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A Crosssectional Study Of 25 Hydroxy Vitamin D And Parathroid *Hormone Status During Pregnancy In Ankara Turkey*

Ankara İlinde Gebelerde 25-Hidroksi Vitamin D ve Paratiroid Hormon Düzeylerinin Kesitsel İncelemesi

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ABSTRACT

Aim: Vitamin D deficiency is common during pregnancy. We aimed to assess the incidence of vitamin D deficiency and vitamin supplementation rates during pregnancy in a relatively large cohort of pregnant Turkish women.

Material and Methods: Pregnant women who admitted to the antenatal follow-up clinic between June and December 2013 fulfilled a survey which includes information about eating habits, lifestyleand vitamin supplementation. Blood samples were obtained to measure vitamin D and Parathyroid hormone levels from the pregnant who gave a written consent.

Results: A total of 1088 pregnant women were analyzed. Mean vitamin D concentration was 17.5±9.9 ng/mL and PTH was 18.7±11.4 pg/ml. Vitamin D deficiency (< 20 ng/ml) was observed in 693 (63.6 %) women. Five (0.45%) women received vitamin D supplementation alone, 71 (6.5 %) received multivitamins. Multi-nominal logistic regression analysis revealed that, summer season (OR: 92.7, 95% CI 36.4-236; p<0.01), vitamin supplementation (OR: 2.5, 95% CI 1.2-5.2; p=0.01) and sun exposure (OR: 6,4,95% CI 1.29-28.2; p=0,02) are protective.

Conclusion: Our results suggests that even with the seasonal changes, Vitamin D deficiency is a common health problem also in Turkey and a considerably few women get vitamin supplementation despite the national guidelines.

Keywords: Vitamin D deficiency, pregnancy, Turkey.

ÖZ

Amaç: Vitamin D eksikliği gebelikte sık görülür. Çalışmamızda geniş bir Türk gebe kohortu değerlendirildi, gebelik süresince D vitamini eksikliği insidansı ve vitamin desteği alma oranlarının saptanması amaçlandı.

Gereç ve Yöntemler: Haziran - Aralık 2013 tarihleri arasında hastanemiz gebelik izlem poliklinliğine başvuran ve gönüllü olan gebeler ile , yeme alışkanlıkları, yaşam tarzları ve vitamin takviyesi ile ilgili soruların yer aldığı bir anket gerçekleştirdi. Yazılı onamı alınan gebelerden D vitamini ve Paratiroid hormon düzeylerini ölçmek için kan örnekleri alındı.

Bulgular: Toplam 1088 gebe analiz edildi. Ortalama D vitamini düzeyi 17.5 ± 9.9 ng / mL ve PTH 18.7 ± 11.4 pg / ml idi. Vitamin D eksikliği (<20 ng / ml), 693 (% 63,6) gebede tespit edildi. Çalışmaya dahil edilen 5 gebenin (% 0.45) yalnızca D vitamini desteği aldığı, 71'inin (% 6.5) multivitamin desteği aldığı saptandı. Lojistik regresyon analizi sonuçlarına göre, yaz mevsiminde olmanın (OR: 92.7,% 95 CI 36.4-236; p <0.01), vitamin takviyesi almanın (OR: 2.5,% 95 CI 1.2-5.2; p = 0.01) ve güneşten yararlanmanın (OR:% 6,4,95 CI 1,29-28,2; p = 0,02) Vitamin D eksikliğinden koruyucu olduğu görülmüştür.

Sonuç: Sonuçlarımız, mevsimsel faklılıklar olabilmekle birlikte, D Vitamini eksikliğinin Türkiye'de de sık görülen bir sağlık sorunu olduğunu ve ulusal kılavuzlara rağmen oldukça az oranda gebenin vitamin desteği aldığını göstermektedir.

Anahtar Kelimeler: Vitamin D eksikliği, gebelik, Türkiye.

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INTRODUCTION

Vitamin D is an essential fat soluble vitamin-hormone like molecule and has multiple functions in different organs and tissues. Its impact on skeletal health is well known however non-classical actions such as promoting insulin action and secretion, immune modulation and lung development is being increasingly recognized(1,2). Adequate Vitamin D levels are particularly important for women who are pregnant, because mothers have to sustain their own vitamin D stores as well as those of their fetuses (3,4). A significant amount of research has shown a potential impact of vitamin D deficiency (VDD) in pregnant women on maternal, fetal and neonatal health (5). However, evidence is inconsistent depending on geographic and seasonal status, lifestyle and eating habits so need for regional data for each country is still remained.

Turkish Ministry of Health issued a circular on May 2011 about vitamin D supplementation in pregnant women. They recommended 1200 IU vitamin D to all women who were >12 week pregnant, 6 months during pregnancy and 6 months during lactation over 1 year (6). There is a little knowledge about the incidence of VDD during pregnancy and supplementation practices in Turkey as well as the implications of above mentioned circular. We aimed to define the prevalence of VDD, supplementation rates in Turkish pregnant women and to establish major risk factors leading vitamin D deficiency.

MATERIAL AND METHODS

This prospective study was conducted in a cohort of pregnant women who visited antenatal outpatient clinic in Zekai Tahir Burak Maternity Education and Research Hospital between June 2013 and December 2013. A survey form was prepared which includes following information:age, gestational week at admission, region,educational status, and socioeconomic status, number of children, monthly income, and daily consumption of diaries, sun exposure, clothing habits, and vitamin supplementation. Survey form was fulfilled by women at their regular clinic visit. Blood samples were collected to measure vitamin D and Parathyroid Hormone (PTH) levels from women who signed informed consent. Collected samples were analyzed separately later on as according to the season obtained. June-July and August stated summer, September, October, November and December grouped as Autumn-Winter season. Vitamin D concentrations were measured with LC-MS/MS (Liquid chromatography mass spectrometry) on Waters (Acquity UPLC and Quattro Premier XE Micromass spectrometry) and PTH with ECLIA electrochemiluminescenceimmunoassay oncobas E601 analyzer (Diagnostics GmbH, Mannheim, Germany). Vitamin D levels <20 ng/ml was defined as deficiency and <10 ng/ml was defined as severe deficiency.

Exclusion criterion was the presence of chronic renal, hepatic or any systemic diseases or treatment effecting Vitamin D metabolism. The study was approved by our institution's ethics committee.

SPSS® for Windows, software version 20.0 (IBM, Armonk, NY, USA) was used for data processing. The results are presented as means ± standard deviations or number and percentage. *T-test* for independent samples, chi-square test and Fisher exact test were used for nominal comparisons between groups. Pearson's correlation coefficient and Spearman test were used to determine the strength of correlation between vitamin D concentrations and other parameters. A multi-nominal logistic regression model was performed for predicting the risks for severe vitamin D deficiency. A *p* value of <0.05 was considered statistically significant.

RESULTS

A total of 1088 pregnant women were analyzed. Mean vitamin D concentration was 17.5±9.9 ng/mL and PTH was 18.7±11.4 pg/ml. Vitamin D deficiency was observed in 693 (63.6 %) women. Twenty five percent of them (n=273) suffered from severe deficiency. Five (0.45%) women received vitamin D supplementation alone, 71 (6.5 %) received multivitamins. The average age of women in the summer group was 26.5 ± 5 years, and in the autumn group 26.9 ± 5 years (P=0,184). The groups did not significantly differ in parity, about half of the women in each group being primiparous and the rest mostly delivering the second or third child. There were no statistically significant differences between the groups according to gestational age, eating habits (dairy products and milk derived food consumption), frequency of nutritional supplement use or sunbathing (Table 1). A significantly higher percentage of women in the summer group had more sun exposure according to wearing status.

The mean vitamin D concentration in the summer group was 20,4 ± 9 ng/mL, and in the autumn group 8,4 ± 6 ng/mL ($p < 0.01$) . When we divide and compare pregnant women according to vitamin D levels (group A <10 ng/mL, and group B >10 ng/ml), women who took nutrition supplements containing vitamin D (P=0,001), milk derived nutrition (cheese) more than average during pregnancy (P=0,037) had significantly higher vitamin D levels than those who did not. Multi-nominal logistic regression analysis revealed that, summer season (OR: 92.7, 95% CI 36.4-236; p<0.01), vitamin supplementation (OR: 2.5, 95% CI 1.2-5.2; p=0.01), cheese consumption (OR 1,2, 95% CI 1,01-1,6; p=0,038) and body sun exposure (OR: 6,4, 95% CI 1.29-28.2; p=0,02) were protective against vitamin D deficiency.

A significant inverse relationship was observed between vitamin D and PTH levels (r=-0.26, p<0.01).

Table 1: Demographic characteristics of the groups and the effect of season on vitamin D and Parathroid Hormone Levels.

	Summer n=840	Autumn n=248	P value
Age, years, ± SD	26,5 ± 5	26,9 ± 5	0,184
Gestational age, week, ± SD	21,8 ± 8	21,2 ± 9	0,344
House type, flat, n (%)	709 (84)	223 (89)	0,12
Primiparous,n (%)	353 (42)	110 (44)	0,917
Sun exposure, arms and legs, n(%)	416 (49)	34 (14)	0,000
Income level, less than 500 USD/month, n(%)	237 (27)	57 (22)	0,161
Education, primary school only, n (%)	488 (58)	151 (60)	0,494
Vitamin D levels, mean ± SD, ng/ml	20,4 ± 9	8,4 ± 6	0,0001
PTH levels, mean ± SD, ng/ml	17,6 ± 10	22,5 ± 12	0,001

DISCUSSION

We found that there was high prevalence of VDD and low rates of supplementation in pregnant women in Turkey. Furthermore a significant impact on Vitamin D levels was observed with seasonal differences, eating and wearing habits.

The incidence of severe VDD reported to be 18.2% - 45.9% and mean vitamin D levels differed between 4.97-14.8 ng/ml during pregnancy in some previous studies reported from Turkey(11-16). Most of these studies was conducted in a particular season or gestational week with small sample sizes. However in our study blood samples were collected in two different seasons and variable gestational weeks from a relatively large cohort of pregnant women. Yet the incidence of severe deficiency and the mean vitamin D levels in our study were quite comparable with the other reports. Associations of maternal VDD with pregnancy in developing countries were studied in a recent systematic review which includes three studies from Turkey and the prevalence of VDD was reported to be ranged from 51.3% to 100 %(17).

The World Health Organization/Food and Agriculture Organization of the United Nations (WHO/FAO) recommended nutrient intake (RNI) for vitamin D in pregnant women is 5 μg (200 IU) per day(18). Although in some developed countries routinely recommend vitamin D supplementation during pregnancy, guidelines vary considerably. Such as in United States, pregnant women are advised supplementation of 600 IU of vitamin D daily while Canadian guidelines recommend 2000 IU daily, especially in the winter (19,20). Despite the regulation issued by Turkish Ministry of Health about vitamin D supplementation during pregnancy, the number of women who received supplementation was expressively low in our study. Regarding the high prevalence of vitamin D deficiency, all Turkish pregnant women strictly must been couraged to get supplementation and take measures about their lifestyles such as increased sun exposure, healthy eating during pregnancy and lactation.

Our study has several limitations; we included consecutive healthy women who were admitted for routinely antenatal physical examination and the number of patients with different gestational age and we have no neonatal data to detect any correlations between pregnancy and neonatal complications and vitamin D levels. Additionally, the questionnaire about eating habits, nutritional supplement use and sun exposure during pregnancy is a subjective and not very precise method of determining the possible factors that could have influenced vitamin D values. However, even with this method we managed to detect a clear and statistically significant difference between the women who took vitamin D supplements and those who did not. We could compare eating, vitamin supplement and clothing habits and these were important and striking results of this study.

Turkish pregnant women are in high risk of having vitamin D deficiency, a strict supplementation policy is warranted concerning seasonal differences and lifestyle to improve both maternal and fetal health.

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