

Serum Vitamin D Levels In Rheumatoid Arthritis

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ABSTRACT

Aim: To assess the serum vitamin D levels in rheumatoid arthritis and to assess the relationship between serum vitamin D levels and severity of Rheumatoid arthritis

Materials and methods: All newly diagnosed patients with rheumatoid arthritis whose age is more than 18 yrs diagnosed according to the new ACR-EULAR criteria. Age and sex matched controls were chosen from among patients relatives for assessing vitamin D levels and it was compared with that of patients. A complete musculoskeletal examination and relevant investigations were done in the study subjects. Serum vitamin D levels were done in all patients and severity of RA was assessed using DAS score

Conclusion: Serum vitamin D levels were low in both patients and controls but severe vitamin D deficiency was seen in patients with severe RA.

Keywords: Rheumatoid arthritis; Severity, Serum; Vitamin D level

INTRODUCTION

Rheumatoid Arthritis (RA) is a chronic inflammatory disease of unknown cause which mainly affects the synovium. It is one of the most common inflammatory joint disease. There may be involvement of multiple organs and extra articular systems in rheumatoid arthritis [1,2]. Vitamin D deficiency is common in general population. Its deficiency has been linked to many diseases. Several studies have assessed the association of vitamin D deficiency in rheumatoid arthritis and have reached at different conclusions. While some studies could prove a link between severity of RA and severity of vitamin D deficiency, others could not find any link [3]. The present study looks in to the identifiable etiological factors in rheumatoid arthritis and also the association between severity of rheumatoid arthritis and vitamin D deficiency [4,5].

LITERATURE REVIEW

Aim

To look for possible association between the presence of vitamin D deficiency and severity of rheumatoid arthritis as assessed by DAS score.

Study design

- Prospective study
- Period: 6 years from Sept 2011-Aug 2017
- Centre: Rheumatology OP, Medicine OP, Department of Medicine wards
- Sample size: 60 patients

Inclusion criteria

All newly diagnosed patients with rheumatoid arthritis whose age is more than 18 yrs diagnosed according to the new ACR-EULAR criteria. Age and sex matched controls were chosen from among patients relatives for assessing vitamin D levels and it was compared with that of patients.

Exclusion criteria

- Patients already on vitamin D supplementation.
- Patients with other co morbid conditions like renal or liver diseases, malabsorption or drug intake which can predispose to vitamin D deficiency.
- Patients who have not given consent for the study.

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DATA COLLECTION

After noting the preliminary data of the patient a complete history was taken which included the mode of onset, preceding history of infection, pattern of joint involvement, duration of symptoms, extra articular manifestations, past history, family history and personal history. The diagnosis of rheumatoid arthritis was made clinically and using the ACR-EULAR criteria. The criteria rates the patients on a scale of 0-10 points with points assigned in for separate domains of signs and symptoms, joint involvement, serology, duration of symptoms, and acute phase reactants. Patients who tally 6 or more points were considered to have definite RA. A complete general examination as well as detailed systemic examination was done in all the patients. A locomotors system examination was done to know the pattern of joint involvement and the presence of signs of inflammation. Complete blood count, hemoglobin, ESR, urine routine, liver and renal function tests as well as fasting blood sugar were done in all the patients. Serum rheumatoid factor was done in all the patients. Anti CCP antibody was done in patients when indicated. To assess the incidence and severity of vitamin D deficiency 25(OH) vitamin D levels were done by Electrochemiluminescence Immunoassay (ECLIA) technique using vitamin D kits. To know the disease activity of patients and to correlate it with vitamin D deficiency the disease activity score (DAS28) was calculated online in all patients according to the formula $DAS28(4) = 0.56 * \sqrt{t28} + 0.28 * \sqrt{sw28} + 0.70 * \ln(ESR) + 0.014 * GH.DAS28(4)$.

Statistical analysis of the data was analyzed using SPSS software and conclusions were reached. The statistical significance of different variables was assessed using chi square test.

Variables studied

There were socio-demographic variables like age, sex, smoking history, pattern of diet etc. Clinical variables like duration of disease, clinical manifestations, pattern of joint involvement, extra articular manifestations and also serum 25(OH) vitamin D level and comparison with disease activity measured using DAS 28 score.

Statistical analysis

Interpretation of results was done by another person who did not know the final results of previous studies. The severity of disease as well as its relation to vitamin D level was studied using appropriate statistical tests. Here we used SPSS package for statistical analysis. There were a total of 60 cases (48 females and 12 males 4:1) and same number of age and sex matched controls. The mean age of the study population was 42.5 ± 8.3 years and the median value was 40.5 years. The serum rheumatoid factor was positive in 41.7% (25 out of 60) patients (Figure 1).

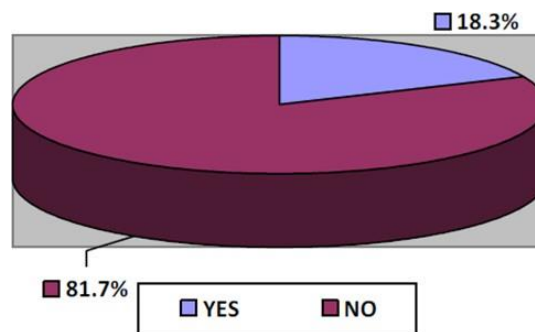


Figure 1: Age distribution of the study population.

Das score

The severity of the rheumatoid arthritis was assessed using DAS 28 score. Das score of >5.2 was seen in 9 patients (16%) indicating severe rheumatoid arthritis and DAS score of 3.2 -5.1 was seen in 51 patients (85%) (Table 1).

Das score	No. of patients
>5.2	9
3.2-5.1	51

Table 1: DAS score of patients.

Vitamin D Level

Serum 25 (OH) vitamin D level was done in all patients and controls. The mean vitamin D level was 15.8 ng/dl in cases and 21.54 ng/dl in controls the difference of which was statistically significant. This shows that patients with RA have significantly low vitamin D levels when compared with age and sex matched controls. 49 Among the patients 46 patients (76.7%) had serum vitamin D level below 20 ng/ml (severe vitamin D deficiency). But only 16 controls (26.7%) had vitamin D level below 20 ng/ml. The differences being statistically significant. But none of the controls had vitamin D level >30 ng/ml indicating that vitamin D deficiency is prevalent in general population. Of the 9 patients who had severe rheumatoid arthritis with a DAS score of >5.2, all of them had severe vitamin D deficiency in Table 2.

Average vitamin D level in patients	Average vitamin D level in controls
15.8 ng/dl	21.54 ng/dl

Table 2: Comparison of average vitamin d levels in cases and controls.

DISCUSSION

Vitamin D is a fat soluble vitamin. It is obtained from diet and is also synthesized by the action of UV rays on the skin. Vitamin D has an effect on immunity due to its action on dendritic cells and T helper cells [6]. It is believed to play a role in many autoimmune diseases due to its immunomodulatory properties.

Vitamin D deficiency is seen in majority of people in developing countries like India appears to be due to lack of balanced diet rather than decreased exposure to sunlight [7]. 85% patients had moderately severe RA based on DAS 28 score (3.2-5.1) and 15% (9) patients had very severe RA with a DAS score of >5.2. 74.5% (38) patients with moderately severe RA had severe vitamin D deficiency 59.

Serum 25 dihydroxy vitamin D level was done in all patients and in age and sex matched controls. Vitamin D deficiency was defined as 25(OH) vitamin D level below 20 ng/ml, vitamin D insufficiency was defined as 25(OH) vitamin D level 20-30 ng/ml and vitamin D sufficiency was defined as 25 (OH) vitamin D level 30-100 ng/ml [8]. It was found that 45 cases (76%) had vitamin D level below 20 ng/ml whereas only 9 (16%) of the controls had a serum vitamin D level below 20 ng/ml, the difference being statistically significant. Majority of the controls 73.3 % (44) also had vitamin D level in the moderate deficiency range of 20-30 ng/ml while only 16 (26.7%) had vitamin D level below 20 ng/ml. Neither the control nor the cases had vitamin D level >30 ng/ml. This is similar to the findings by Saisdaran et al. which also found that there was widely prevalent vitamin D deficiency in Indian population [9]. Vitamin D is a fat soluble vitamin. It is obtained from diet and is also synthesized by the action of UV rays on the skin. Vitamin D has an effect on immunity due to its action on dendritic cells and T helper cells, [10]. It is believed to play a role in many autoimmune diseases due to its immunomodulatory properties. Vitamin D deficiency is seen in majority of people in developing countries like India appears to be due to lack of balanced diet rather than decreased exposure to sunlight. 85% (51), 15% (9), patients had moderately severe and very severe RA respectively based on DAS score.

But it was striking that all the 9 patients who had very severe RA also had very severe vitamin D deficiency of vitamin D deficiency which is statistically significant. Rajeev Sharma et al. [11] reports that patients with high disease activity had significantly lower vitamin D levels in comparison to patients with low or moderate disease activity. This result is comparable to our study where also it is found that even though vitamin D deficiency is common in general population patients with high disease activity had more severe vitamin D deficiency than patients with moderate disease activity. Low levels of vitamin D have been implicated in the etiology of RA. Also it was found that mean serum vitamin D levels in the patient population was significantly less when compared to controls. In contrast to the present study Rossini et al. in a study published in 2010 found that vitamin D deficiency was equally common in both patients and controls, [12]. But most of the studies have found a negative correlation between vitamin D deficiency and severe RA.

CONCLUSION

Hypovitaminosis is common in Indian population. It is even more common in rheumatoid arthritis patients with serum Vitamin D levels severely low in patients with severe RA. The treatment of Vitamin D deficiency might provide a cheap way to treat severe RA which has to be taken up in further studies.

REFERENCES

1. Majithia V, Geraci SA. Rheumatoid arthritis: diagnosis and management. *Am J Med* 2007;120(11):936-939.
2. Smolen JS, Aletaha D, McInnes IB. Rheumatoid arthritis. *Lancet*. 2016;388(10055):2023-2038.
3. Rossini M, Avola GD, Muratore M, Malavolta N, Silveri F, Bianchi G, et al.. Regional differences of vitamin D deficiency in rheumatoid arthritis patients in Italy. *Reumatismo*. 2013;65(3): 113-120.
4. Scott DL, Wolfe F, Huizinga TWJ. Rheumatoid arthritis. *Lancet*. 2010;376(9746): 1094-1108.
5. Malaviya AN, Kapoor SK, Singh RR, Kumar A, Pande I. Prevalence of rheumatoid arthritis in the adult Indian population. *Rheumatol Int*. 1993;13(4):131-134.
6. Frisell T, Saevarsdottir S, Askling J. Does a family history of RA influence the clinical presentation and treatment response in RA? *Ann Rheum Dis*. 2016;75(6):1120-1125.
7. Sharma R, Saigal R, Goyal L, Mital P, Yadav RN, Meena PD, et al.. Estimation of Vitamin D Levels in Rheumatoid Arthritis Patients and its Correlation with the Disease Activity. *J Assoc Physicians India*. 2014;62(8):678-681.
8. Gopinath K, Danda D. Supplementation of 1,25 dihydroxy vitamin D3 in patients with treatment naive early rheumatoid arthritis: a randomised controlled trial. *Int J Rheum Dis*. 2011;14(4):332-339.
9. Etten EV, Mathieu C. Immunoregulation by 1,25-dihydroxyvitamin D3: basic concepts. *J Steroid Biochem Mol Biol*. 2005;97(1-2):93-101.
10. Marwaha RK, Tandon N, Garg MK, Kanwar R, Narang A, Sastry A, et al.. Vitamin D status in healthy Indians aged 50 years and above. *J Assoc Physicians India*. 2011;59:706-709.
11. Sharma R, Saigal R, Goyal L, Mital P, Yadav RN, Meena PD, et al.. Estimation of Vitamin D Levels in Rheumatoid Arthritis Patients and its Correlation with the Disease Activity. *J Assoc Physicians India*. 2014;62(8):678-681.
12. Rossini M, Bongio SM, Montagna GL, Minisola G, Malavolta N, Bernini L, et al.. Vitamin D deficiency in rheumatoid arthritis: prevalence, determinants and associations with disease activity and disability. *Arthritis Res Ther*. 2010;12(6):R216.