Does vitamin D differ among the different thyroid states? A pilot study on Egyptian patients

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Introduction: Thyroid diseases have widespread systemic manifestations including their effect on musculoskeletal system. With the world epidemic of vitamin D deficiency, to investigate whether there is a relation between thyroid dysfunction and hypovitaminosis D might be beneficial.

Aim of Work: Evaluation of serum 25-OH Vitamin D in a sample of Egyptian subjects with different thyroid dysfunction states.

Subject and Method: Forty five (45) subjects (7 males and38 females) from outpatient clinic at Ain Shams University, participated in the study, they were divided into: Group 1: 15 Control subjects. Group 2: 15Hyperthyroid patients. Group 3: 15 Hypothyroidism patients of matching age and sex. All participants had thorough history taking with special emphasis on dietary habits, smoking, social status, housing condition, residence, occupation, sun exposure (30 minutes of sun exposure to the face and extremities), pattern of clothes, parity, menopause, physical activity, history of chronic illnesses. Drugs affecting vitamin D metabolism, Thyroid replacement therapy (regularity, dose, duration). General Physical examination and Measurements of:

- 25-hydroxy vitamin D level by ELISA.
- TSH, FreeT3, FreeT4 by ELISA.
- Serum Alkaline Phosphatase, serum Ionized Calcium, serum Phosphorus.
- Serum BUN, Creatinine, SGOT, SGPT and CBC were done.

Exclusion criteria: Thyroidectomy, Diabetes Mellitus, Chronic renal diseases, Chronic liver diseases, history of malignancies, CHF (congestive heart failure), Long term treatment with drugs that might affect vitamin D metabolism.

Results:

- There was no significant difference between the studied groups as regard age, gender, BMI, adequate sun exposure, pattern of clothes and dietary intake for vitamin D (P > 0.5).
- Serum ionized Ca was law in the 3 studied groups.
- All groups had low serum vitamin D, being deficient in the control group (25 ±15.78 nmol/L) (the lowest), and in the hypothyroid (28.46±8.51 nmol/L), and insufficient in the hyperthyroid subjects (42.88±20.02nmol/L), with significant difference between both hypo and hyperthyroid (P < 0.05), hyperthyroid and control (P < 0.05), but no difference between control and hypothyroidism (P > 0. 5)

Table (1): Comparison of the demographic characteristics of the 3 groups using either One way ANOVA test (qualitative data) and Chi Square test (quantitative data):

	Control Group (15)		Hyperthyroid Group (15)		Hypothyroid Group (15)		P	Sig.
	Mean	SD	Mean	SD	Mean	SD		
Age*	43.33	±12.98	38.63	±10.33	40.466	±11.08	0.525	NS
BMI* Kg/m²	26.733	±3.45	27.62	± 4.897	29.87	±4.47	0.135	NS
Gender M/F#	3:12		4:12		0:15		0.126	NS
Sufficient sun exposure (>30mins)#	60% (9/ 15)		50 % (8/16)		33.33 % (5/15)		0.815	NS

NS: non-significant, *Quantitave data compared by One way ANOVA test, #Qualitative data compared by Chi Square test.

Table (2): Comparison between 3 Groups regarding the types of clothes using Chi Square test:

Clothes		Control Group (15)	Hyperthyroid Group (16)	Hypothyroid Group (15)	Total	P value	Sig.
Usual clothing	Count	3	4	1	8	0.218	NS
	%	20%	25%	0.66%	17%		
Hejab	Count	12	12	12	36		
	%	80%	75%	80%*	78.2%		
Nekab	Count	0	0	2	2		
	%	0%	0%	1.3%	4.3%		

NS: non-significant

Table 3: Comparison between the 3 groups as regarding vitamin D related types of food intake done by one way ANOVA test:

Food	Control (15)		Hyperthyroid (15)		Hypothyroid (15)		P	Sig.
	Mean	±SD	Mean	±SD	Mean	±SD		
Sardines/salmon/tuna/wk (200g/serving)	0.767	±0.319	0.75	±0.316	0.8	±0.31	0.325	NS
Fish/wk (150g/serving)	0.933	±0.49	1.093	±0.58	1.33	±0.67	0.462	NS
Eggs/wk (1egg/serving)	4.8	±1.37	4.69	±1.13	4.33	±1.4	0.131	NS
Meat/wk (70g/serving)	5.07	±1.16	4.19	±0.98	4.133	±0.99	0.068	NS
Milk/wk (250ml/serving)	4.47	±1.35	3.75	±1.9	3.27	±1.7	0.223	NS
Cheese/wk (15g/serving)	6.333	±0.97	5.43	±1.15	5.533	±1.23	0.078	NS

NS: non-significant

TABLE 4: Comparison bone profile parameters between the 3 studied Groups using one way ANOVA test:

	Control (15)		Hyperthyroid (16)		Hypothyroid (15)		P	Sig.
	Mean	±SD	Mean	±SD	Mean	±SD		
Ionized Calcium (mg/dl)	3.78	±0.69	3.53	±0.64	3.45	±1.25	0.6	NS
Phosphorous (mg/dl)	3.69	±0.43	3.687	±0.4425	3.97	±1.44	0.6	NS
Alkaline phosphates (IU/L)	70.93	±13.97	77.81	±11.571	71.9	±15.28	0.3	NS

NS: non-significant

Table 5: Comparison of vitamin D and thyroid profile among the 3 studied groups using onaway ANOVA test:

	Control (15)		Hyperthyroid (15)		Hypothyroid (15)		P	Sig
	Mean	±SD	Mean	±SD	Mean	±SD		
VitD (nmol/L) N: 30 -75nmol/l	25	±15.78	42.88	±20.02	28.46	±8.51	0.006	S
TSH (mIU/L) N: 0.3 -6.2 mIU/L	1.396	±0.92	0.064	±0.131	6.112	±2.34	0.000	HS
FT3 (pg/ml) N: 1.4-4.2pg/ml	1.580	±0.517	4.828	±2.38	2.8	±1.194	0.000	HS
FT4 (ng/dl) N:0.8-2.0 ng/dl	1.100	±0.136	3.678	±2.86	1.142	±0.697	0.000	HS

HS: highly significant, S: significant, NS: non-significant

Expected values

- Deficiency : < 30nmol/ (or <12ng/ ml)
- Insufficiency : 30-75 Nmol/L (or 12-30ng/ ml)
- Sufficient : >75nmol/L (or > 30 Ng/ ml)
- Toxicity : >100nmol/L

1 ng/ml = 2.5 nmol/l
1 nmol/l = 0.4 ng/ml

Conclusion:

- Vitamin D was inadequate in both control and thyroid dysfunction subjects.
- Being lower in the control than thyroid dysfunction group groups decrease the role of participation of vitamin D in the musculoskeletal disorders associated with thyroid dysfunction.
- In addition, being lower in hypothyroid than hyperthyroid subjects significantly, decreases the role Vitamin D might play in the development of bone disorders associated with thyroid dysfunction namely thyrotoxic states.
- Assessment of vitamin D and replacement is most probably adjuvant in patient with thyroid disorder.

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