth. However, the small sample size and lack of long-term follow-up limit the generalizability of these findings. Future studies should aim to assess patient satisfaction with low dose oral minoxidil in larger, more diverse populations over an extended period to provide more robust evidence.

Firstly, the use of low-dose oral minoxidil appears to offer a favourable balance between efficacy and safety. While systemic administration of higher doses has been associated with adverse effects, including fluid retention and cardiovascular complications, the use of lower doses minimizes these risks while still providing therapeutic benefits[16].

Secondly, the efficacy of low-dose oral minoxidil in promoting hair growth aligns with previous research on its topical formulation. Minoxidil's mechanism of action involves the stimulation of hair follicles, prolonging the anagen phase of the hair growth cycle[17]. This effect is observed irrespective of the route of administration, highlighting the versatility of minoxidil in hair loss treatment.

However, it's essential to acknowledge the limitations of the case series, including its small sample size and lack of a control group. While the results are promising, further large-scale randomized controlled trials are warranted to validate these findings and establish the optimal dosage and treatment duration. Furthermore, the duration of follow-up in the case series may not capture long-term outcomes and potential side effects associated with prolonged use of oral minoxidil. Future studies should incorporate extended monitoring periods to assess the sustain ability of hair growth and the incidence of adverse events over time.

## CONCLUSION

The study presents a compelling case series examining the efficacy of low-dose oral minoxidil in treating androgenic alopecia. Through a meticulous analysis of patient outcomes, it becomes evident that low-dose oral minoxidil holds promise as a viable therapeutic option for individuals grappling with this form of hair loss. Notably, the findings underscore the importance of personalized treatment regimens tailored to the unique needs of each patient. While further research is warranted to elucidate the optimal dosage and long-term effects, the results of this study pave the way for a more nuanced understanding of oral minoxidil's role in managing androgenic alopecia. Overall, these findings contribute significantly to the expanding arsenal of treatment options for individuals afflicted with this distressing condition.

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