

Serum concentration of vitamin D in Alopecia areata - A hospital based observational study in a hilly state of North-East India

Subrata Kumar Das^{*1} and Saptadipa Das²

¹Senior Resident Doctor, Department of Dermatology, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim

²Senior Resident Doctor, Department of Medicine, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim

Abstract

Aim and objectives: To investigate serum level of vitamin D in AA and to assess any correlation between serum vitamin D level and AA.

Materials and methods: Place of study - OPD of Dept. of Dermatology, Sikkim Manipal Institute Of Medical Sciences, Gangtok, Sikkim.

Duration of study: From August 2019 to December 2020. Approval for study was taken from Institutional Ethical committee.

Sample size: 50 patients were randomly selected in this study.

Results: In our study, we have recruited 50 patients of alopecia areata. Out of 50 patients, 33 were males and 17 females). The index study showed most of the patients was in the age group 20-30 years with 23 patients, followed by 30-40 years with 17 patients. Most of the study subjects, 17 were college student, and no of employee were 15.27 patients had duration of lesions between < 1 month, 13 patients had duration between 1-2 months. Out of 50 patients 44 had path (es) and 2 patients had alopecia totalis. Mean serum concentration of vitamin D according to gender (P - value 0.129).

Limitations: The main limitation was less sample size of our study.

Conclusion: we did not observe any significant correlation of serum level of vitamin D in AA.

Keywords: Alopecia areata (AA), Vitamin D, Inadequate, Deficiency.

*Correspondence Info:

Dr. Subrata Kumar Das
Resident Doctor,
Department of Dermatology,
Sikkim Manipal Institute of Medical Sciences,
Gangtok, Sikkim, India

*Article History:

Received: 04/074/2021
Revised: 26/07/2021
Accepted: 28/07/2021
DOI: <https://doi.org/10.7439/ijbr.v12i7.5639>

QR Code



How to cite: Das SK and Das S. Serum concentration of vitamin D in Alopecia areata - A hospital based observational study in a hilly state of North-East India. *International Journal of Biomedical Research* 2021; 12 (07): e5639. DOI: 10.7439/ijbr.v12i7.5639 Available from: <https://ssjournals.com/index.php/ijbr/article/view/5639>

Copyright (c) 2021 International Journal of Biomedical Research. This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)

1. Introduction

The word “alopecia areata” (AA) was introduced by Sauvages in his “*Nosologica Medica*” published in 1760, in France. It’s a common type of nonscarring, chronic alopecia which often manifests as circumscribed patches of loss of hair at scalp, beard, moustache, and body [1]. Sometimes, it will lead to diffuse, total, ophiasis or universal baldness. The incidence was 0.1%–0.2% with a projected lifetime risk of 1.7%[2], in a population study of AA from Olmsted County, Minnesota, USA, Its etiology is multifactorial, where genetic [3,4] or environmental [5] and autoimmune hypotheses are prevailing[6,7]. Current evidence indicate that AA is a T-cell-mediated autoimmune disease [8,9]. Different autoimmune diseases like

Hashimoto's thyroiditis [10,11], diabetes mellitus, vitiligo, and systemic lupus erythematosus, had been associated with AA[12,13]. Hence, the index observational study was conducted to observe any association of AA and serum vitamin D level.

Vitamin D, which is a fat- soluble steroid hormone source being dietary supplements and it is synthesized after sun exposure of skin. Vitamin D₃ or cholecalciferol and vitamin D₂ or ergocalciferols are synthesized by ultraviolet B radiation. The conversion of provitamin D to pre-Vitamin D is done when skin is exposed to UVB irradiation and then vitamin D₃ is produced [3].

It is thought that vitamin D is responsible for calcium metabolism and homeostasis. It has got affects in

and adaptive and innate immune system via its effect on T and B lymphocytes, macrophages, dendritic cells [15,16]. Its role had been established in systemic inflammatory diseases like inflammatory bowel disease (IBD), systemic lupus erythematosus (SLE) rheumatoid arthritis (RA) [17,18]. It has got also role in immune modulator like alopecia, atopic dermatitis, Vitiligo, psoriasis [19-22].

Aim and objectives:

To investigate serum level of vitamin D in AA and to assess any correlation between serum vitamin D level and AA.

2. Materials and methods

2.1 Place of study: OPD of Dept. of Dermatology, Sikkim Manipal Institute of Medical Sciences, Gangtok, Sikkim,

2.2 Duration of study: From August 2019 to December 2020. Approval for study was taken from Institutional Ethical committee.

2.3 Sample size: 50 patients were randomly selected in this study.

2.4 Inclusion Criteria: Male and female patients with clinical diagnosis of alopecia areata.

2.5 Exclusion Criteria-

- 1) Pregnant,
- 2) Breastfeeding,
- 3) Patients who were taking oral contraceptive pills (OCP),
- 4) Postmenopausal women,
- 5) Patients who were taking glucocorticosteroids, and other medication which affects metabolism of vitamin D like Isoniazid, Rifampin, Ketoconazole, Phenytoin.
- 6) Patients who were taking vitamin D and multivitamins.
- 7) Patients who were having active malignancy and other chronic diseases, and taking any medicine for any kind chronic diseases.

2.6 Serum vitamin D analysis

For evaluation of serum levels of vitamin D, blood samples were collected analyzed within 24 hour of collection of samples. Levels of vitamin D were grouped into adequate (> 20 ng / mL), inadequate (12 – 20 ng/mL), or deficient (< 12 ng / mL) per standard guidelines by Food and Nutrition Board of the Institute of Medicine [16].

2.7 Statistical analysis

Statistical analyses were done by SPSS software version 23. Continuous data would be summarized in the form of mean and standard deviation. Count data will be expressed in the form of proportion. For categorical data chi-square test was done. The correlation of serum vitamin D level and severity of AA was done by using Pearson's correlation test.

3. Results

In our study, we have recruited 50 patients of alopecia areata. Out of 50 patients, 33 were males and 17 females).

Baseline demographics and clinical characteristics of the participants are presented in (Table 1).

The index study showed most of the patients was in the age group 20-30 years with 23 patients, followed by 30-40 years with 17 patients. There were 5 patients in each group of 10 – 20 years and above 40 years. (Table 2)

Most of the study subjects, 17 were college student, and no of employee were 15. No. of school students in this study was 4 and 14 patients belonged to other profession. (Table 3)

27 patients had duration of lesions between < 1 month, 13 patients had Duration between 1-2 months (table 4). 7 patients had duration of lesion for 3 - 4 months and in 3 patient's duration of disease was > 4 months. (Table 4)

Out of 50 patients 44 had path (es) and 2 patients had alopecia totalis. We had 1 patient in each group of alopecia subtotalis, alopecia universalis, ophiasis, sisaipho (Table 5).

Mean serum concentration of vitamin D according to gender (P - value 0.129) (Table 6).

Table 1: Gender wise distribution of study population

	Male	Female	Total
No	33	17	50
%	66	34	100

Table 2: Age wise distribution of study population

Age group	Male	Female	Total
10-20 Year	3	2	5
20-30 Year	17	6	23
30-40 Year	10	7	17
Above 40 Year	3	2	5
Grand Total	33	17	50

Table 3: Occupational status of study subjects

Occupation	Male	Female	Total
School Student	2	2	4
College Student	11	6	17
Employee	10	5	15
Others	10	4	14
Grand Total	33	17	50

Table 4: Disease duration in study subjects

Duration	Male	Female	Total
< 1 Month	17	10	27
1-2 Month	9	4	13
3-4 Month	5	2	7
> 4 Month	2	1	3
Grand Total	33	17	50

Table 5: Distribution of subjects according to types of lesions

Types of alopecia areata	No.
Patches	44
Alopecia totalis	2
Alopecia subtotalis	1
Alopecia universalis	1
Ophiasis	1
Sisaipho	1
Total	50

Table 6: Mean serum level of vitamin D in AA

Parameters	Male	Female	P value
Mean serum vitamin D level (ng/mL)	26.60	25.29	0.129

4. Discussion

Alopecia areata is the commonest type of recurrent non scarring hair loss [1]. The global statistic reports suggest, in general population the incidence is 0.1%–0.2%, the lifetime risk is 1.7.[2] In the index study, the incidence of AA was 0.07%, which is quite less than Sharma *et al* (1.3%)[13,23,24]. Most of the AA patients (23) in our study were in the age group of 20 – 30 years. It indicates that AA affects predominantly young persons, just other previous studies [25]. It may be because of the fact that AA preferably affects pigmented hair and graying of hair usually starts at 35 years [26,27]. However, many authors have reported its peak at the third to fourth decade [28-30]. The sex distribution of AA patients is often equal in both the genders [31-33]. However, Sharma *et al*[31] reported male preponderance. The index study also showed male preponderance (66%). Besides genetic predisposition [3,4] and autoimmunity[12,13,23,24], psychological stress[27] might have been responsible for occurrence of AA. It is also indicated in the index study which showed that majority of AA patients were students. There is a complex correlation of stress and AA. Probably, sympathetic system stimulation and substance P secretion during stress of study and job, the vascular supply to scalp hair may be altered or there is an alteration of hair cycle which ultimately leads to hair loss.[28] Patch (es) over the scalp is the most common form of involvement in AA, [29-32] which was also substantiated in the index study also (44 patients). However, certain uncommon forms, such as diffuse alopecia (2 cases), ophiasis / sisaipho (2 cases), total / subtotal alopecia (1 case) and universal alopecia (1 case), were also reported. Beard and moustache were also involved in some cases.

Various authors have also reported uncommon forms of AA [14,24]. “Severity of Alopecia Tool Score”[23] or SALT is a scoring system to evaluate the severity of AA Occasionally, nails may be affected in AA in the form of fine / coarse pitting and dystrophy of nail

plates. Similarly, the index study has also reported nail pitting in 7 AA patients.

The severity of AA might be depending on family or personal history of atopy [25-27], autoimmune disorders like atopic dermatitis, Vitiligo, psoriasis hashimoto's thyroiditis, pernicious anemia, diabetes mellitus, lupus erythematosus, and other diseases [24,28-31]. We had 7 patients in our study who had deficient or insufficient serum vitamin D levels compared with reference value⁴¹. In other studies also serum level vitamin D in AA patients was inadequate [42-44]. This may suggest that vitamin D supplementation might have a role in the treatment of AA but it has to be confirmed by appropriate RCT studies.

In our study, we did not observe any significant correlation of serum level of vitamin D and gender or age of affected patients or duration of AA. Bhat *et al* described that, in female patient of AA, the level of vitamin D in serum were significantly decreased [45]. But our study failed to show such kind of association. Similarly Mahamid *et al* [46] also didn't find any significant correlation.

5. Conclusion

Our study did not find any significant correlation of serum level of Vitamin D in patients of different variants of AA. This index study shows that the evaluation of Vitamin D₃ in AA can be done. Since our study population was small and confined to a particular age group, there is a need for a larger study involving a wider age group.

There is also a need to study the pattern of hair growth following Vitamin D₃ supplementation in AA patients. Considering the rural and financial background of a majority of patients in India, testing for Vitamin D₃ levels may not be possible in all patients with complaints of AA due to the cost of the test. Our study tries to emphasize on the need to use Vitamin D₃ supplements as a part of AA treatment in the future.

Declaration of patient's consent

The authors declared that they have obtained written informed consent had been obtained from all participants. in the form the participant (s) / accompanying guardian (s) had given his / her / their consent for his / her / their clinical photographs and any other clinical information for reporting in the journal.

Financial support and sponsorship - Nil

Conflicts of interest – There are no conflicts of interest.

References

- [1]. Bolduc C. Alopecia Areata. *Medscape web portal: eMedicine*. 2006:1–33.
- [2]. Safavi KH, Muller SA, Suman VJ, Moshell AN, Melton LJ., 3rd Incidence of alopecia areata in

- Olmsted County, Minnesota, 1975 through 1989. *Mayo Clin Proc.* 1995; 70:628–33.
- [3]. Yang S, Yang J, Liu JB, Wang HY, Yang Q, Gao M, et al. The genetic epidemiology of Alopecia areata in China. *Br J Dermatol.* 2004; 151:16–23.
- [4]. Dogra D, Sood A, Khaitan BK. Alopecia areata in identical twins. *Indian J Dermatol Venereol Leprol.* 1996; 62:199.
- [5]. Friedmann PS. Alopecia areata and auto-immunity. *Br J Dermatol.* 1981; 105:153–7.
- [6]. Gilhar A, Kalish RS. Alopecia areata: A tissue specific autoimmune disease of the hair follicle. *Autoimmun Rev.* 2006; 5:64–9.
- [7]. Friedmann PS. Decreased lymphocyte reactivity and autoimmunity in alopecia areata. *B J D.* 1981; 105:145–52.
- [8]. Madani S, Shapiro J. Alopecia areata update. *J Am Acad Dermatol.* 2000; 42:549–66.
- [9]. Hordinsky MK, Hallgren H, Nelson D, Filipovich AH. Suppressor cell number and function in alopecia areata. *Arch Dermatol.* 1984; 120:188–94.
- [10]. Puavilai S, Puavilai G, Charuwichitratana S, Sakuntabhai A, Sriprachya-Anunt S. Prevalence of thyroid diseases in patients with alopecia areata. *Int J Dermatol.* 1994; 33:632–3.
- [11]. Lewinski A, Broniarczyk - Dyla G, Sewerynek E, Zerek-Melen G, Szkudlinski M. Abnormalities in structure and function of the thyroid gland in patients with alopecia areata. *J Am Acad Dermatol.* 1990; 23 (4 Pt 1):768–9.
- [12]. Thomas EA, Kadyan RS. Alopecia areata and autoimmunity: A clinical study. *Indian J Dermatol.* 2008; 53:70–4.
- [13]. Sharma VK, Sialy R, Kumar B, Gupta S. Evaluation of thyroid function in north Indians with alopecia areata: Response to intravenous injection of 100 micrograms thyrotropin releasing hormone (TRH). *J Dermatol.* 1999; 26:339–42.
- [14]. Wacker M, Holick MF. Sunlight and Vitamin D: a global perspective for health. *Dermatoendocrinol.* 2013; 5 (1):51–108. doi:10.4161/derm.24494
- [15]. Bhalla AK, Amento EP, Clemens TL, Holick MF, Krane SM. Specific high - affinity receptors for 1,25-dihydroxyvitamin D₃ in human peripheral blood mononuclear cells: presence in monocytes and induction in T lymphocytes following activation. *J Clin Endocrinol Metab.* 1983; 57:1308–10.
- [16]. Provvedini DM, Tsoukas CD, Deftos LJ, Manolagas SC. 1,25-dihydroxyvitamin D₃ receptors in human leukocytes. *Science* 1983; 221:1181–3.
- [17]. Arnson Y, Amital H, Shoenfeld Y. Vitamin D and autoimmunity: new aetiological and therapeutic considerations. *Ann Rheum Dis.* 2007; 66:1137–42.
- [18]. Kostoglou-Athanassiou I, Athanassiou P, Lyraki A, Raftakis I, Antoniadis C. Vitamin D and rheumatoid arthritis. *Ther Adv Endocrinol Metab.* 2012; 3:181–7. doi: 10.1177/2042018812471070
- [19]. Cheng HM, Kim S, Park GH, Chang SE, Bang S, Won CH et al. Low vitamin D levels are associated with atopic dermatitis, but not allergic rhinitis, asthma, or IgE sensitization, in the adult Korean population. *J Allergy Clin Immunol.* 2014; 133:1048–55.
- [20]. Gisondi P, Rossini M, Di Cesare A, Idolazzi L, Farina S, Beltrami G et al. Vitamin D status in patients with chronic plaque psoriasis. *Br J Dermatol.* 2012; 166:505–10. doi: 10.1111/j.1365-2133.2011.10699.
- [21]. Silverberg JI, Silverberg AI, Malka E, Silverberg NB. A pilot study assessing the role of 25 hydroxy vitamin D levels in patients with vitiligo vulgaris. *J Am Acad Dermatol.* 2010; 62:937–41. doi: 10.1016/j.jaad.2009.11.024
- [22]. Aksu Cerman A, Sarikaya Solak S, Kivanc Altunay I. Vitamin D deficiency in alopecia areata. *Br J Dermatol.* 2014; 170:1299–304. doi: 10.1111/bjd.12980
- [23]. Ahmed I, Nasreen S, Jaehangir U, Wahid Z. Clinical spectrum of alopecia areata and its association with thyroid dysfunction. *J Pak Assoc Dermatol.* 2012; 22:207–12.
- [24]. Messenger AG, Bleehen SS. Expression of HLA-DR by anagen hair follicles in alopecia areata. *J Invest Dermatol.* 1985; 85:569–72.
- [25]. McDonagh AJ, Tazi-Ahnini R. Epidemiology and genetics of alopecia areata. *Clin Exp Dermatol.* 2002; 27:405–9.
- [26]. Tobin DJ, Orentreich N, Fenton DA, Bystryn JC. Antibodies to hair follicles in alopecia areata. *J Invest Dermatol.* 1994; 102:721–4.
- [27]. Baker GH. Psychological factors and immunity. *J Psychosom Res.* 1987; 31:1–10.
- [28]. Price VH. Alopecia areata: Clinical aspects. *J Invest Dermatol.* 1991; 96:68S.
- [29]. Muller SA, Winkelmann RK. Alopecia areata. An evaluation of 736 patients. *Arch Dermatol.* 1963; 88:290–7.
- [30]. Tan E, Tay YK, Goh CL, Chin Giam Y. The pattern and profile of alopecia areata in Singapore – A study of 219 Asians. *Int J Dermatol.* 2002; 41:748–53.
- [31]. Sharma VK, Dawn G, Kumar B. Profile of alopecia areata in Northern India. *Int J Dermatol.* 1996; 35:22–7.
- [32]. Manzoor S, Masood C. Alopecia areata in Kashmir: A study of 200 patients. *Indian J Dermatol Venereol Leprol.* 2001; 67:324–5.

- [33]. Finner AM. Alopecia areata: Clinical presentation, diagnosis, and unusual cases. *Dermatol Ther*. 2011; 24:348–54.
- [34]. Ikeda T. A new classification of alopecia areata. *Dermatologica*. 1965; 131:421–45.
- [35]. Jain S, Marfatia YS. Alopecia areata – Pattern in industrial city of Baroda. *Indian J Dermatol Venereol Leprol*. 2003; 69: 81–2.
- [36]. Kaur S, Sharma VK, Kumar L, Kumar B. Atopy and alopecia areata in North Indians. *Indian J Dermatol Venereol Leprol*. 2002; 68:267–9.
- [37]. Cline DJ. Changes in hair color. *Dermatol Clin*. 1988; 6:295–303.
- [38]. Werth VP, White WL, Sanchez MR, Franks AG. Incidence of alopecia areata in lupus erythematosus. *Arch Dermatol*. 1992; 128:368–71.
- [39]. Gandhi V, Baruah MC, Bhattacharaya SN. Nail changes in alopecia areata: Incidence and pattern. *Indian J Dermatol Venereol Leprol*. 2003; 69:114–5.
- [40]. Brenner W, Diem E, Gschnait F. Coincidence of vitiligo, alopecia areata, onychodystrophy, localized scleroderma and lichen planus. *Dermatologica*. 1979; 159: 356–60.
- [41]. Kuriacose R, Olive KE. Vitamin D insufficiency / deficiency management. *South Med J* 2014; 107:66-70.
- [42]. Liu Y, Li J, Liang G, Cheng C, Li Y, Wu X. Association of alopecia areata with Vitamin D and calcium levels : A systematic review and meta - analysis. *Dermatol Ther (Heidelb)* 2020; 10:967-83.
- [43]. Yilmaz NY, Serarslan G, Gokce C. Vitamin D concentrations are decreased in patients with alopecia areata. *Vitam Trace Elem* 2012; 1: 105-9.
- [44]. Aksu Cerman A, Sarikaya Solak S, Kivanc Altunay I. Vitamin D deficiency in alopecia areata. *Br J Dermatol* 2014; 170:1299-304.
- [45]. Bhat YJ, Latif I, Malik R, Hassan I, Sheikh G, Lone KS, et al. Vitamin D level in alopecia areata. *Indian J Dermatol* 2017; 62:407-10.
- [46]. Mahamid M, Abu-Elhija O, Samamra M, Mahamid A, Nseir W. Association between Vitamin D levels and alopecia areata. *Isr Med Assoc J* 2014; 16:367-70