Evaluation of serum Vitamin D (25-OH)D in Egyptian Thyroid Dysfunction patients

Thesis

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1,25OH D	1, 25 di hydroxy vitamin D
24(R),25-$(OH)_2D_3$)	24,25-Dihydroxycholecalciferol
25 OH D	25 hydroxy vitamin D
AAP	American Association Of Pediatrics
AAD	American association of dermatology
ACEE	American Association of Clinical Endocrinologists
AI	Adequte Intake
AITDs	Autoimmune thyroid disease
ALK. Phos./Alp	Alkaline phosphatase
ALRI	Acute lower respiratory tract infection
ATDs	Anti thyroid drugs
BMD	Bone mass density
BUN	Blood urea nitrogen
BMT	bone metabolic turnover
BMI	Body mass index
bAlp	Bone alkaline phosphatase
CBC	Complete blood count
CMAJ	Canadian Medical Association Journal
c.albicans	Candida albicans
CTX	c-terminal cross-linking telopeptide type 1
DEXA	dual energy absorptiometry
D_2	Ergochalciferol
D_3	Cholecalciferol
Dpd	deoxypyridinoline
EIA	enzyme immunoassay
ELISA	Enzyme-linked immunosorbent assay
EMBASE	Elsevier bio medical database
FNB	Food and Nutrition Board(US)
FSG	Fasting serum glucose
FT3	Free triiodothyronine
FT4	Free thyroxine
GD	Grave's disease
g/sq cm	Gram /square centimeter(unit of BMD)

Hb%	Serum Haemoglobin percent
HTN	Hypertension
HT	Hashimoto thyroiditis
hMEC	Human microvascular endothelial cells
I ^{131}	Radioactive iodine 131
ICU	Intensive care unit
IOM	Institute Of Medicine (US)
IU/L	International unit /litre
IU	International Unit
c-Jun	c-Jun N-terminal kinase(one of JNKs)
JNK	Jun N-terminal kinases
Kg/m^2	Weight in Kilogram / length in meter squared
LBP	ligand binding pockets
LPS	(microbial)lipopolysaccharides
LRP5	lipoprotein receptor-related protein 5
L-thyroxine	Levothyroxine
LL37	Peptide of cathilicidin anti -microbial family
Mins	Minutes
MMI	Methimazole
mmol/l	milli mole /litre
mg/dl	milli gram /deciliter
mIU/L	Milli international unit / litre
NHANES	National Health and Nutrition Examination Survey(US)
NICE	National Institute for Health and Clinical Excellence(GB)
NIH	National Institute of Health(US)
NAMS	North American Menopause Society
NFkB	Nuclear factor kappa of B cells
Nmol/l	Nano mole per litre
Ng/dl	Nano gram /deciliter
Nm	Nanometer
OC	Osteocalcin
OPG	Osteoprotogenin
OSI	Calcaneo Osteo Sono assessment indices
p.aeruginosa	Pseudomonous aeruginosa
PTH	Parathormone hormone
P value	Probability value
Pg/ml	Picogram /milliliter

Pyd	resorption pyrinodoline
QUS	Quantitative Ultrasound
RANK L	Receptor activator of nuclear factor kappa-B ligand
RDA	Required daily allowance
ROS	Reactive oxygen species
SED	Sub erythemic dose
SD	Standard deviation
SGOT/AST	Serum glutamic oxaloacetic transaminase / /aspartate aminotransferase
SGPT/ALT	Serum Glutamic Pyruvate Transaminase / / Alanine transaminase
Sig .	Significance
SST	serum separating tube
TBII	Thyrotropin Binding-Inhibiting Immunoglobulins
TGI	Thyroid growth immunoglobulins
TNF α	Tumor necrosis factor alpha
TR alpha	Thyroid receptor alpha
TNG	Toxic nodular goitre
TSH	Thyroid Stimulating Hormone
TSHR	Thyroid Stimulating Hormone Receptor
TSHR Ab/TrAb	Thyroid Stimulating Hormone Receptor Antibody
TSI	Thyroid stimulating immunoglobulins
UVA	ULTRA-violet rays A
UVB	ULTRA-violet rays B
µg	Microgram
VDS	Vitamin D sterol
VDBP	Vitamin D binding protein
VDR	Vitamin D receptor
VEGF	Vascular endothelial growth factor
VEGF(Flk)	Fetal liver kinase 1 a receptor for VEGF
Wk	Week
Wnt	Wnt proteins family
Yrs.	Years
HS	Highly significant
S	Significant
NS	Non significant

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Introduction

Vitamin D_3 is a prohormone produced in skin through ultraviolet irradiation of 7-dehydrocholesterol. It is biologically inert and must be metabolized to 25-hydroxyvitamin D_3 in the liver and then to 1,25-dihydroxy vitamin D_3 in the kidney before function. The hormonal form of vitamin D_3, i.e., 1,25-dihydroxy vitamin D_3, acts through a nuclear receptor to carry out its many functions, including calcium absorption, phosphate absorption in the intestine, calcium mobilization in bone, and calcium reabsorption in the kidney **(Deluca , 2004)**. It also has several non-calcemic functions in the body as liver regeneration , myocardial contractility, vascular muscle tone and also hormone production ; like insulin, prolactin (**Shoback , 2007$_a$)** .Serum 25-hydroxyvitamin D_3 [25(OH)D_3] concentrations are currently recognized as the functional indicator for vitamin D status **(Heaney , 2004)** .

Vitamin D deficiency is common for many reasons mostly due to decreased time and/ or wrong method of exposure to sunlight which is the major factor of providing our recommended dose of vitamin D **(Holick , 2005)**. Other causes of vitamin D deficiency that may be common too, are low dietary intake, malabsorption diseases , chronic renal failure , nephrotic syndrome , severe liver disease, drugs like; anticonvulsants , glucocorticoids **(Shoback , 2007 $_b$)**.

In addition to its vital role in Ca & phosphate metabolism it affects many other systems so its deficiency is hazardous as there are associations between low 25(OH)D levels and peripheral vascular disease **(Melamed , et al., 2008)** . Also certain cancers, multiple sclerosis, rheumatoid arthritis, juvenile diabetes, are said

to be prevented or modified through manipulating vitamin D serum level **(Holick , 2004)** .

Parkinson's and Alzheimer's disease are being investigated too for their relation to vitamin D insufficiency/deficiency and which one is related more to vitamin D **(Evatt , et al., 2008).**

However these associations were found in observational studies and vitamin D supplements have not been demonstrated to reduce the risks of these diseases **(Pittas , et al., 2010).**

Overall, excess or deficiency in the calciferol system appear to cause abnormal functioning and premature aging **(McCann , 2007/ Keisala , et al., 2009/Tuohimaa , et al., 2009).**

In thyroid dysfunction patients; the high incidence of muscle pains (esp. proximal) and myopathies and bone metabolic disorders arise questions whether it is related to Ca metabolism or not and whether pathological alteration of vitamin D serum levels may be the underlying pathology. It has been noticed that 30-80% of individuals with hypothyroidism, manifest neuromuscular symptoms, depending on the severity of hypothyroidism. Muscle weakness is observed in one third of patients with hypothyroidism. Carpal tunnel syndrome-although not part of the myopathy- is a peripheral nerve dysfunction found in 15-30% of patients with hypothyroidism **(Cakir , et al., 2003).** On the other hand , Thyrotoxic myopathy is a well- known problem. It can sometimes be the first presentation of the underlying hyperthyroid state **(Victor and Ropper , 2005).**