Original Article

# Prevalence of Vitamin-D Deficiency among Individuals Diagnosed with Alopecia Areata



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## ABSTRACT

**Objective:** An immunological response causes hair follicle inflammation in alopecia areata (AA). Alopecia totalis, universalis, and patchy hair loss may occur. This Study examined vita min-d deficiency in alopecia areata patients.
**Study Design:** A case-control study
**Place and Duration of Study:** This study was conducted at the Department of Dermatology, Farooq Hospital Islamabad from October 2022 to July 2023.
**Methods:** This case-control Study was done on 45 alopecia areata (AA) patients and 45 controls. Serum 25-hydroxy vita min-d [25-(OH)-D3] levels were measured in all individuals. The SALT was used to assess alopecia's severity. Venous blood samples were taken in the lab for 25-(OH) vita min-d enzyme immunoassay on a chemical analyzer. The analytical data was recorded in SPSS 27.
**Results:** The mean age of study and control group was 22.94 ±7.92 years and 23.84 ±8.46 years respectively. The median (IQR) of vita min-d level of study and control group was 14.6±17.9) ng/dL and 23.2±15.32 ng/dL respectively. The incidence of Unifocal, Multifocal, Oophiasis, Alopecia universalis, and Alopecia totalis were different pattern of alopecia found in 20% (n=9), 51.1% (n=23), 11.1% (n=5), 6.7% (n=3), and 11.1% (n=5) respectively. Significant differences between study and control group were seen in terms of vita min-d levels based on SALT score that was 23.5 ng/dl in S1 compared to 7.9 ng/dl in S5.
**Conclusion:** It has been observed that a significant association between lower serum vita min-d levels and alopecia areata (AA) compared to the levels in healthy controls. This suggests that there may be a correlation between AA and vita min-d deficiency, as the mean vita min-d levels in patients were notably lower than healthy control group.

**Key Words:** Alopecia areata, vita min-d, autoimmune disease, hair loss

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## INTRODUCTION

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An autoimmune condition known as alopecia areata (AA) that affects only certain organs is characterized by T-cell infiltration and cytokine release around anagen stage hair follicles.[1] This condition has long been recognized for its associations with HLA Class I and II, as well as its occurrence alongside various autoimmune disorders including rheumatoid arthritis (RA), type I diabetes mellitus (DM), vitiligo, systemic lupus erythematosus (SLE), thyroiditis, pemphigus vulgaris (PV), pernicious anemia, and celiac disease[2, 3]. A kind of hair loss called alopecia areata (AA) does not leave scars behind. It may show up in a variety of ways, from isolated areas of hair loss to alopecia totalis (total baldness) and alopecia universalis (hair loss across the body)[4]. Individuals have a 1.7% lifetime chance of developing alopecia areata (AA), with a recorded prevalence estimated to be between 0.1% and 0.2%. References[5,6]. With alopecia areata (AA), the incidence of autoimmune disorders rose by 16%[7]. Numerous studies on vita min-d have shown how important it is for immune system regulation[8].

The maintenance of calcium homeostasis and bone health may be strongly influenced by the secosteroid hormone known as vita min-d. Although 1,

25-dihydroxyvita min-d (1, 25(OH)2D3) is the physiologically active form, its short half-life (less than 4 hours) may sometimes result in normal levels, even in cases of vita min-d insufficiency. Consequently, this marker is seen to be a more trustworthy indication as it captures vita min-d exposure from all sources and offers a consistent picture of vita min-d levels.[9, 10]. Furthermore, calcium and vitamin D both have immunomodulatory properties. A lack of vitamin D has been connected to a variety of autoimmune conditions, such as vitiligo, psoriasis, and systemic lupus erythematosus.[11,12]. The correlation between vita min-d deficiency and alopecia areata (AA) is still a subject of debate, and conflicting data on this association exist. Therefore, the objective of the current study was to determine the prevalence of vita min-d Deficiency among Individuals Diagnosed with Alopecia Areata.

## METHODS

45 alopecia areata (AA) patients and 45 controls. All patients had vita min-d levels checked and SALT was used to assess disease severity. Venous blood samples were taken in the lab for twenty five-(OH) Enzyme immunoassay for vitamin D on a chemical analyzer. Following signed notification consent, demographic, illness, family, and atopy histories were gathered. Several hair loss patterns were recorded: totalis, unifocal, universalis, ophiasis, and multifocal. SALT reported illness severity as S1–S5. The hospital laboratory analyzed vita min-d levels in 5 ml blood samples from each patient. vita min-deficiency, insufficiency, and sufficiency were classified as <20, 21-29, and 30 ng/dl. The data obtained from the analysis was recorded using SPSS version 27. The mean ± standard deviation (SD) was calculated for continuous variables such as age and the number of patches. Qualitative parameters such as SALT score, family history of the disease, disease's duration, history of atopy, and alopecia pattern were presented as frequencies and percentages.

## RESULTS

The overall mean age of study and control group was 22.94 ±7.92 years and 23.84 ±8.46 years respectively. The median (IQR) of vita min-d level of study and control group was 14.6±17.9 ng/dL and 23.2±15.32 ng/dL respectively. The incidence of Unifocal, Multifocal, Oophiasis, Alopecia universalis, and Alopecia totalis were different pattern of alopecia found in 20% (n=9), 51.1% (n=23), 11.1% (n=5), 6.7% (n=3), and 11.1% (n=5) respectively. Significant differences between study and control group were seen in terms of vita min-d levels based on SALT score that was 23.5 ng/dl in S1 compared to 7.9 ng/dl in S5. Each group comprised 18 individuals (40%) who were male and 27 individuals (60%) who were female. Nail pitting was observed in 16 (35.6%) of the patients, while none were observed in the control group. Demographic details of patients are shown in Table-I. Distribution of patients based on their disease duration are shown in Figure-1. Figure-2 illustrate the Pattern of alopecia. SALT score are shown in Table-II.

**Table No. 1: Demographic and baseline characteristics of patients**

| Parameters | Study group (N=45) | Control (N=45) |
|---|---|---|
| Age (years) | 22.94 ±7.92 | 23.84 ±8.46 |
| vita min-d level (ng/dL) | 14.6±17.9 | 23.2 ±15.32 |
| Gender N (%)<br>Male<br>Female | <br>27 (60%)<br>18 (40%) | <br>27 (60%)<br>18 (40%) |
| Family history of Disease | 13 (28.9%) | 4 (8.9%) |
| Family history of atopy | 10 (22.2%) | 7 (15.6%) |

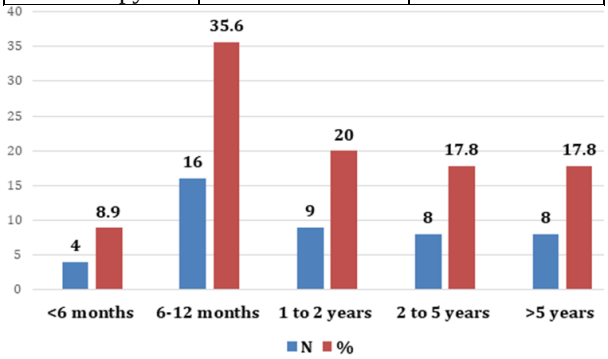


**Figure No. 1: Distribution of patients based on their disease duration (N=45).**

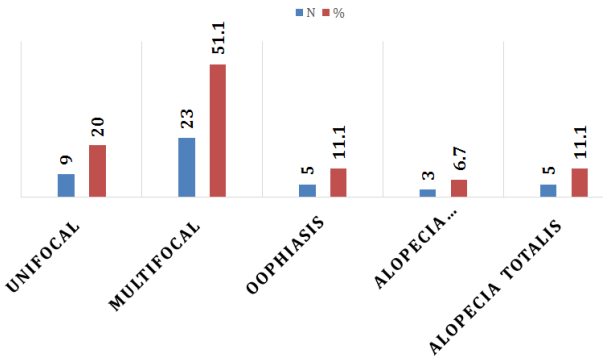


**Figure No. 2: Pattern of alopecia (N=45)**

**Table No. 2: SALT score**

| SALT Score | N (%) [(ng/dl)] |
|---|---|
| S1 | 7 (15.6%) [23.5] |
| S2 | 10 (22.2%) [22.5] |
| S3 | 18 (40%) [18.6] |
| S4 | 3 (6.7%) [12.4] |
| S5 | 7 (15.6%) [7.9] |

# DISCUSSION

Alopecia areata predominantly affects individuals at a young age and is more prevalent in females. The most prominent alopecia areata pattern was multifocal alopecia, characterized by the presence of two or more patches. A majority of patients sought medical attention within one year of experiencing symptoms. Moreover, in the study, twelve patients (27%) had a positive family history of the disease, in contrast to only two individuals in the healthy control group. Additionally, a higher number of alopecia areata patients were found to have a family history of atopy compared to the healthy controls. The present study's findings show that those with "alopecia areata" (AA) had significantly lower average vita min-d levels than did healthy controls, with a p-value of less than 0.05 indicating statistical significance. Surprisingly, a more severe vita min-d deficiency was linked to more severe instances of AA[13,14]. Yilmaz et al.[15] reported that AA patients had lower vita min-d serum levels than control cases. The study found that 85% of their cohort had 25(OH)D deficiency, a slightly lower prevalence than the observed value in the present study. Their study reported no significant correlation between AA severity and vita min-d levels. On contrary, vita min-d levels were inversely related to AA severity as observed in the present study. These variations underscore the complexity of the association of vita min-d levels with AA severity, suggesting that additional factors may contribute to these associations.

vita min-d, generated through the skin conversion process of pro to pre-vitamin, plays a role in enhancing tyrosinase activity and melanin synthesis. Consequently, it contributes to pigmentation and exhibits diverse immunoregulatory functions[16–20]. vita min-d analogues are recognized for their ability to promote repigmentation in individuals with vitiligo patches[21, 22].

The potential pathogenesis of "alopecia areata" (AA) is likely associated with autoimmunity and inflammation. An earlier report revealed that immunomodulatory effects of vita min-d exerts by pro-inflammatory cytokines inhibition[23]. The pro-inflammatory cytokines upregulation comes from vita min-d deficiency in AA. Consequently, this could lead to increased systemic inflammation in AA, which is recognized as an autoimmune disease affecting the hair follicles[24].

Another study reported the "alopecia areata" (AA) relapse as a seasonal variation, which indicated the lower vita min-d levels in winter season[25]. In the study groups of both patients and controls in this study, vita min-d levels were lower, suggesting a potential vita min-d deficiency in the general population[26].

# CONCLUSION

A significant association between lower serum vita min-d levels and "alopecia areata" (AA) compared to the levels observed in healthy controls. This suggests that there may be a correlation between AA and vita min-d deficiency, as the mean vita min-d levels in patients were notably lower than healthy control group.

**Author's Contribution:**

| | |
|---|---|
| Concept & Design of Study: | Sumyra Saleem |
| Drafting: | Muhammad Erfan, Muhammad Faisal Bacha |
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| Revisiting Critically: | Sumyra Saleem, Muhammad Erfan |
| Final Approval of version: | Sumyra Saleem |

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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