ORIGINAL ARTICLE

Frequency of Vitamin D Deficiency with Non-Specific Musculoskeletal Symptoms in Female Patients

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ABSTRACT

Objective: To determine frequency of vitamin D deficiency in female patients presenting with non-specific musculoskeletal symptoms.

Study Design: Descriptive cross sectional.

Place and Duration of Study: The study was conducted in Medical Outpatient Department (OPD), Combined Military Hospital (CMH) Quetta from 30th November 2018 to 30th May 2019.

Materials and Methods: A total of 150 female patients with nonspecific musculoskeletal symptoms were included. Patients on vitamin D supplements, osteopenia, osteoporosis, chronic kidney disease, neuropathies, cancers, diabetes mellitus, iron and Vitamin B_{12} deficiency were excluded. Data including gender, age and presence of bone pain, muscle aches, bone tenderness and fracture was collected. SPSS version 17 was used for data analysis. Chi-square test was applied to test for associations, *p* value less than 0.05 was taken as significant.

Results: The mean age was 37.20 $\pm$ 13.30 years. Mean Vitamin D levels were 14.89 $\pm$ 7.76 ng/ml with range from 3.10 to 35.67ng/ml. Participants with vitamin D3 < 10 ng/ml were 24% (n=36), < 20 ng/ml were 54% (n= 81), <30 ng/ml were 12 % (n=18) and only 10 % (n= 15) had optimal Vitamin D_3 levels. Among the study population 82% (n=123) had bone pains, 88.6% (n=33) had muscle aches and weakness, 72.66% (n=109) had bone tenderness while only 4% (n=6) had fractures. There was a statistically significant association between symptoms and vitamin D_3 deficiency with *p* value <0.001.

Conclusion: This study showed that vitamin D deficiency is prevalent in our female population and it presents with nonspecific musculoskeletal symptoms.

Key Words: *Deficiency, Musculoskeletal Symptoms, Vitamin D.*

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Introduction

Vitamin D is an important vitamin in human body which exerts many important and beneficial effects on human body. Vitamin D is made available in the body by oral intake in diet and via its production in the human body. Vitamin D_3 (cholecalciferol) is present in various fortified diets such as dairy products and oils. It can also be synthesized in the skin after exposure to sunlight from 7-dehydrocholesterol. Many factors affect production of vitamin D in the human body such as colour of skin, exposure to sunlight, season of the year, latitude, altitude, and use of sun blocks.[1] In order to produce its metabolic effects on bone metabolism, it is required to be activated to its metabolically active form.[2] It is transported in blood bounded to plasma proteins to liver and kidneys, where its activation takes place via hydroxylation. In the liver vitamin D is hydroxylated at C-25 by 25-hydroxylase which leads to production of 25- hydroxyl vitamin D (25OHD).[2] In the kidneys, a second hydroxylation reaction takes

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place by 1α hydroxylase which converts 25(OH)D3 to 1,25(OH)2D3. Once converted into its active form it exerts its metabolic effects. It increases absorption of calcium from gastrointestinal tract and Vitamin D_3, along with calcium, helps building bones and keep bones strong and healthy.[3] At the same time, it inhibits release of parathyroid hormone (PTH), which is involved in bone resorption and thus increased PTH causes bones to become brittle and weak. A severe vitamin D deficiency can cause osteomalacia, whereas less severe deficiency increases the risk of osteoporosis and fractures.[4] Moreover, mild vitamin D deficiency may produce varied and nonspecific musculoskeletal pain such as fibromyalgia-like pain, low back ache, muscle aches and arthralgia, which can adversely affect quality of life. In addition to its effects on bone metabolism, vitamin D_3 also boosts our immune system and has protective role against inflammatory bowel disease.[5,6] Researchers are working to identify its role in protection against various cancers.[7-9]

A study conducted in Peshawar showed prevalence of biochemical vitamin D deficiency in 80% of patients, with 21.5% severe, 44% moderate, and 14.5% mild vitamin D deficiency.[10] There may be multifactorial origin of vitamin D3 deficiency such as reduced dietary intake and decreased sun exposure. The aim of this study was to determine the frequency of Vitamin D_3 deficiency in females presenting with chronic nonspecific musculoskeletal symptoms such as muscle aches, bone pain and bone tenderness in our population.

Materials and Methods

This was a descriptive cross-sectional study done in Medical Outpatient Department (OPD) of Combined Military Hospital (CMH) Quetta from 30th November 2018 to 30th May 2019. Approval was sought from Institutional Ethical Review Committee. Female patients of any age presenting with non-specific musculoskeletal symptoms in Medical OPD were included while those patients on treatment with vitamin D supplements, diagnosed cases of osteopenia, osteoporosis, chronic kidney disease (CKD), chronic liver disease (CLD), neuropathies, cancers, diabetes mellitus, iron and vitamin B_{12} deficiency, rheumatologic disorders such as rheumatic arthritis, osteoarthritis were excluded from the study.

The cases satisfying the selection criteria were selected from medical OPD by non-probability consecutive sampling. An informed verbal consent was obtained from every patient. Demographic data including gender, age and socioeconomic status was collected along with history of musculoskeletal symptoms such as muscular aches, bone pains, bone tenderness and present or old fractures. Blood samples were taken for serum vitamin D3, calcium, alkaline phosphatase, albumin and RA factors.

Data was analysed in SPSS-version 17. The mean age and mean vitamin D levels were calculated. The frequency of different symptoms such as bone pains and tenderness, fractures, muscle aches and weakness were calculated. The patients were divided into four groups according to vitamin D levels (severe, moderate, mild deficiency and optimal levels). Chi- square test was used to assess an association between symptoms and vitamin D deficiency.

Results

Among 150 patients the mean age was 37.20 $\pm$ 13.30 years with range of 18 to 80 years and the mean vitamin D levels were 14.89 $\pm$ 7.76 ng/ml with range from 3.10 to 35.67 ng/ml as shown in table no 1.

Table No 1: Mean values for age and vitamin D_3

Parameter	N	Mean + SD	Maximum	Minimum
Age (years)	150	37.20 $\pm$ 13.30	80	18
Vitamin D_3 levels(ng/ml)	150	14.89 $\pm$ 7.76	35.67	3.10

Out of 150 patients, 24%(n=36) had severe deficiency with Vitamin D_3 < 10 ng/ml, 54% (n=81) had moderate deficiency with Vitamin D_3< 20 ng/ml, 12% (n=18) had mild deficiency with Vitamin D_3 <30 ng/ml while only 10% (n=15) had optimal Vitamin D_3 levels. Among the study population 82% (n=123) had bone pains, 88.6 % (n=33) had muscle aches and weakness, 72.66% (n=109) had bone tenderness while only 4% (n=6) had fractures. Comparison of clinical features with vitamin D3 levels are shown in table no 2.

There was a statistically significant association between bone pain, bone tenderness and muscle aches and vitamin D_3deficiency with *p* value <0.001

Discussion

Nonspecific musculoskeletal symptoms such as muscle aches, bone pain and tenderness are a very

Table No 2: Comparison of vitamin D_3 deficiency level with clinical features

VIT D3 level	Bone pain	Muscle ache	Bone tenderness	Bone fracture	*P* value
Normal 10% (15)	46.7% (7)	53.3%(8)	13.3%(2)	6.7%(1)	<0.001
Insufficiency 12% (18)	50%(9)	72.2%(13)	27.8%(5)	5.6%(1)	<0.001
Deficiency 54% (81)	91.4%(74)	95.1%(77)	86.4%(70)	2.5%(2)	<0.001
Severe deficiency 24% (36)	91.7%(33)	97.2%(35)	88.9%(32)	5.6(2)	<0.001
Total 150	82%(123)	88.66%(133)	72.66%(109)	4%(6)	

common presentation in our OPDs especially in the older population and females. Vitamin D deficiency has become public health problem worldwide and this study showed that it affected female patients in all age groups. We found that 24% had severe and 54% had moderate deficiency of vitamin D3. The main reason for this deficiency could be decreased dietary intake or reduced exposure of female patients to UV light because of adherence of hijab in our society in low socio-economic patients and use of sun blocks in middle and high socioeconomic class. These findings are similar to other studies conducted in different regions.[11] In a study conducted by Manoharan A *et al* in India, 40.2% had deficiency, 31.3% had insufficiency and 28.5 had sufficient vitamin D levels.[12] Similarly another study showed vitamin D deficiency (<30 ng/ml) was present in 91.3% of patients, among them, 61.2% had severe deficiency with vitamin D level <20 ng/ml and only 8.7% of patients had sufficient levels of vitamin D.[13] Research conducted in Peshawar showed biochemical vitamin D deficiency was present in 80% of patients, with 21.5% having severe, 44% having moderate, and 14.5% having mild vitamin D deficiency.[14] Vitamin D deficiency presents as non-specific symptoms which has been depicted in various studies in past.[15,16,17] There were limitations in our study as we did not take BMI, number of pregnancies, lactating years and dietary intake into account. The study included only those patients who had symptoms, but not asymptomatic patients.

Various studies have been done in the past which have revealed that vitamin replacement results in considerable improvement in symptoms and quality of life in patients presenting with these nonspecific complaints.[18-21] Since vitamin D_3 assays are not widely available in remote areas, vitamin D replacement can be carried out empirically done in those patients who present with chronic non-specific muscle aches and pains. Randomized control trials should be done to compare the efficacy of this replacement with placebos in Pakistani population.

Conclusion

Vitamin D deficiency is a known cause of chronic nonspecific musculoskeletal symptoms in female population. The screening of all such patients for vitamin D deficiency should be standard practice and empirical vitamin D replacement can be done in areas where the vitamin D assays are not readily available.

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