Original Research Article

Assessment of Disease Activity Score with Respect to Vitamin D in Rheumatoid Arthritis: An Observational Study

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Abstract

Background: Rheumatoid Arthritis (RA) is a crippling disorder with a prevalence rate ranging from 0.3% to 1% globally having an annual incidence rate of 3 per 10,000 adults. Vitamin D has unavoidable effects on numerous physiological functions as well as pathological conditions and several studies have analyzed the association of vitamin D deficiency in rheumatoid arthritis and have reached varied conclusions. Identifying the role of Vitamin D in curbing the articulation of RA is a topic of enormous importance having practical applications too. **Material & Methods**: This was an observational study conducted on 42 patients in the age group of 18-45 years having RA, diagnosed by the American College of Rheumatology criteria (ACR/EULAR criteria), for assessing disease activity score concerning vitamin D in them. **Results**: In the distribution of Disease Activity Level, the proportion of moderate activity level was found higher i.e. 66.7%. The mean vitamin D level was 10.93 ± 2.70, the minimum was 7 and the maximum was 18. The mean DAS-28 Score was 4.46 ± 0.82 with a minimum value of 2.63 and a maximum of 6.08. **Conclusions**: A notable association has been found between the comparison of the level of vitamin D and the DAS-28 score. The deficiency of vitamin D can be speculated to be a substantial reason for rheumatoid arthritis.

Introduction

RA is a crippling disorder with articular, extra-articular as well as systemic drawbacks. Anaemia, cardiovascular diseases, lymphoma, cancers, renal disease, endocrine diseases, infections, lung diseases, and neuropsychiatric disorders are some comorbidities of RA. This can be prohibited by early diagnosis and periodic treatment of the patients retaining RA[1,2].

Disease Activity Score (DAS) is a type of examination equipment used by clinicians for assessing RA disease activity, in order to determine whether the evidence and indications have curtailed or stopped, and if treatment needs to be modified[6].

Vitamin D has inevitable effects on numerous physiological procedures as well as pathological conditions and several studies have evaluated the association of vitamin D deficiency in rheumatoid arthritis and have attained varied conclusions. vitamin d status may be a potential contributor to inflammatory diseases such as RA[5]. In vitro, vitamin D metabolites modulate inflammation through modifications in T helper and regulatory T cell process. Recent researches have discerned that vitamin D level may be an apparent benefactor to provocative disorders such as Rheumatoid Arthritis. In vitro, vitamin D metabolites modulate inflammation through upheavals in T helper and regulatory T cell function[3,4,18].

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Despite developments synthesized by several current meta-analyses, the union between vitamin D and RA expects supplementary evaluation. Additional research is needed to substantiate the relationship between RA susceptibility and vitamin D polymorphisms and to specify whether vitamin D plays a role in curbing the manifestation of RA. So, distinct studies are needed to assume the effect and optimal amount of vitamin D supplementation in the treatment of RA patients[13,14,17].This background in the present study has been recognizing the cases of RA besides getting an estimation of vitamin D level in patients of RA for learning any association between the disease activity of RA and vitamin D levels.

Materials and methods

This observational study has been carried out in the Department of Orthopaedics, Teerthanker Mahaveer Medical College & Research Centre, and Delhi Road, Moradabad from January 2020 till June 2021. A total of 42 patients of Rheumatoid Arthritis between the ages of 18-45 years who were present to the outdoor/ indoor department of Orthopaedics at the above mentioned centre during the study period. A written informed consent was obtained from all patients included in the study on an Informed consent form (ICF) as per the guidelines of Institutional Ethical Committee (IEC). Any information regarding patients has not been disclosed under any circumstances. The data obtained through the study has been used for the epidemiological quantification since no such identical studies have been carried out previously.

Inclusion criteria

Both male and female patients from the age group of 18-45 years having RA, diagnosed by American college of Rheumatology criteria (ACR/EULAR criteria) were being assessed for this study.

Exclusion criteria

Patients who were below 18 years of age including patients of juvenile rheumatoid arthritis or patients of RA above 45 years were excluded from the study besides the patients who were on vitamin D supplementation.

Methodology

A brief history of symptomatology was taken on all the patients qualifying the inclusion criteria and noted on a specifically designed performa including age, gender, age of onset of symptoms, disease progression, pattern of joint involvement, Pain and swelling in joints, drug history.

In order to do quantitative measurement of vitamin D, ELISA Kit was used and the estimation process was done in an autoanalyzer.Other investigations i.e. ESR, Rheumatoid Factor (Quantitative) and C - reactive protein (Quantitative) were carried out for all participants.

Disease activity score 28(DAS28) and Visual analog scale scoring system tools were used for assessment of end results, i.e., annexures.

For calculating the DAS28, swollen tender joint examination was performed and the value of each affected was noted on Form A. Post completion, all swollen and tender joints were added and total was noted in appropriate boxes in Form B. Patient erythrocyte sedimentation rate or C-reactive protein were recorded in Form B. Patient general health also was recorded on the Visual Analog Scale in Form B. Lastly, the score was calculated and all values were placed according to the formula.

Disease severity was evaluated according to the significance of DAS28 score are as follows:

1. Remission: DAS28 ≤2.6
2. Low disease activity: 2.6 <DAS28 ≤3.2
3. Moderate disease Activity: 3.2 <DAS28 ≤5.1
4. High disease Activity: DAS28 >5.1.

The findings from the patients has been recorded through a predefined proforma and the collected data has been compiled in the Microsoft Excel sheet after which it was being analysed statistically. The Data analysis of this study was carried out with the help of SPSS version 20. Also Medcalc 19.5 was used. Mean ± SD was being expressed for the continuous variables. In order to compare the mean values, the one-way ANOVA test has been used over here. After finding out the P values the level of significance was being kept as < 0.05 or 5%.

Results

Table 1: - Comparison of Mean Vitamin D and DAS-28 Score in Disease Activity group

Variable	Low activity	Moderate activity	High activity	P-Value
Vitamin D Level Mean (SD)	10.5 (0.71)	11.32 (2.64)	10.08 (2.97)	0.413
DAS-28 SCORE Mean (SD)	2.87 (0.34)	4.18 (0.50)	5.37 (0.56)	0.000

(To compare the mean, we used ANOVA Test)

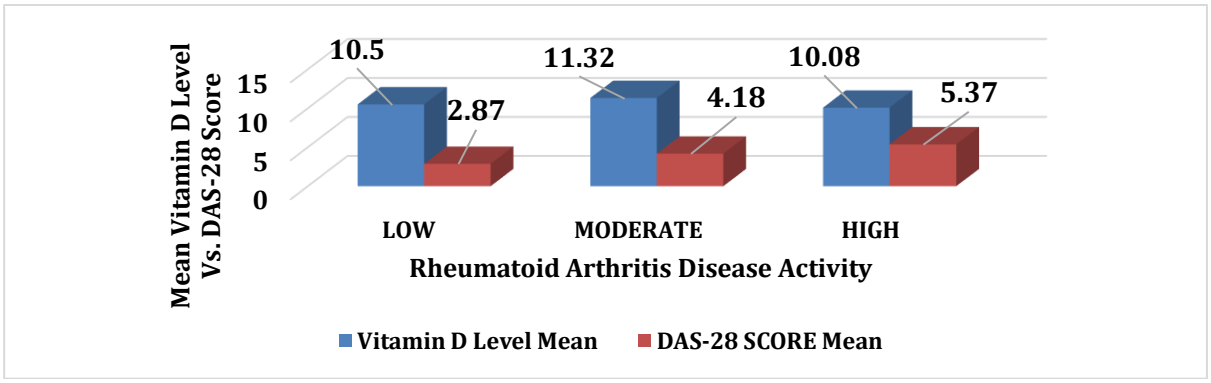

Fig.1: Rheumatoid Arthritis Disease Activity

Table 2: - Comparison of Mean Vitamin D and DAS-28 Score in Disease Severity group

Variable	Low	Moderate	High	P-Value
Vitamin D Level Mean (SD)	10.00 (1.0)	11.20 (2.59)	10.33 (3.43)	0.590
DAS-28 SCORE Mean (SD)	2.99 (0.32)	4.27 (0.50)	5.59 (0.36)	0.000

(To compare the mean, we used ANOVA Test)

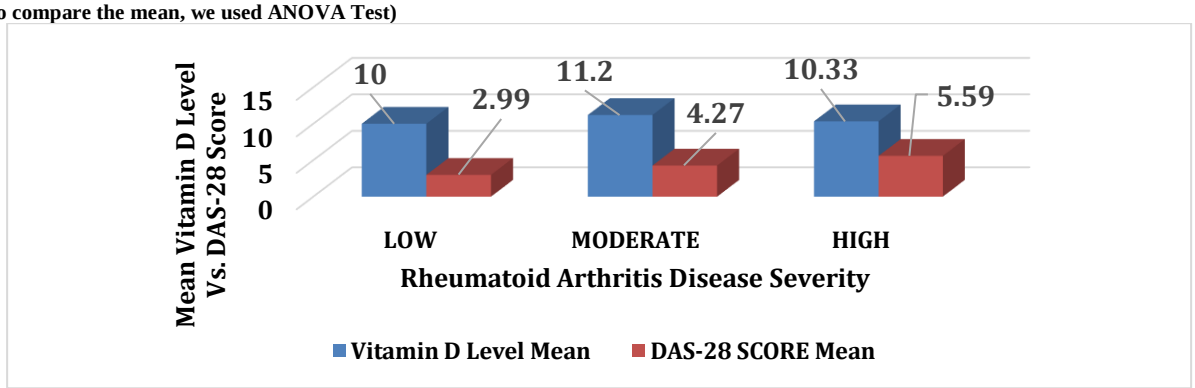

Fig.2: Rheumatoid Arthritis Disease Severity

Discussion

In this study the vitamin D levels and its association was noticed in 42 patients from which the female cases outnumber the number of male cases and the frequency distribution was 61.9 % and 38.1 % respectively. The demographic profile also shows that mean age was 36.38 ± 8.24 years with minimum age was 19 and maximum was 48 years. The disease activity score represented that 66.7% were in moderate level, 28.6 were in high level and 4.8 were in low level. In the study of Lossa et al. (2020), the DAS28-CRP, specified that sufferers possessed a usual vitamin D level of 30.4 ± 10.7, 31.9 ±

10.7, and 31.8 ± 12.1 ng/mL, for low, moderate and high activity group respectively[19,20].In our study the mean values of vitamin D level in the disease activity group was 10.50 ± 0.71, 11.32 ± 2.64 and 10.08 ± 2.97 for low, moderate and high disease activity respectively and came to a P- value of 0.413. Similarly, Kostoglou-Athanassiou et al. (2012), conducted a Cohort study to evaluate vitamin D status in 44 patients with RA, where 25(OH) D3 levels were found to be low compared with the control group, 25(OH) D3 being 15.26 ± 1.07 ng/ml and 25.8 ± 1.6 ng/ml in the patient and control group respectively. They observed vitamin D deficiency is highly prevalent in patients with RA[16,15].The mean DAS-28 score in this study in the disease activity group came out to be 2.99 ± 0.32 ,4.27 ± 0.50 , 5.59 ± 0 36 respectively for low, moderate and high levels. The comparison of Mean in the disease activity group as disease severity group of the Subjects**,** the difference in Mean DAS-28 Score were found Significant as the P-value is <0.05. Following that, in the study of Gheita et al. (2016), th level of vitamin D in RA patients was significantly lower (23.11 ± 12.71 ng/mL) than that in the controls (32.59 ± 13.06 ng/mL) (P = 0.005) being deficient in 50.8%, insufficient in 23.8% and normal in 25.4%[7,9].

Stoica et al. (2013), estimated the prevalence of vitamin D deficiency in patients with RA, included 52 rheumatoid arthritis premenopausal women between 35-48 years, 32.7 % (17 patients) with vitamin D supplements. In non supplemented RA patients a significant negative correlation between 25(OH)D serum levels and age was observed (P<0.05). They concluded that Vitamin D deficiency is common in RA patients[8,10]. Contrastingly Craig et al. (2010), had noticed that the prevalence of 25(OH)-D deficiency (≤ 37.5 nmol/l or 15 ng/ml) was 50%, the vitamin D concentrations were inversely correlated with Disease Activity Score (DAS28, p = 0.05) but not with criteria at 3 years' disease interval. Thus they inferred that there was not vital coalitions of 25(OH)-D concentration or disease severity in patients with RA[11,12].

Strength of the study: This study has focused over the possible immunomodulatory role of the discussed Vitamin D and has analysed the development of rheumatoid arthritis why keeping a consistency with the presence of this vitamin. An inverse relationship within the severity of the disease activity for rheumatoid arthritis so that with the vitamin D levels has also been emphasized.

Limitations of the study: Study that unlimited sample size and there was a time constraint too.

Conclusion

The disease activity score is a great assessment tool that is often used by clinicians for measuring the disease activity of rheumatoid arthritis in determining the various Symptoms and signs and its prevalence of rheumatoid arthritis among the patients. And the deficiency of vitamin D is also being considered to be greatly associated with the patients suffering from RA. A significant association has been found between the comparison of the level of vitamin D and the DAS-28 score. Even though vitamin D is not the most prominent one in playing any type of important role for evaluating rheumatoid arthritis patients, but the deficiency is very much common within the rheumatoid arthritis patients and acts to be one of the most leading cause for worsening the situation of the patients suffering from rheumatoid arthritis.

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