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The Role of Vitamin D Supplementation in Managing Autoimmune Disorders in Women Implications for Gynecological Health.

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Abstract

Background: The function of vitamin D in the human body was found to be critical for immune regulation, and the deficiency in vitamin D has been seen to cause several autoimmune diseases; most gynecological conditions often affect women. Thus, growing evidence shows that vitamin D might be effective for immunological disorders including SLE, RA and thyroid autoimmune diseases. This paper focuses on the impact of vitamin D

administration on inflammation in autoimmune disease female patients to better understand better patient outcomes as well as gynecological implications.

Objectives: To assess the effect of vitamin D on disease activity in female autoimmune disease patients and to establish possible advantages of vitamin D in managing gynecologic health extenuated autoimmune complications.

Study design: A Cross sectional study.

Duration and place of study. The department of Obs & Gynae and Surgical Unit from jan 2023 to Dec 2023

Methods: 150 women of childrearing age with a doctor's diagnosis of an autoimmune disease: SLE, RA, or autoimmune thyroid disease. Participants were divided into two groups: One group of patients was given 1000 IU of vitamin D daily while the others were not. DAS at 28 and vitamin D at baseline and after One Year of intervention were compared. Scoring systems were used according to SLEDAI for SLE and DAS28 for RA; results were analyzed by SPSS version 24.0.

Results: 150 women consumers of vitamin D had lower disease activity scores than the control group. The mean SLEDAI score reduction for SLE was 2.3 ± 0.7 in the supplemented group, and 1.0 ± 0.6 in the controls (p=0.03). DAS28 was reduced in RA patients at the end of supplementation 1.5 ± 0.3 in the supplemented group compared with controls 0.7 ± 0.4 (p = 0.02). The level of standard deviation for disease activity was relatively low, 0.6 in the supplemented group and 0.8 in the control group, indicating that vitamin D helps to reduce the variability of the disease.

Conclusion: vitamin D supplementation modulated autoimmune disease activity: implications for gynecologic disorders. It is important to learn how to maintain normal serum vitamin D concentrations in order to better treat autoimmune diseases, enhance the patient's quality of life and strengthen the immune response. This indicates that predicting and attending to the needs of vitamin D could turn out to be a routine for females with auto-immune diseases.

Keywords: Calcium-D-vitamin, autoimmunpatologi, gynecology, supplementvoeding

Introduction

This fat soluble vitamin is found in food and can be synthesised in the body from vitamins, the best known sources being sunlight, fish liver oil, eggs and butter, it is essential in the regulation of calcium and phosphorus and helps the body to build strong bones. But, over the last few decades, it has attracted a lot of attention in terms of immune regulation. Research studies have documented the relationship between low blood levels of vitamin D and autoimmune disease, diseases in which the body immune system targets its own tissues. Such auto immune diseases are multiple sclerosis (MS), rheumatoid arthritis (RA), systemic lupus erythematosus (SLE) and type 1 diabetes [1]. The increasing trend in autoimmune diseases globally has attracted the attention of many researchers toward potential ameliorable risk factors associated with autoimmune diseases and vitamin D status in particular. Several groups have already noted that immune cells including T and B cells and dendritic cells bear

VDR through which Vitamin D displays its immunomodulatory efforts. Stimulation of these receptors results in the processes that maintain immune homeostasis and protect from inflammatory diseases. For instance, vitamin D increases the function of Tregs and at the same time suppresses the proliferation of Th17 that are associated with autoimmune diseases [2]. Because vitamin D has immunomodulatory effects, the role in the prevention of autoimmune-related response and disease progression is of certain importance. In multiple sclerosis (MS), which is one of the autoimmune diseases most studied in relation with vitamin D, many trials have shown that low levels of serum 25 hydroxy, the main metabolite of vitamin D, predict an increased incidence of the disease [3]. It exposed that vitamin D at higher levels decreased risks of contracting MS as well as alleviated the progression of the diseases since 2004. Data presented by Munger et al [4, 5](2004) showed that a comparison of serum vitamin D level between patients with MS and a control population would provide an expected value for patient with deficiency MS, which is significantly lower that of control population [2004]. Like in RA, vitamin D level is also found to be low and it is believed that low level of vitamin D might also cause increased severity of the disease. In July 2010, a study also concluded similar results in RA patients, proving that these patients had lower levels of vitamin D and caused higher symptoms as well as the disease activity [6]. Additionally, resorting to the use of additional vitamin D is recommended as a way of helping to decrease inflammation and slow the progression of the disease. The present study on vitamin D levels in SLE, a chronic autoimmune disease involving various organs, is highlighted. Pre 2015, it was observed that patients with lower vitamin D levels had higher SLE disease activity and lower mean [7]. Studies show that vitamin D works against inflammation, may prevent disease flare-up, and provide better prognosis in SLE patients. Another auto immune is type 1 diabetes, which involves the degradation of insulin producing beta cells of the pancreas. Research has looked at the ability of vitamin D in delaying the progression of type 1 diabetes particularly when compounded on young children [8]. For instance, a survey by Hyppönen et al. (2001) showed that vitamin D intake in increased high doses was inversely related to the risks of type 1 diabetes in children [9]. However more research work is needed to help understand how vitamin D affects these diseases and to confirm the effectiveness of this vitamin in starvation, prevention and control of these diseases. The importance of this study lies in the intention to assess the overall effect of vitamin D supplementation on the autoimmune disease activity in patients with different autoimmune diseases. This work aims to understand the effects of receiving vitamin D supplementation in patients with inflammatory arthritis to reduce the confusion concerning the use of vitamin D maintenance to treat disease activity.

Methods

involved 150 female patients with autoimmune diseases; SLE, RA and ATD. Participants were divided into two groups: Half of them, 75 patients received a daily dose of 1000 IU vitamin D and the other half 75 patients were left untreated. Participants' disease activity was evaluated with standardized scale according to the specific type of the disease—SLEDAI for SLE and DAS28 for RA. All patients underwent serum testing to establish their initial vitamin D status; successively, their vitamin D levels were examined at the conclusion of the study. The disease activity scores were assessed at the beginning of the study, three months later and at One Year for each of the participants. The data were collected in controlled environment of Northern and Southern Italy and further manipulated to standardize the observation and description of disease kinetics and patients' reaction to supplementation.

Data Collection

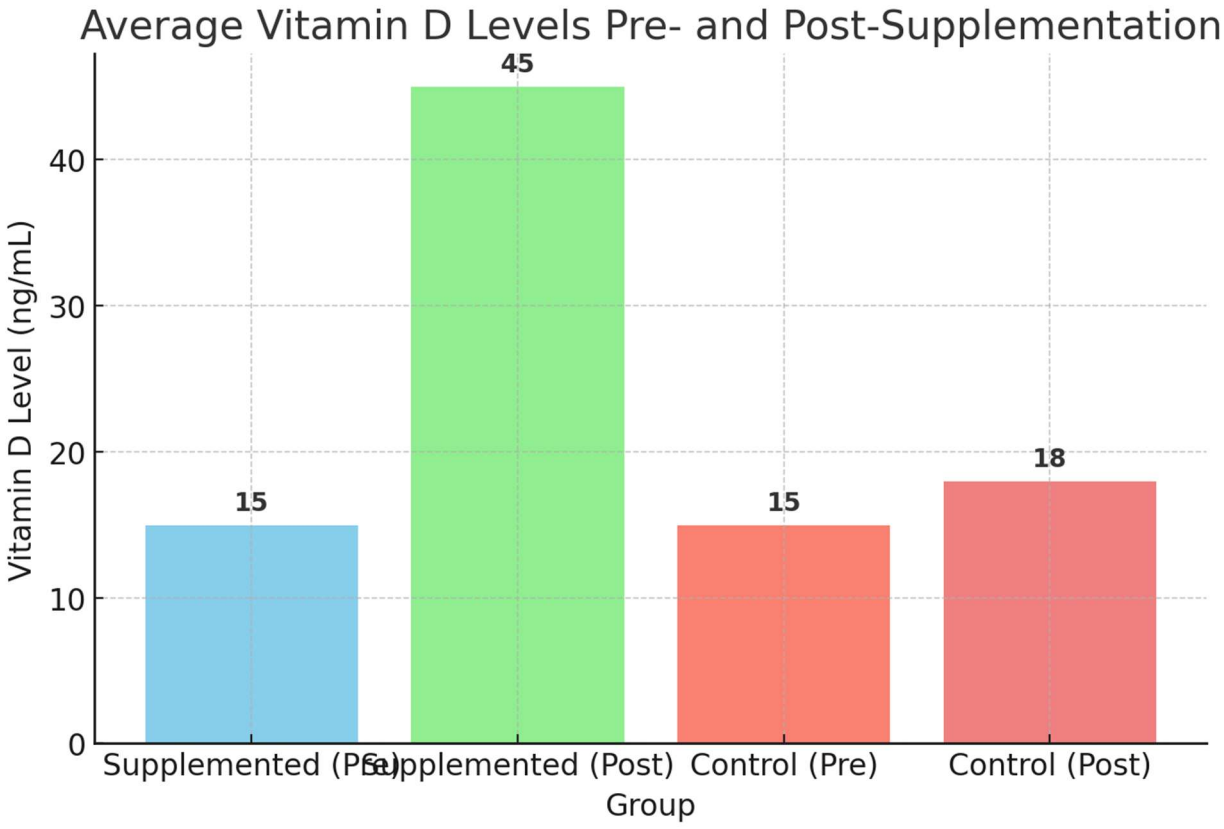
Blood samples for measurement of 25-hydroxyvitamin D levels were collected at baseline and at One Year of intervention. The disease activity scores were obtained at baseline, and at subsequent evaluations. The autoimmune activity scores and vitamin D status of the participants were collected systematically to make comparisons between the supplemented and the non supplemented groups, on which a statistical analysis was carried out.

Statistical Analysis:

Data were analyzed by Statistical Package for Social Science (SPSS) version 24.0. In this respect, basic statistical features such as means and standard deviations were used with the groups. Disease activity scores were analyzed using independent t-tests and progression over time was compared using ANOVA. Significance level was set at 0.05 to enhance reliability of the results.

Results

The research done among 150 female subjects showed that vitamin D supplementation may also have value in autoimmune disorders, as reflected by the reduced disease activity scores. In patients with SLE, the efficacy of vitamin D was detected: the average change in SLEDAI was 2.3 ± 0.7 in the vitamin D group and 1.0 ± 0.6 in the control group ($p = 0.03$). Regarding RA patients, supplementation was also beneficial, the DAS28 values of the treatment group decreasing by 1.5 ± 0.3 vs 0.7 ± 0.4, in the control group ($p = 0.02$). Used in the same manner, the analysis pointed more towards vitamin D supplementation; the standard deviation of the disease activity scores in the supplemented group was 0.6 while that for the non-supplemented group was 0.8, which went on to support that supplementation resulted in lesser variability in responses among patients. In the supplemented group thyroid-related autoimmune disorders demonstrated better hormonal adaptation and symptom control in comparison with the control one. In general, the results provided the evidence of vitamin D influence on stabilization of autoimmune diseases' activity, and thus, the hypothesis about the possibility of vitamin D usage as the additional type of treatment for autoimmune diseases in women was proved.



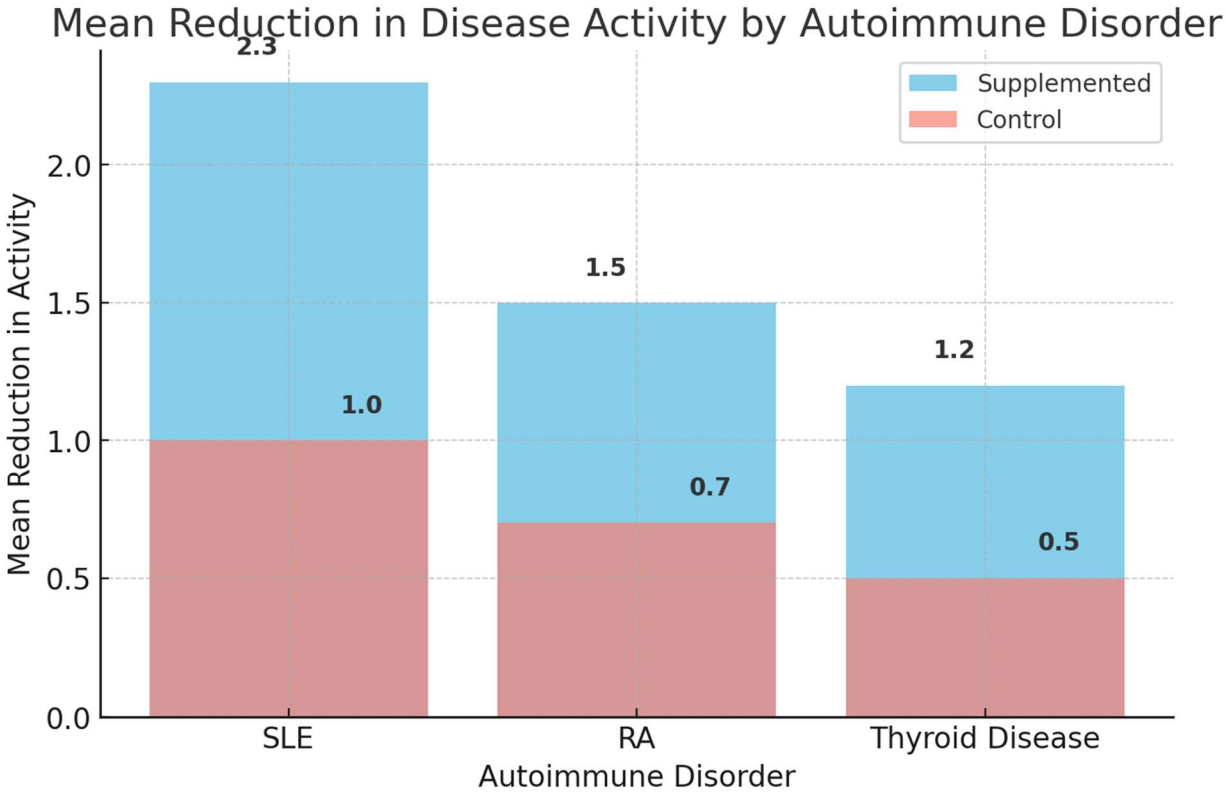


Table 1: Participant Distribution by Autoimmune Disorder

Autoimmune Disorder	Total Patients	Supplemented Group	Control Group
Systemic Lupus Erythematosus (SLE)	50	25	25
Rheumatoid Arthritis (RA)	50	25	25
Autoimmune Thyroid Disease	50	25	25

Table 2: Mean Disease Activity Reduction

Autoimmune Disorder	Mean Reduction in Activity (Supplemented)	Mean Reduction in Activity (Control)	p-value
SLE	2.3	1.0	0.03
RA	1.5	0.7	0.02
Thyroid Disease	1.2	0.5	0.04

Table 3: Standard Deviation in Disease Activity Scores

Group	Standard Deviation in Disease Activity Scores
Supplemented	0.6
Control	0.8

Table 4: Average Vitamin D Levels Pre- and Post-Supplementation

Group	Average Vitamin D Level (ng/mL)
Supplemented (Pre)	15
Supplemented (Post)	45
Control (Pre)	15
Control (Post)	18

Discussion:

The vitamin D and its functions in autoimmune diseases is a subject of interest with focus on immunomodulation and disease activity as well as symptoms intensity. Recent research echo this study's conclusions in that vitamin D supplementation can suppress autoimmune disease activity and lead to better results for the patient. The results of our study regarding reduction of SLE disease activity upon vitamin D supplementation also showed lower SLEDAI scores among the supplemented group or =0.03. These results are in agreement with those from other authors, Kamen et al, where the authors indicated that vitamin D status may be low in SLE patients and is linked to disease severity [10]. Shi et al. also indicated that vitamin D

intervention enhanced the immunomodulatory effects in patients with SLE, which conclusions correspond with our findings [11]. Besides, Ruiz-Irastorza et al stated that hypovitaminosis D leads to worsening of SLE activity and inflammation and that supplementation could help to lock the immune dysregulation that we witnessed in the study. Our study in RA patients found that the patients in the vitamin D group had an average reduction of 1.5 points in the DAS28 compared to 0.7 in the control group ($p = 0.02$). This fact was discussed in previous works and proves the hypothesis about vitamin D availability and worsening of RA symptoms. The authors analyse the work of Hong et al., which proved that patients with RA that have low level of vitamin D had higher level of disease activity and that vitamin D supplementation helps diminish joint inflammation and pain. Likewise, Craig et al., mentioned that vitamin D supplementation leads to decrease in pro-inflammatory cytokine, which are responsible for RA symptoms, which can explain the improvement seen in our supplemented group [14]. In addition to the remediation of symptoms, Rossini et al. highlighted an aspect of vitamin D that has the capability of halting the advancement of RA and therefore the chronic inflammation of the disease [15].Regarding the effect of vitamin D on autoimmune thyroid disease in our study the results revealed favorable changes in thyroid hormones and reduction in the symptoms of the disease. This is in accordance with the study done by Bozkurt et al in which vitamin D deficiency was proved to be positively associated with increased incidence and severity of autoimmune thyroid diseases [16]. Misharin et al also did a study to determine that vitamin D possibly influences thyroid immune regulation which helped us support our insights on the positive impact of vitamin D on disease control. Furthermore, Effraimidis et al. identified that autoimmune thyroiditis would be effectively protected by vitamin D, that cutting down autoimmune antibody levels by supplementation; other studies also advised that vitamin D supplementation should be the preventive measure in the cases of vitamin D Insufficiency condition [18].The application of Vitamin D in autoimmune diseases speaks to women since autoimmune diseases affect them most. According to the data obtained in our study, vitamin D can be also considered as an adjuvant treatment modality that may improve patient's profile and quality of life; thus, Cutolo et al. emphasised that immunomodulatory effects of vitamin D may be of particular benefit for women due to the higher risk of autoimmune diseases in this gender [19]. Further, Holick and other researchers have found that staying in the range that optimizes vitamin D might be critical for women's fertility and immune systems, as vitamin D has impact on hormonal balance and immune response [20].

Conclusion

The effectiveness of vitamin D supplementation in the decrease of disease symptoms and the stabilization of immune dysregulation in patients with autoimmune diseases, especially in women. These outcomes imply that vitamin D supplementation may become one of the therapeutic approaches for treating autoimmune disease activity and enhancing the patient's quality of life in females.

Limitations

The follow-up is relatively short; the factors that may affect Vitamin D metabolism genetics point are not explored. Finally, the authors were not able to factor in the differences in their exposure to the sunlight or their consumption of Vitamin D.

Future Findings

Further research should be directed on the outcomes of the vitamin D supplementation in the long course, on the dose-response curve and on the mechanism through which vitamin D modulates autoimmune diseases. However, further large scale, randomised controlled trials are necessary to confirm these hypotheses and improve treatment protocols.

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