



Original Article

# Serum vitamin D levels and alopecia areata: A comparative cross-sectional study

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Received: 16 March 2021  
Accepted: 11 April 2021  
EPub Ahead of Print: 18 May 2021  
Published: 14 April 2023

DOI  
10.25259/JSSTD\_24\_2021

Quick Response Code:



## ABSTRACT

**Objectives:** To determine the relation between serum vitamin D levels and alopecia areata.

**Materials and Methods:** This cross-sectional study included patients with AA who were above 12 years of age and age- and sex-matched controls who attended the dermatology department of a tertiary care center during a period of 1 year. Serum Vitamin D level was determined in each participant. Serum Vitamin D levels documented in both groups were compared.

**Results:** Thirty patients and 30 age- and sex-matched controls constituted the study population. The male-to-female ratio was 1.7:1. Most of the patients (9/30, 30%) were in the age group of 31–40 years. We observed patchy AA in 17 patients (56.7%). Nail involvement was seen in 9 patients (30%). Serum vitamin D levels were insufficient/deficient in 16 patients (53.3%), while in the age- and sex-matched comparison group, vitamin D was insufficient / deficient in 7 cases (23.3%). The difference was statistically significant ( $P = 0.03$ ). No significant relation was noted either between serum vitamin D levels and number of alopecia lesions or between serum vitamin D levels and the clinical pattern of AA. No significant difference was noted in the vitamin D levels between patients who had involvement of only scalp and those who showed involvement of other body sites.

**Limitations:** Small sample size was the major limitation of the study.

**Conclusion:** Low serum vitamin D levels were more frequent in patients with AA in comparison to healthy controls.

**Keywords:** Alopecia areata, Vitamin D, Insufficiency, Deficiency

## INTRODUCTION

Alopecia areata (AA) is a common form of non-scarring alopecia, characterized by hair loss without any accompanying clinical signs of inflammation. It can affect any hair bearing area. AA is an autoimmune disease mediated by T-lymphocytes in which auto-antigens play an important part in activating the T-cells. AA is associated with other autoimmune diseases.<sup>[1]</sup> Vitamin D functions as a hormone. Vitamin D is synthesized in the body and it is also derived from the diet. Vitamin D plays an important role in the regulation of immune mechanisms.<sup>[2]</sup> It has been demonstrated that vitamin D receptors (VDRs) are strongly expressed in the hair follicles and lack of VDR adversely affects epidermal differentiation and growth of hair follicles.<sup>[3]</sup> Previous authors have noted low serum vitamin D levels in patients with alopecia area in comparison to controls.<sup>[4,5]</sup> In a systematic review and meta-analysis on association of AA with serum

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vitamin D and calcium levels, Liu *et al.* found deficiency of serum vitamin D, rather than calcium deficiency in patients with AA.<sup>[5]</sup> The current study was designed to determine the relation between serum vitamin D levels and AA.

## MATERIALS AND METHODS

This was a 1 year cross-sectional study done in a tertiary care center. The inclusion criteria included consecutive patients with AA above 12 years of age and who attended the dermatology department of our institution during the study period. Patients receiving immunosuppressants, patients who had received topical or systemic therapy for AA or vitamin D supplements during the previous 1 month, and patients who had been using sunscreens on a regular basis during the previous 1 month were excluded from the study. Those who had a history of other autoimmune diseases such as vitiligo, rheumatoid arthritis, thyroid disorder, and lupus erythematosus were excluded from the study. Age- and sex-matched healthy controls who were accompanying the patients attending the dermatology department were recruited as controls, after excluding those who had been using sunscreens on a regular basis during the previous 1 month. We also excluded pregnant and lactating females from both groups. Permission to conduct this study was granted by the Institutional Ethics Committee. Individual study participant gave written informed consent.

A pre-set proforma was used to collect data on history, general examination, and dermatological examination pertaining to the scalp, other hair bearing areas of the body, and the nails.

Blood samples for vitamin D estimation were collected after 8 h of fasting. Serum vitamin D level was estimated by the chemiluminescence method in each study participant. A serum vitamin D level of 20–30 ng/ml was considered as insufficient and <20 ng/ml was considered as deficient as per standard reference.<sup>[6]</sup>

The data collected were analyzed in terms of descriptive statistics. Chi-square test was used to find any association between categorical variables.  $P < 0.05$  was taken as statistically significant.

## RESULTS

The study population included 30 patients ( $n = 30$ ) with AA and 30 age- and sex-matched controls. The male-to-female ratio was 1.7:1 (19 males and 11 females). Students and homemakers constituted the maximum number of cases (17, 56.7%). Nineteen patients (63.3%) had duration of illness of more than 3 months. Six patients (20%) gave a history of a stressful incident in life before the onset of AA. Eight patients (26.7%) had used some type of topical application before the onset of AA for daily hair care out of which 6 (20%) were indigenous preparations. Twenty-eight patients (93.3%) had

scalp involvement. Face [Table 1] was the most common site affected after scalp (beard and moustache). Involvement of other body sites was seen in 11 patients (36.7%). Fifteen patients (50%) had more than 3 patches of AA. The clinical pattern of AA is given in Table 2. We found nail pitting in nine (30%) patients.

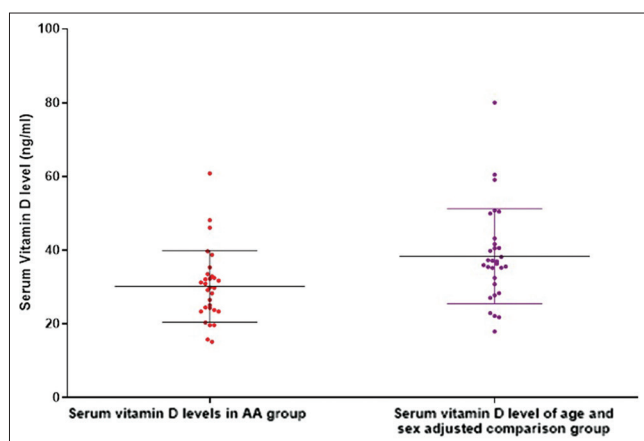
The mean serum vitamin D level was 30.2 ng/ml in cases and 38.4 ng/ml in controls. We found vitamin D insufficiency (12/30, 40%) or deficiency (4/30, 13.3%) in 16 patients (53.3%). Vitamin D insufficiency/deficiency was seen in 7 controls (23.3%). This was statistically significant [ $P = 0.03$ ,

**Table 1:** Distribution of alopecia areata in study participants.

Distribution of alopecia areata	Frequency (percentage) $n=30$ (100%)
Affected sites of scalp	
Frontal	11 (36.7)
Temporal	17 (56.6)
Vertex	16 (53.2)
Occipital	17 (56.6)
Other sites affected	
Eyebrows	7 (23.3)
Moustache	5 (16.7)
Beard	5 (16.7)
Axilla	4 (13.3)
Trunk	4 (13.3)

**Table 2:** Clinical pattern of alopecia areata in study participants.

Pattern of alopecia areata	Frequency (percentage) $n=30$ (100%)
Patchy	15 (50)
Reticulate	4 (13.3)
Ophiasis	2 (6.7)
Totalis	3 (10)
Universalis	4 (13.3)



**Figure 1:** Scatter diagram showing serum vitamin D levels in alopecia areata patients and in healthy controls. AA: Alopecia areata

Figure 1]. No significant relation was noted between serum vitamin D levels and gender, age, or occupation of the patient. No significant relation was noted between serum vitamin D levels and the duration of illness. There was no significant relation between serum vitamin D levels and number of alopecia lesions, or the clinical pattern of AA, or AA affecting other body sites.

## DISCUSSION

The male predilection noted for AA in this study was similar to other Indian studies.<sup>[4,7]</sup> The maximum number of cases were seen in the 31–40 years age group, which was higher than the same noted in other studies.<sup>[4,8,9]</sup> Majority of the study participants being students could be attributed to the fact that 23% of the study participants belonged to the 13–20 years age group. The majority of the patients in this study had a disease duration of more than 3 months. Only six patients gave a history of definite stressful incident before the onset of AA lesions. A study by Reinhold showed positive relation between AA and emotional stress.<sup>[10]</sup> Most of the patients had patchy pattern of AA and this was consistent with literature.<sup>[11]</sup> The temporal and occipital regions being the most common sites affected by AA as noted by us was concordant to the study by Juhasz and Mesinkovska.<sup>[12]</sup> Face being the most common site affected after scalp as observed by us was similar to the findings of Patil *et al.*<sup>[13]</sup> About 30% of the patients in this study had nail pitting, which was comparable to the observation of Chelidze and Lipner.<sup>[14]</sup>

Sixteen patients and seven controls had insufficient/deficient serum vitamin D levels as per the reference standard.<sup>[6]</sup> We noted a statistically significant ( $P = 0.03$ ) relation between serum vitamin D levels and AA. The previous studies have shown deficient serum vitamin D levels in AA patients.<sup>[5,15-17]</sup> This makes it an interesting proposition, as vitamin D supplementation may have a therapeutic role in treating AA, if future large studies confirm this finding. We did not observe any significant relation between serum vitamin D levels and the gender or age of the affected or with the duration of the disease. A study by Bhat *et al.* showed a significantly deficient vitamin D levels in female AA patients.<sup>[18]</sup> The current study did not show any significant association between vitamin D levels and the clinical types of AA. This was similar to the study by Mahamid *et al.*<sup>[6]</sup> Other studies have shown significant reduction in vitamin D levels in alopecia totalis and universalis in comparison to other types of AA.<sup>[19]</sup>

## Limitations

Small sample size was the major limitation of the study.

## CONCLUSION

This study showed a significant relation between serum Vitamin D levels and AA while no significant relation was noted between serum vitamin D levels and gender, number of lesions, clinical types, or nail involvement in AA.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

## Financial support and sponsorship

Nil.

## Conflicts of interest

Dr. Pradeep S. Nair and Dr Anuja Elizabeth George are on the editorial board of the Journal.

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**How to cite this article:** Dasankunju BB, Nair PS, George AE. Serum Vitamin D levels and alopecia areata: A comparative cross-sectional study. *J Skin Sex Transm Dis* 2023;5:36-9.