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Research Article

TO EVALUATE VITAMIN D LEVELS IN DIAGNOSED PATIENTS OF RHEUMATOID ARTHRITIS

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ABSTRACT

Objectives: This study was designed and conducted to evaluate Vitamin D levels in diagnosed patients of rheumatoid arthritis (RA) and to correlate them with age and gender.

Methods: 50 patients with confirmed diagnosis of RA arthritis (comprising study group) and 50 non-RA individuals (comprising control group) were included in the study. Serum Vitamin D levels were determined in the patients.

Results: In our present study, maximum number of patients was in the age group of 41–50 years. The mean±SD of serum Vitamin D levels in patients (n=50) was 11.45±6.07 ng/mL (taking normal value of Vitamin D is 30 ng/mL-100 ng/mL). The serum Vitamin D levels were decreased in RA patients.

Conclusion: Serum Vitamin D level was found to be decreased in patients of RA. The decrease is more significant with advancing age and is more in females than males.

Keywords: Rheumatoid arthritis, Vitamin D, Age, Gender.

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INTRODUCTION

Rheumatoid arthritis (RA) is a systemic autoimmune multifactorial complex disease caused by the interactions between diverse environmental and genetic factors [1]. It affects 0.5–1.0% of the adult population in most developed countries, with 3 times higher prevalence in women compared with men [2]. Incidence and prevalence of RA in populations vary substantially between geographic areas which implicate a combination of environmental exposures and gene-environmental interactions [3].

Vitamin D is a steroid hormone obtained after hepatic (C-25 position) and kidney (C-1 position) hydroxylations [4]. It plays a key role in calcium homeostasis and as a prohormone, it plays potential immune-suppressive roles and exerts an endocrine action on the immune system cells, generating anti-inflammatory and immunoregulatory effects [5,6]. Vitamin D may influence B-cell and T-cell function inhibiting their differentiation and proliferation, promoting their apoptosis, and promoting a shift from a pro-inflammatory to a more tolerogenic immune status. These findings may explain the protective effect of Vitamin D upon the risk of developing autoimmune diseases like RA [5].

In genetic studies, RA is strongly linked to the major histocompatibility complex class II antigens HLA-DRB, whose main function is to present antigenic peptides to CD4+T cells. Arthritogenic antigen-activated CD4+T cells caused joint damage in RA [7]. Smoking is the strongest known environmental risk factor for RA [8]. One possible mechanism is that smoking may cause a modification of potential autoantigens being recognized by T cells, which are restricted by major histocompatibility complex class II antigens carrying the shared epitope structures. Another possibility is that substances in the smoke (such as char) might act as adjuvants and thereby trigger the innate immune system to contribute to arthritis development [9].

RA is characterized by synovial inflammation and hyperplasia, autoantibody production, cartilage and bone destruction, increased stiffness early in the morning and systemic features, including cardiovascular, pulmonary, psychological, and skeletal disorders [10,11]. Symmetrical peripheral polyarthritis results in deformity of the joints, particularly the metacarpophalangeal, proximal interphalangeal, and metatarsophalangeal joints [12].

Vitamin D levels have been studied in RA and Vitamin D levels were found to be negatively correlated with disease activity in RA. Vitamin D deficiency may be associated with an increased risk for the development of RA [13].

Aims

The aim of the study was to evaluate the levels of Vitamin D in 50 diagnosed cases of RA and 50 age and gender-matched controls (non-RA individuals) and also to correlate the levels of Vitamin D with age and gender in cases of RA.

METHODS

This study was conducted in the Department of Biochemistry, Government Medical College referred by the Department of Orthopedics, Rajindra Hospital, Patiala, on 50 diagnosed patients of RA. 50 non-RA individuals comprised the control group. Patients were explained about the study and consent was obtained. Patients of RA within the age group of 20–50 years were included and with any comorbidities were excluded. A cross-sectional study was done. Serum Vitamin D levels were evaluated and correlated with age and gender. The results were subjected to statistical analysis using paired t-test, Chi-square test, and analysis of variance in SPSS software.

OBSERVATION AND RESULTS

Age-wise distribution of patients included in the study (n=50) is shown in Table 1.

RA has seen in all ages but the prevalence of the disease increases with age. In the present study, maximum number of patients was in the age group of 41–50 years.

Table 2 shows the mean value of serum Vitamin D among different age groups. Mean value of Vitamin D levels decreases with advancing

Table 1: Age-wise distribution of patients with rheumatoid arthritis

Age group (years)	RA patients, number of patients (%)
21–30	10 (20)
31–40	13 (26)
41–50	27 (54)
Total	50 (100)

RA: Rheumatoid arthritis

Table 2: Mean value of Vitamin D levels among different age group

Age group	Number of patients	RA patients (mean±SD)
21–30	10	16.61±7.82
31–40	13	12.48±4.42
41–50	27	9.05±4.75
P		0.002*

*p<0.05; significant. SD: Standard deviation

age. Hence, higher prevalence of Vitamin D deficiency was observed in elderly people of RA.

The mean value of Vitamin D in RA patients according to gender is depicted in Table 3. Serum Vitamin D levels are lower in females than males.

Comparison of mean value of Vitamin D levels in RA patients and controls group is shown in Table 4. The levels of Vitamin D in RA patients were lower than the control group which is highly significant.

There was statistically significant decrease in mean levels of serum Vitamin D in RA as compared with controls. Vitamin D levels were decreased significantly in elders and as well as more decrease in females as compared to males.

DISCUSSION

The present study was conducted at Government Medical College and Rajindra Hospital, Patiala, India. This study has established that the levels of serum Vitamin D decreased in case of RA.

Kostoglou-Athanassiou *et al*. in their study concluded that Vitamin D deficiency is highly prevalent in patients with RA and that Vitamin D deficiency may be linked to disease severity in RA. Vitamin D appears to regulate the immune response by a variety of mechanisms, such as decreasing antigen presentation, inhibiting the pro-inflammatory T helper type 1 profile, suppressing proliferation and immunoglobulin production, and retards differentiation of B-cell precursors into plasma cells [14].

Ishikawa *et al*. concluded in their study that lower Vitamin D levels correlate with more severe clinical manifestations in RA patients. Therefore, supplementation with Vitamin D to achieve normal serum levels is worthwhile as an aforethought [15].

Gallagher concluded in their study that aging reduces Vitamin D production in the skin. Effects of aging on Vitamin D are decreased Vitamin D receptor, decreased renal production of Vitamin D by the aging kidney, decreased skin production of Vitamin D, and substrate deficiency of Vitamin D [16].

Sokka *et al*. in their study concluded that RA disease activity measures appear to be worse in women. Estrogen has a dichotomous impact on the immune system by downregulating inflammatory immune responses and upregulating immunoglobulin production [17].

Kadera *et al*. concluded in their study that there were significantly lower serum Vitamin D levels in women compared to men. Differences

Table 3: Mean value of Vitamin D in rheumatoid arthritis patients according to gender

Gender	Number of patients	RA patients (mean±SD)
Males	15	15.22±7.11
Females	35	9.85±4.84
p		0.003*

*p<0.05; Significant. RA: Rheumatoid arthritis, SD: Standard deviation

Table 4: Comparison of mean value of Vitamin D levels in rheumatoid arthritis cases and controls

Group	Frequency	Mean±SD	t-value	p	Significance
RA patients	50	11.45±6.07	16.250	<0.001	Highly significant
Controls	50	39.47±10.56			

RA: Rheumatoid arthritis, SD: Standard deviation

according to gender and age group may be because of biological differences. There also might be that women spend less time outside, resulting in less exposure to the sun [18].

Padyukov *et al*. in their study concluded that the disease risk of rheumatoid factor-seropositive RA associated with one of the classic genetic risk factors for immune-mediated diseases is strongly influenced by the presence of an environmental factor (smoking) in the population at risk [9].

In our study also, we have observed decreased levels of Vitamin D in patients of RA. Decrease Vitamin D levels are prevalent in RA. Levels decrease more significantly with advancing age and in females. Hence, normal concentrations of Vitamin D are required to maintain the physiological innate and adaptive immune responses as well as the immune tolerance of self-antigen. Treatment of Vitamin D deficiency in patients with RA is relevant as deficiency is common.

CONCLUSION

Low serum levels of Vitamin D have been associated with increased risk of autoimmune disease onset and high disease activity. Vitamin D regulates the immune system by inhibiting the secretion of pro-inflammatory markers (IL-α, TNF-α, IL-2, etc.) and hence has a protective effect on the development of RA. Therefore, consumption of Vitamin D supplements is recommended for treating RA and can be evaluated by measuring serum levels of Vitamin D. However, medical supervision is required to prevent increased Vitamin D toxicity in patients who self-administrate Vitamin D at higher doses.

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CONFLICTS OF INTERESTS

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