

Prevalence and of vitamin D deficiency and associated factors in Turkey

P-1163

Ilhan Satman¹, Nese Colak Ozbey¹, Harika Boztepe¹, Sibel Kalaca², Beyhan Omer³, Refik Tanakol¹, Sema Genc³, Faruk Alagol¹,
On behalf of the TURDEP-II Study Group. ¹Div. Endocrinology & Metabolism, Dept. Internal Medicine; ³Dept. Clinical Biochemistry,
Istanbul University Faculty of Medicine; ²Dept. Public Health, Marmara University Faculty of Medicine, Istanbul – Turkey.



Background

Enormous evidence suggests that vitamin D deficiency could be linked to several chronic diseases, including cardiovascular disease, diabetes, obesity, depression and cancer. Serum 25-hydroxyvitamin D (25[OH]D) is considered to be the best indicator of overall Vit-D status of an individual. 25(OH)D concentration provides the evaluation of Vit-D.

There is a debate regarding the optimal 25(OH)D level. WHO defined Vit-D insufficiency as 25(OH)D level <20 ng/mL in 2003 (1). There are studies reporting optimal 25(OH)D levels as near 30 ng/mL (2,3).

Objective

The purpose of this study was to examine the prevalence and correlates of vitamin D deficiency in adult Turkish population.

Materials & Methods

We used data from a population-based, cross-sectional ‘Turkish Diabetes, Hypertension, Obesity and Endocrine Disease Epidemiology Survey (TURDEP-II)’; including 9,560 adult Turkish people (mean [SD] age: 45.3 [15.4] yrs., 64% women). The study was conducted in 540 urban/rural centers from Jan to June 2010.

Serum 25(OH)D concentration was measured by HPLC (ClinRep, Germany), other parameters were measured by E170 autoanalyzer Roche, Germany.).

Serum levels of 25(OH)D according to demographic features and lifestyle factors in women and men are depicted in Table 1.

Vit.D deficiency was defined as 25(OH)D concentration ≤20 ng/mL (≤50 nmol/L).

The prevalence of vit.D deficiency was 93%, higher in women than in men.

Results

As it is illustrated in Figure 1, serum 25(OH)D was inversely correlated with PTH ($r=-0.122$, $p<0.001$).

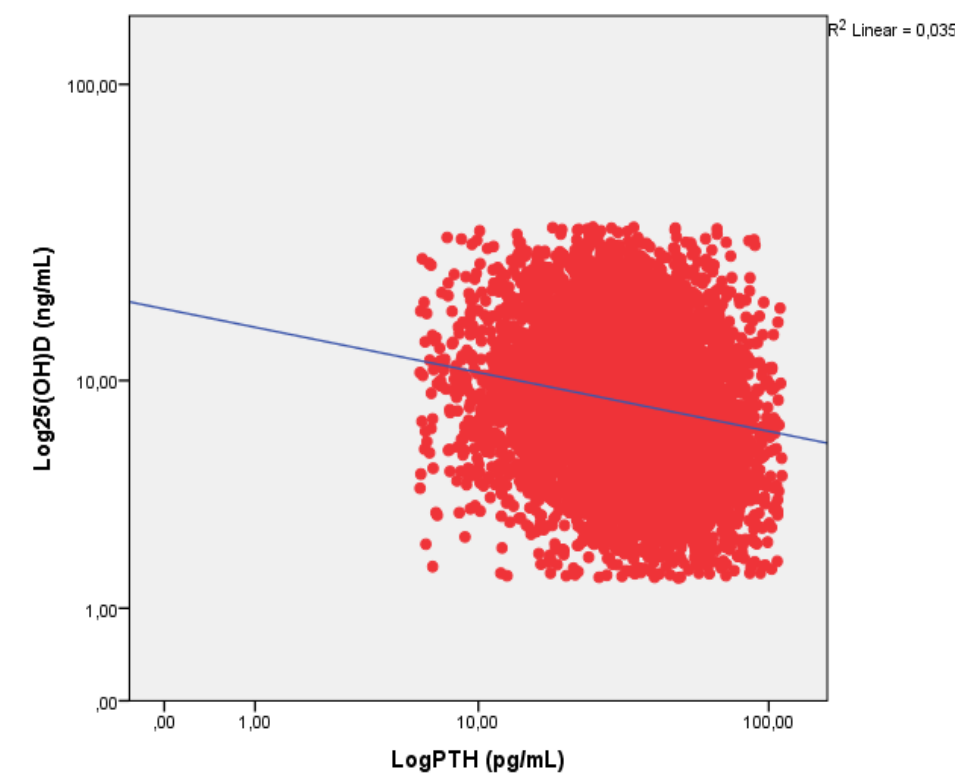


Fig. 1. Scatter plots of 25(OH)D and PTH

Distribution of 25(OH)D levels by age groups in (A) women and (B) men participants of the TURDEP-II is shown in Figure 2.

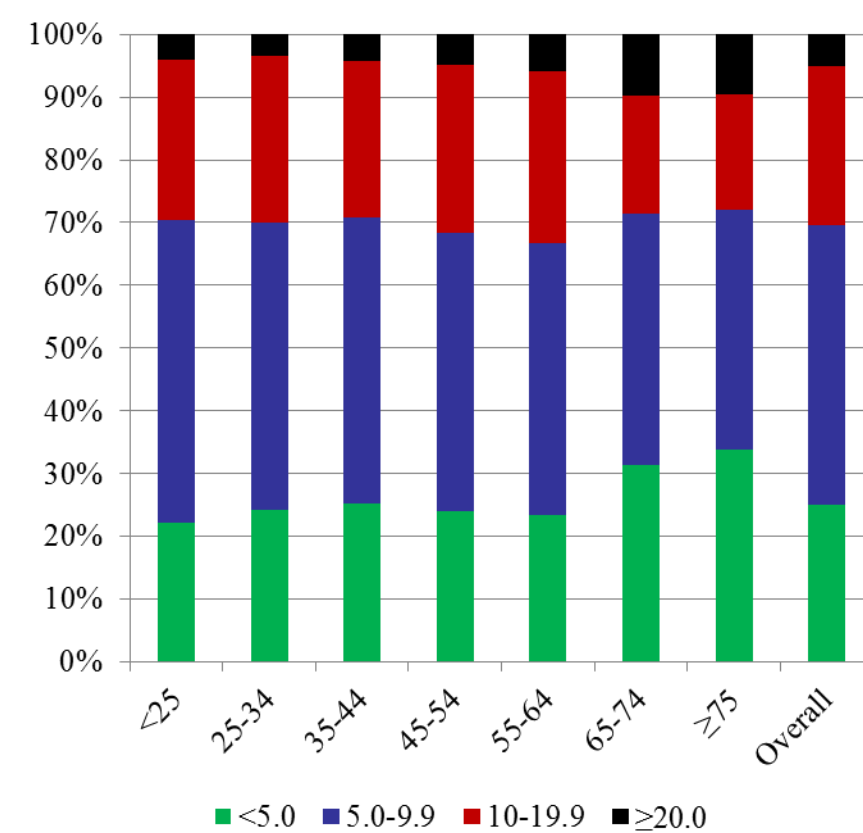


Fig. 2A. Women

Serum 25(OH)D levels (controlled for age, gender, region, living environment, BMI, waist, and season) correlated with fish, cheese, and sunflower oil consumption; serum creatinine, LDL-cholesterol, HDL-cholesterol, FT4, vit.B12, folates, IGF1, IGFBP3 and eGFR.

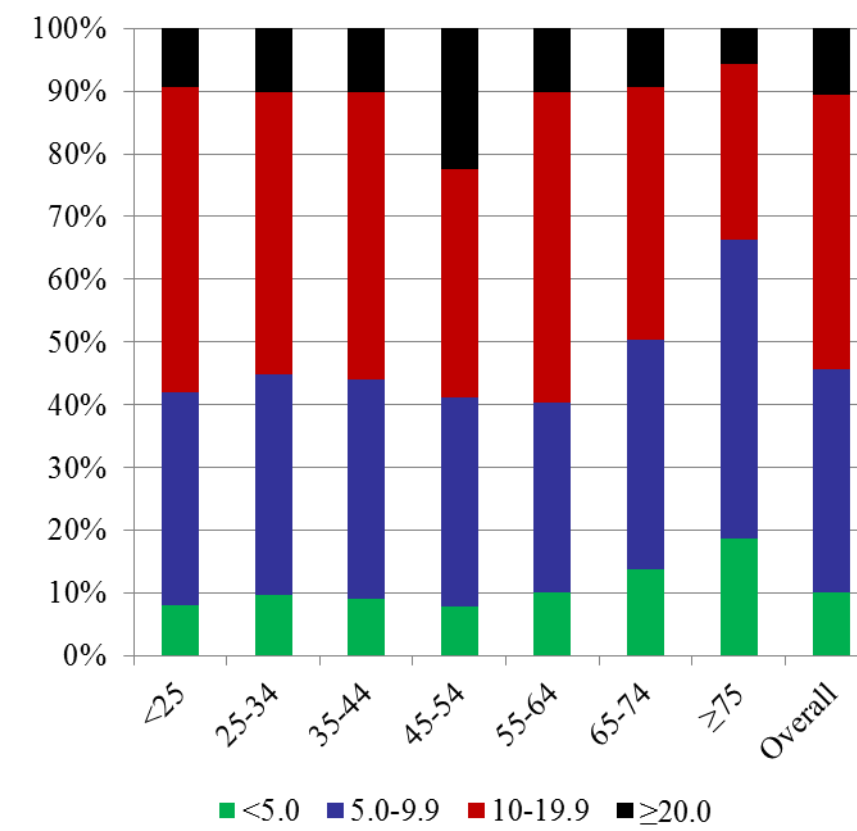


Fig. 2B. Men

Multiple logistic regression model with Z scores showed in Table 2. Accordingly, male gender, increase in total chol, HDL-cholesterol, and IGF1 positively associated; but eGFR (18.6 mL/min) and PTH (22.7 pg/mL) inversely associated with vitamin D (≥20 ng/mL).

Table 2. Variables associated with 25(OH)D >20 ng/mL

	B	Sig.	Exp(B)	95% CI for	
Gender (male vs. women)	,842	,000	2,321	1,757	3,067
T. chol (39.3 mg/dL)	,159	,023	1,172	1,022	1,344
IGF-1 (69 ng/mL)	,137	,048	1,147	1,001	1,314
eGFR-MDRD 18.6 mL/min 1.73 m ²	-,184	,011	,832	,723	,958
logPTH (22.7 pg/mL)	-,279	,000	,756	,669	,855

Variable(s) entered on step 1: Age, gender, BMI, FPG, 2hPG, Triglycerit, T. chol, HDL-cholesterol, anti-TPO, anti-TG, FT4, IGFBP3, eGFR-MDRD, logPTH, logInsulin, loghsCRP, TSH, IGF-1.

Discussion

The prevalence of Vit-D deficiency is common in the adult population of Turkey.

Lifestyle and general health factors are related with having reasonable 25(OH)D levels.

The impact of Vit-D deficiency on general health and on chronic disease management needs to be further evaluated.

Parameter	Women			Men			p between groups
	n	Mean (SD)	95% CI	n	Mean (SD)	95% CI	
BMI (kg/m²)							
Normal	1,544	9.1 (6.9)	8.8-9.5	962	12.0 (9.2)	11.4-12.5	W: p=0.050
Overwt	1,890	9.1 (7.2)	8.8-9.4	1,400	12.3 (7.2)	11.9-12.7	M: p=0.265
Obese	2,471	8.7 (6.5)	8.4-8.9	812	11.7 (7.0)	11.2-12.2	
WAIST (cm)							
Normal	1,094	8.8 (6.8)	8.4-9.2	1,176	12.0 (8.5)	11.5-12.5	W: p=0.011
Borderline	1,020	9.4 (6.9)	9.0-9.9	905	12.4 (7.5)	11.9-12.9	W: p=0.265
Obese	3,799	8.7 (6.4)	8.5-9.0	1,077	11.8 (7.3)	11.4-12.3	M: p=0.265
CARBOHYDRATE REGULATION							
Normal	3,085	9.0 (6.7)	8.7-9.2	1,898	12.1 (7.0)	11.8-12.4	W: p=0.057
PreDM	2,971	8.9 (7.0)	8.7-9.2	1,327	12.1 (8.5)	11.7-12.6	W: p=0.231
Diabetes	1,038	9.0 (6.9)	8.8-9.2	500	11.5 (7.4)	10.9-12.2	M: p=0.231
DAIRY CONSUMPTION (milk & yoghurt & cheese; serve per week)							
≤7	779	8,8 (7.8)	8.3-9.4	403	11,5 (6.6)	10.9-12.2	W: p=0.237
8-14	1058	9,4 (7.9)	8.9-9.9	554	11,8 (6.9)	11.3-12.5	W: p=0.180
≥15	1351	9,2 (6.8)	8.8-9.6	809	12,3 (8.8)	11.8-12.9	M: p=0.180
FISH INTAKE (serve per week)							
≤1	3128	8,8 (6.4)	8.6-9.1	1761	12,0 (6.9)	11.7-12.4	W: p<0.001
2-3	564	10,5 (7.4)	9.9-11.1	360	13,5 (10.7)	12.4-14.6	W: p<0.001
≥4	58	11,0 (7.4)	9.1-12.9	53	13,5 (6.7)	11.7-15.4	M: p=0.003
PHYSICAL ACTIVITY (leisure time & professional)							
Sedentary	5435	8,8 (6.7)	8.6-9.0	1759	11,6 (8.0)	11.2-11.9	W: p=0.083
Moderate	635	9,5 (7.6)	8.9-10.0	1261	12,5 (7.3)	12.2-12.9	W: p=0.002
Active	74	8,9 (5.0)	7.7-10.0	231	12,7 (7.6)	11.7-13.7	M: p=0.002
SMOKING							
Never	5215	8,7 (6.6)	8.6-8.9	1460	12,2 (8.7)	11.8-12.7	W: p<0.001
Quitter	582	9,4 (5.7)	8.9-9.9	950	11,2 (6.4)	10.8-11.6	W: p<0.001
Smoker	347	10,3 (10.6)	9.2-11.4	841	12,6 (7.4)	12.1-13.1	M: p<0.001
ALCOHOL USE							
Never	6022	8,9 (6.8)	8.7-9.0	2502	11,7 (7.5)	1.4-11.9	W: p<0.001
Quitter	29	10,0 (7.0)	7.3-12.7	197	13,3 (9.8)	11.9-14.7	W: p<0.001
Drinker	93	12,2 (6.5)	10.8-13.8	552	13,2 (7.7)	12.6-13.8	M: p<0.001
EDUCATION							
Illiterate	1526	8,5 (7.2)	8.2-8.9	153	10,1 (7.1)	8.9-11.3	W: p<0.001
Primary	3747	8,8 (6.4)	8.6-9.0	2070	12,2 (8.3)	11.9-12.6	W: p<0.001
High sch	521	9,3 (7.0)	8.7-9.9	607	12,2 (7.0)	11.7-12.8	M: p=0.003
University	350	10,9 (8.6)	10.0-11.8	421	11,4 (6.1)	10.8-12.0	
REPRODUCTIVE LIFE (women only)							
No parity	5,114	9,1 (7.2)	8.7-9.1	-	-	-	W: p=0.004
1-2 parity	1866	9,3 (6.0)	9.0-9.6	-	-	-	(for parity subgroups)
3-5 parity	2263	8,7 (6.9)	8.5-9.0	-	-	-	
≥6 parity	894	8,5 (7.7)	7.9-9.9	-	-	-	
SEASON (month)							
January	1,412	8,5 (5.7)	8.1-8.8	834	11,5 (8.3)	11.0-12.0	W: p<0.001
February	2,196	8,8 (6.8)	8.6-9.1	1,352	11,9 (7.3)	11.5-12.3	W: p<0.001
March	2,004	8,8 (7.2)	8.5-9.1	856	11,8 (7.1)	11.3-12.3	M: p<0.001
May-June	532	11,0 (7.7)	10.4-11.5	207	16,6 (9.2)	15.5-17.6	
LIVING ENVIRONMENT							
Urban	3,849	9,0 (7.4)	8.8-9.2	1,874	11,6 (8.2)	11.3-12.0	W: p=0.241
Rural	2,295	8,8 (5.8)	8.5-9.1	1,375	12,6 (7.1)	12.2-13.0	M: p<0.001
REGION							
North	1,048	9,8 (6.6)	9.4-10.2	596	13,5 (9.9)	12.9-14.2	W: p<0.001
South	1,645	9,0 (7.1)	8.7-9.4	962	12,4 (8.0)	11.9-12.8	W: p<0.001
West	1,190	8,5 (6.1)	8.1-8.9	675	11,2 (6.0)	10.6-11.7	M: p<0.001
East	1,202	8,2 (6.8)	7.8-8.6	472	10,9 (6.7)	10.2-11.6	M: p<0.001
Central	1,059	9,2 (7.3)	8.7-9.6	544	12,0 (7.8)	11.3-12.6	

References: 1. Sai AJ, et al. JCEM2011;96:E436-46; 2. Heaney RP. AJCN 2004;80:1706S-09S.; 3. Vieth R, et al. JCEM 2003;88:185-91; 4. Satman I, et al. EJEP 2013;28:169-80.