The Association Between Rheumatoid Arthritis and Serum Levels of Vitamin D

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Abstract

Objective: To find out the status of vitamin D in patients with Rheumatoid Arthritis.

Material and Methods: This comparative study was conducted in Govt Kot Khawaja Saeed Teaching Hospital. Duration of study was from June 2017 to June 2018. A case control study was carried out on 60 patients with Rheumatoid arthritis (age range 25 to 60 years fulfils the criteria of 2010 Rheumatoid arthritis classification. Duration of study was from June 2017 to June 2018. Patients/controls were comprised as group A (30 patients with mild arthritis), group B (30 patients with moderate form of arthritis) and group C (20 age, sex matched healthy controls).

Results: Mean age of patients was 36.50 years. Majority of women were house wives with average health status with normal pulse rate and blood pressure. Clinical variables of patients showed the small joint involvement, swelling, tenderness with moderate to severity of disease. It is observed that the level of vitamin D was significantly low in group of patients presented with severe form of arthritis as compared to group of patient who has mild to moderate arthritis. Study also observed that both group of patient has significantly low levels of vitamin D as compared to controls.

Conclusions: Vitamin D deficiency is observed in patients with rheumatoid arthritis, and may be linked to severity in RA. It is therefore a need of supplementation of Vitamin D for the pain relief in RA patients.

Keywords: rheumatoid arthritis, Women, Vitamin D deficiency

How to cite: Hameed M, Zia M, Qayyum M, Hameed H, Yasmin R, Zahra S. *The Association Between Rheumatoid Arthritis and Serum Levels of Vitamin D. Esculapio - JSIMS 2023;19(03):269-272*

DOI: https://doi.org/10.51273/esc23.25131931

Introduction

Rheumatoid arthritis (RA) is an inflammatory ailment typified by flares & remissions. The flares described by pain. Deficiency of Vitamin D is related with diffuse musculoskeletal pain. The prevalence of RA in southern region of Pakistan is low (0.14%) and in Northern region is high (0.55%).[1,2] On the other hand the prevalence rate of RA in European countries is 0.5 - 1.0%.[3] Risk factors of RA are obesity, family history, and environmental pollutants. Sign and symptoms of RA are swollen joints, stiffness of joints especially in morning, Early RA initially affects small joint (joint of finger and toes).[4] With the passage of time, the disease spread to knees, elbow, wrist, hip, ankles and shoulder.[5] DAS-28 (Disease Activity Score-28 joint) given by European League against Rheumatism to calculate the severity of RA. The scale of score is from 0-10 showing the severity of disease. According to DAS > 5.1 indicate the high severity of disease, DAS between 5.1 & 3.2 shows moderate level of disease and value <3.2 shows low level of severity.[6] Vitamin D is believed to have an anti-inflammatory and immunomodulatory role and its lack has been related to several autoimmune disarrays, including RA.[7] Role of vitamin D in immune system is very important. It is proposed vitamin D stimulate a strong anti-microbial response, to activate the body to immediately remove micro-organism before they cause any infection.[8] In addition the supplement of vitamin D in primary stage of RA may inhibit the progress of RA from moderate to severe form.[9,10] However a study found no clear link between serum vitamin D and severity. The affiliation between the levels of vitamin D and

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Submission Date: 04-05-2023
1st Revision Date: 24-05-2023
Acceptance Date: 04-08-2023

severity of RA is of gigantic interest and therapeutic proposal. A cross sectional study was designed to find out the status of vitamin D in patients with Rheumatoid Arthritis. Study was considered as cross sectional (to find the relation between RA and vitamin D status).

Material and Methods

A case sectional study was carried out on 60 patients with Rheumatoid arthritis fulfils the criteria of 2010 rheumatoid arthritisclassification[12]. Sample size was calculated as 61 with 90% confidence Interval. Female with age range 20-60 year were taken from Govt Kot Khawaja Saeed Teaching Hospital. Duration of study was from June 2017 to June 2018. Patients/controls were comprised as group A (20 patients with mild arthritis), group B(20 patients with moderate form of arthritis) and group C (20 age ,sex matched healthy controls). DAS scoring system for sample selection was used for inclusion criteria. The patients newly diagnosed, using vitamin D supplement, or with any serious morbidity were excluded from the study. Data was analyzed by SPSS 20. Demographic variables were expressed in percentages. One way Anova was applied to find the

Table 1: *Demographics of female patients (group A & B) and controls (group C)*

Variables	Group A	Group B	Group C
Age	36.4±10.1	37.4±10.2	32.7±11.0
Profession			
Job	45%	55%	60%
House wife	50%	45%	40%
Socioeconomic status			
Middle	18(90%)	19(95%)	17(85%)
Upper	2(10%)	1(5%)	3(15%)
General health status			
Good			
Average	5(25%)	2(10%)	4(20%)
Poor	15(75%)	16(20 %)	16(80%)

Table 2: *Clinical variables of patients*

	Group B Frequency and percentages	Group C Frequency and percentages
Small joint pain	11(55%)	15(75%)
Swelling	3(15%)	16(80%)
Tenderness	16(80%)	0(0%)
Pain status		
Mild	0(0%)	19(95%)
Moderate	15(75%)	1(5%)

Table 3: *Group wise comparison of vitamin D levels among female patients and controls*

Groups		Mean difference	Standard error	P-value
Group 3	Group 1	51.20	3.17	<0.001
	Group 2	33.75	3.22	
Group 2	Group 1	18.56	3.37	<0.001

significant difference among female patients groups and female control subjects. P<0.05 showed significance.

Results

The Demographics of patients and control were presented as table 1. Mean age of patients in group A and B was 36 and 37 years respectively. Most of the patients belong to middle class and professional whereas majority of women were house wives with average health status with normal pulse rate and blood pressure. Clinical variables of patients and controls were tabulated as table 2. Clinical variables of group B and group C showed that in group C, the small joint involvement, swelling, tenderness mild to moderate to severity was presented as high frequency and percentages as compared to in group B. Group wise comparison of vitamin D levels among patients and controls was tabulated as table 3. By using One way ANOVAs, it is observed that mean difference and standard error of vitamin D among group A and group B was significantly higher (P<0.001) as compared to control group C. On the other hand, the mean difference and standard error of vitamin D among group B was significantly higher (P<0.001) as compared to control group C.

Discussion

According to our study patients with mild to moderate severity of RA or patients with severe form of RA have age range 36-38 years. However, a study was carried out in 80 patients with RA and found the mean age of patients was 44.7 (range 40-45 years). Study demonstrated that as compared to early age, the onset of disease late age might cause worse outcome. It is suggested age at the onset of disease have an impact on severity of disease and clinical results.[13,14] Another study stated that patients with later onset of disease had higher DAS 28 and this may be possible in age of 40 to 60 years. It is demonstrated that in the age of 40 years, there is a high score of DAS 28 with activation of immunological change of patients with RA.[15] Our study observed that

RA patients with high severity of disease present with more involvement of small, swelling, tenderness and mild to moderate to severity. We agreed with a study that also observed the problems of joint pain including swelling and difficulty to move in patients. It is suggested that early judgment is help to decreased damage of joint, reduce disability, and usage of anti-rheumatic drugs help to reduce the severity of problem.[16] There is also a need of physical examination of patients, imaging and blood test to confirm RA.[17] We observed that level of vitamin D was significantly low in group of patients presented with severe form of arthritis as compared to group of patient who has mild arthritis. Study also observed that both group of patient with RA has significantly low levels of vitamin D as compared to age matched controls. We agreed with a study that was carried out on 44 RA patients admitted in Red Cross hospital of Greece. Their levels of vitamin D, parathyroid hormone and inflammatory marker were noted. Study found that deficiency of vitamin D is prevalent in RA patients and deficiency of vitamin D may be associated with severity of disease and musculoskeletal pain. It is stated that deficiency of vitamin D may have a role in progression of autoimmune inflammatory states generally and especially in RA.[18] According to a case control study carried out in 300 patients in 2021found significantly reduced level of vitamin D in patients as compared to normal subjects. Study demonstrated high incidence of deficiency of vitamin D in patients with RA and may be linked with severity of disease.[19] It is proposed that both RA and vitamin D are distinguished by flares which are typified by pain.[20]

However a cross-sectional study was carried on 100 admitted patients with mean age 45 years to find the association between level of serum vitamin D and activity index of RA. Study found 45 % of RA patients had low level of vitamin D and 55 % had normal level of vitamin D. Study concluded that there was an in-significant association between severity of disease and levels of circulating vitamin D.[21] Limitation of study: Sample size is small and limited to age 35 years. Role of vitamin D should also be find in age group 50-70 years of RA patients. There is a need of follow-up studies of RA with supplement of vitamin D.

Conclusions

Vitamin D deficiency is prevalent in patients with rheumatoid arthritis, and may be linked to severity in RA. It is therefore a need of supplementation of Vitamin D for the pain relief in RA patients.

Conflict of Interest *None*

Funding Source *None*

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Authors Contribution

MH: Conceptualization of Project
MZ: Data Collection
MQ: Literature Search
MQ: Statistical Analysis
HH: Drafting, Revision
SZ, MQ: Writing of Manuscript