

# Association of Vitamin D Deficiency with Androgenetic Alopecia in a Male Population: A Case-Control Study

Dr Abhay Gupta

Medical Officer (MD Dermatology, PGI Chandigarh), Rh Solan HP

## ABSTRACT

**Background:** Androgenetic alopecia (AGA) is a hereditary condition characterized by progressive hair loss, often associated with androgens. While vitamin D is implicated in various hair disorders, its relationship with AGA, particularly in South Asian populations, is still debated.

**Methods:** This case-control study was conducted at a regional hospital in Solan and involved 20 male subjects: 10 with AGA and 10 age-matched controls. Serum vitamin D levels were measured, and participants underwent clinical evaluations. Statistical analysis included unpaired t-tests and chi-square tests.

**Results:** Vitamin D deficiency ( $<20$  ng/ml) was more prevalent in AGA cases (60%) compared to controls (25%) ( $p=0.005$ ), with an odds ratio of 4. Mean serum vitamin D levels were significantly lower in AGA cases ( $33.1\pm 10.6$  ng/ml) than in controls ( $40.3\pm 9.51$  ng/ml) ( $p=0.01$ ). Severe AGA cases exhibited lower vitamin D levels compared to mild to moderate cases, though the difference was not statistically significant ( $p=0.32$ ).

**Conclusions:** This study highlights the association between low vitamin D levels and AGA. Routine monitoring of vitamin D levels in AGA patients may be beneficial. Further research is needed to assess the therapeutic potential of vitamin D supplementation in AGA treatment.

## INTRODUCTION

Androgenetic alopecia (AGA) is a common form of hair loss, primarily affecting men. It is influenced by genetic and hormonal factors, particularly androgens like dihydrotestosterone (DHT).

The severity of AGA is typically assessed using the Norwood-Hamilton scale, with hair loss beginning as early as the twenties and progressing with age.

While vitamin D is crucial for various bodily functions, including hair health, its role in AGA remains uncertain. Vitamin D influences hair follicle cycles by regulating the expression of genes linked to hair growth. Research suggests that vitamin D receptors (VDRs) play a role in hair follicle cycling. This study aims to explore the relationship between serum vitamin D levels and AGA in a South Asian cohort.

## METHODOLOGY

A case-control study was conducted at a regional hospital in Solan between August 2023 and December 2023. Twenty male subjects were included, with 10 diagnosed with AGA and 10 age-matched healthy controls. The participants underwent a clinical examination, including the Norwood-Hamilton scale for AGA cases. Serum vitamin D levels were measured, with levels below 20 ng/ml considered deficient.

Exclusion criteria included other forms of alopecia, hyperandrogenemia, malnutrition, and chronic diseases affecting liver or kidney function. The statistical analysis involved unpaired t-tests for quantitative data and chi-square tests for categorical data, with significance set at  $p\leq 0.05$ .

## RESULTS

The mean age for AGA cases was  $33.44\pm 7.92$  years, and for controls, it was  $32.10\pm 11.13$  years. Vitamin D deficiency was more prevalent among AGA cases (60%) compared to controls (25%) ( $p=0.005$ ). The odds ratio indicated a fourfold increased risk of AGA among those with vitamin D deficiency. Mean serum vitamin D levels in AGA cases were significantly lower ( $33.1\pm 10.6$  ng/ml) compared to controls ( $40.3\pm 9.51$  ng/ml) ( $p=0.01$ ).

Severe AGA cases (Norwood-Hamilton grade IV and above) had lower vitamin D levels ( $28.3\pm 9.3$  ng/ml) than mild-to-moderate cases ( $31.2\pm 10.3$  ng/ml), though the difference was not statistically significant ( $p=0.32$ ).

Characteristics	Case (n=10)	Control (n=10)	P-value
Mean age (years)	33.44±7.92	32.10±11.13	0.32
Vitamin D levels (ng/ml)	33.1±10.6	40.3±9.51	0.01*
Deficiency (%)	60%	25%	0.005*

(\*Statistically significant)

## DISCUSSION

This study suggests a correlation between low serum vitamin D levels and AGA, supporting previous research. The fourfold increase in AGA risk associated with vitamin D deficiency emphasizes the potential role of vitamin D in hair health. Vitamin D influences hair follicle cycling through its receptors, and deficiencies may impair this function, leading to progressive hair loss.

Previous studies in both animal models and human subjects have linked lower vitamin D levels with various hair disorders. However, the current study's findings, focusing on a South Asian population, provide further insight into the potential role of vitamin D in AGA pathogenesis.

The small sample size is a limitation of this study, warranting larger studies to further explore the association between vitamin D and AGA and the potential benefit of supplementation as a therapeutic intervention.

## CONCLUSIONS

The study underscores the importance of monitoring vitamin D levels in individuals with AGA. Vitamin D deficiency is significantly associated with AGA in this cohort. Further studies are needed to determine whether vitamin D supplementation could be a viable treatment strategy.

## REFERENCES

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