Estimation Of Vitamin D Level And Its Effect On Bone Density In Systemic Sclerosis Patients

Thesis

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بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا الا ما علمتنا انك انت العليم الحكيم

صدق الله العظيم

(سورة البقرة ايه٣٢)

Abstract

Objectives and Aim of the work: The specific aim was to study the level of vitamin D in systemic sclerosis patients and to study its effect on bone density evaluated by DEXA.

Patients and Methods: 25 patients with systemic sclerosis and 25 healthy persons who served as control participated in this study. All patients and controls were subjected to full history taking, clinical examination, laboratory investigations (including serum 25 (OH) vitamin D) and radiological evaluation including DEXA.

Results: the frequency of vitamin D deficiency was highly statistically significant in systemic sclerosis patients (60%) when compared to controls (20%) (p value=0.018).

As regards the different positive DEXA findings,there was a highly significant difference between DEXA findings in SSc patients compared to controls (p value=0.000) (as it was found that 10/25 patients (40%) had osteoporosis, 9/25 patients (36%) had osteopenia and 6/25 patients (24%) had normal bone density while in controls there were only 2/25 persons (8%) who had osteopenia, the rest were normal.

Conculsion: systemic sclerosis patients had significantly higher vitamin D defenciecy when compared to control. A highly significant difference was found concerning DEXA findings of systemic sclerosis patients when compared to control.

Recommendations: We recommend that vitamin D level in all patients with autoimmune diseases especially systemic sclerosis should be evaluated, vitamin D and calcium supplementation should be given to systemic sclerosis patients.

Key words:

- Systemic sclerosis - Vitamin D -DEXA

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LIST OF ABBEVIATIONS

AI	Adequate intake
ACA	Anticentromere antibody
ACR	American College of Rheumatology
ALT	Alanine aminotransferase
ANA	Antinuclear antibody
AP	Antroposterior
ARA	American Rheumatism Association
AST	Aspartate aminotransferase
ATA	Antitopiosomerase antibody
BMC	Bone mineral content
BMD	Bone mineral density
BMI	Body mass index
BUA	Broadband ultrasound attenuation
CI	Confidence interval
CK	Creatine kinase
Crest	Calcinosis, Raynaud`s,esophagus dysmotility, sclerodactly and telangiectasia
CRP	C-reactive protein
CTD	Connective tissue disease
%CV	Percentage coefficient of variation
DAS	Disease activity score
DEXA	Dual energy X ray absorptiometry
DMARDs	Disease modifiying antirheumatic drugs
DM	Dermatomyositis
DNA	Deoxyribonucleic acid
DPA	Dual photon absorptiometry
DSSc	Diffuse systemic sclerosis
DXR	Digital xray radiogrammetry
ELISA	Enzyme linked immunosorbent assay
ERT	Estrogen replacement therapy
ESR	Erythocyte sedimentation rate
FDA	Food and Drug Administration
GIOP	Glucocorticoid induced osteoporosis
HAQ	Health assessment questionnaire score
HB	Haemoglobine

HCQ	Hydrochoroquine
HRT	Hormone replacement therapy
IBD	Inflammatory bowel disease
ICSSc	limited systemic sclerosis
IU	International unit
MCTD	Mixed connective tissue disease
μg	Microgram
MS	Multiple sclerosis
ng/ml	nanogram per millimeter
NFAT	Nuclear transcription factor AT
NF κB	Nuclear transcription factor kappa B
NHANES	National health and nutrition examination Survey
NSB	Non specific binding protein assay buffer
PABM	Peak adult bone mass
PAD	Peripheral artery disease
PLT	Platelets
PM	Polymyositis
QCT	Quantitative computed tomography
QUI	Quantitative ultrasound index
QUS	Qualitative ultrasound
RA	Rheumatoid arthritis
RNA	Ribonuclecic acid
SD	Standard deviation
SERMs	Selective estrogen receptor modulators
SEXA	Single energy x ray absorptiometry
SI	Stiffness index
SIOP	Steroids induced osteoporosis
SLE	Systemic lupus erythematosis
SOS	Speed of sound
SPA	Single photon absorpitometry
SPAP	Systolic pulmonary artery pressure
SS	Systemic sclerosis
TLC	Total lecocytic count
TMB	Tetramethylbenzidine
TRP	Transient receptor potential
UCTD	Undifferentiated connective tissue disease

US	Ultrasound
UV	Ultraviolet
VDBP	Vitamin D binding protein
VDR	Vitamin D receptor
W	Width at the scanned line
WHO	World Health Organization
1,25 $(OH)_2D$	1,25 dihydroxy vitamin D
25(OH)D	25 hydroxy vitamin D

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Introduction

Vitamin D is a steroid hormone that regulates calcium metabolism and bone homeostasis ***(Lips et al., 2006).***

It is widely recognized that vitamin D exerts important effects on many other systems, such as muscles, vasculature, reproduction, cellular growth and differentiation, malignancy, and the immune system. Vitamin D deficiency in adults can precipitate or exacerbate osteopenia and osteoporosis, cause osteomalacia and muscle weakness, and increase the risk of fracture ***(Holick, 2007).***

Identification of vitamin D receptor (VDR) in most tissues and cells, including peripheral blood mononuclear cells was an important discovery ***(Bhalla et al., 1983).***

The ability of several of these receptors to convert the primary circulating form, 25-hydroxy vitamin D, into the active form 1,25-dihydroxy vitamin D, has provided insights into the function of this vitamin ,particularly regarding its immunoregulatory effects. Vitamin D seems to be a physiological regulator of T cell development and VDR in Th(T helper) cells was identified ***(Takeuchi et al., 1998).***

Epidemiological evidence indicates a significant association between vitamin D deficiency and an increased incidence of several autoimmune diseases like multiple sclerosis (MS), insulin dependent diabetes mellitus (IDDM), inflammatory bowel disease (IBD), rheumatoid arthritis (RA), and systemic lupus erythematosus (SLE) ***(Kamen et al., 2006).***

On the other hand, increased vitamin D intake may have been associated with a decreased risk of IDDM, MS, and RA in the lowa Women`s Health study ***(Merlino et al., 2004).***

Low vitamin D levels have also been reported in patients with systemic sclerosis ***(Orbach et al., 2007).*** However no data are available on the relationship between a deficient vitamin D status and SSc disease activity and severity, nor on the clinical consequences that such deficiency might cause. Whether vitamin D could have a role in the complex pathogenesis of SSc remains unclear ***(Allanore et al., 2008).***

Aim of the work

This work is designed to study the level of vitamin D in systemic sclerosis patients and its effect on bone density by DEXA.

Vitamin D

Vitamin D is a group of fat-soluble secosteroids, the two major physiologically relevant forms of which are vitamin D_2 (ergocalciferol) and vitamin D_3 (cholecalciferol). Vitamin D without a subscript refers to either D_2 or D_3 or both.

Vitamin D is produced in the skin of vertebrates after exposure to ultraviolet B light from the sun or artificial sources, and occurs naturally in a small range of foods. In some countries staples such as milk, flour and margarine are artificially fortified with vitamin D, and it is also available as a supplement in pill form ***(Carlson and Costello, 1997).***

Vitamin D is carried in the bloodstream to the liver, where it is converted into the prohormone calcidiol. Circulating calcidiol may then be converted into calcitriol, the biologically active form of vitamin D, either in the kidneys or by monocyte-macrophages in the immune system. When synthesized by monocyte-macrophages, calcitriol acts locally as a cytokine, defending the body against microbial invaders ***(Adams et al., 2010).***

When synthesized in the kidneys, calcitriol circulates as a hormone, regulating, among other things, the concentration of calcium and phosphate in the bloodstream, promoting the