

Investigation of Serum Vitamin D Levels in Term Newborns and Their Mothers

ABSTRACT

Objective:

Vitamin D has effects on a large number of organs and systems, starting from the intrauterine period. Its severe deficiency during the neonatal and childhood period leads to a disease called the Rickets. Therefore, in this report we review the topic of Vitamin D deficiency among pregnant women and neonates, which we believe represents a significant public health issue.

Material and Method: In this study, we prospectively investigated healthy mothers, who gave birth vaginally or by cesarean section during the 37th to 42nd weeks of gestation and their term babies at the Duzce University Medical Faculty Hospital. We investigated the correlation between the serum vitamin D levels of the mother and the baby and the baby's percentiles, and the reflections of this deficiency on the babies from the mothers with vitamin D deficiency.

Results: Serum vitamin D levels of 45 mothers and 45 babies were investigated. The mean vitamin D level was 13.4 ng/mL among the participating mothers, among babies was 8.6 ng/mL. There was a statistically significant correlation between the vitamin D levels of the mothers and babies.

Conclusion:

If applicable, D vitamin level should be investigated in mothers prior to planning of pregnancy and treatment initiated in case of deficiency; if this is not applicable, vitamin D level should be evaluated as a routine control parameter during pregnancy. We believe that timely diagnosis and treatment of vitamin D deficiency of the mother could prevent potential vitamin D deficiency in the baby.

ÖZET

Amaç:

D vitamini intrauterin dönemden itibaren birçok organ ve sisteme etkisi bulunan bir vitamindir. Yenidoğan ve çocukluk döneminde ağır eksikliği riketse yol açar. Bu nedenlerle önemli bir halk sağlığı problemi olduğunu düşündüğümüz gebelerin ve yenidoğan bebeklerin D vitamini eksiklikleri konusunu inceledik.

Gereç ve Yöntem: Bu çalışmamızda Düzce Üniversitesi Tıp Fakültesi Araştırma ve Uygulama Hastanesi'nde, 38-42 gestasyon haftasında sezaryan veya normal doğumla doğum yapan, herhangi bir sağlık problemi olmayan anneler ve term bebekleri prospektif olarak incelendi. Annenin ve bebeğin serum vitamin D düzeyi ile bebeğin persantilleri arasındaki ilişki, D vitamini eksikliği olan annelerin bebeklerinde bu eksikliğin yansımaları araştırıldı.

Bulgular:

45'i anne ve 45'i bebek olmak üzere toplamda 90 hastanın serum D vitamini seviyeleri incelendi. Çalışmamıza katılan annelerin serum D vitamini düzeyleri ortalama 13,4 ng/ml iken bebeklerin 8,6 ng/ml idi. Annelerin D vitamini düzeyleri ile bebeklerin D vitamini düzeyleri arasında istatistiksel olarak anlamlı ilişki saptandı.

Sonuç: Annelerde D vitamini düzeyinin mümkünse gebelik planlanmadan önce incelenmesi ve eksiklik durumunda tedaviye başlanması, mümkün değilse gebelik sırasında rutin kontrol parametrelerinden biri olarak değerlendirilmesi gerekmektedir. Annelerin D vitamini eksikliğinin zamanında tanı alıp tedavi edilmesinin bebeklerde gelişebilecek D vitamini eksikliğini önleyebileceğini düşünmekteyiz.

Keywords: Vitamin D, pregnancy, cord blood, neonate.

Anahtar Kelimeler: D vitamini, gebelik, kord kanı, yenidoğan

Introduction

Vitamin D has been shown to affect the expression of more than 200 different genes. Deficiency has been associated with diabetes, various cancers, heart diseases, obesity, autoimmune diseases, hypertension and immunity (1).

The American Academy of Pediatrics recommended normal serum 25 (OH) D values for children to be ≥ 20 ng / ml. (Severe deficiency ≤ 5 ng / ml, deficiency 5.1 – 15.0 ng / ml, insufficiency 15.0-20.0 ng / ml) (2).

It is thought that vitamin D deficiency in the mother increases the risk of preeclampsia in the mother (3), may adversely affect brain development, head circumference, height growth in the fetus, may cause diseases such as enamel hypoplasia, infantile rickets, neonatal hypocalcemia and congenital cataract (4). In infants of pregnant mice with vitamin D deficiency, it has been reported that ventricular enlargement, decrease in neuronal growth factors, and decrease in gene activities that lead to neurotransmitter formation (5). Vitamin D insufficiency during pregnancy has been suggested to cause disorders in organogenesis and vitamin D intake during pregnancy has been recommended (6,7).

The simplest way to prevent vitamin D deficiency is for mothers and babies to see enough sun. This period is at least 15 minutes between 10: 00-15: 00, when at least 6% of their bodies are directly exposed to the sun (8,9). In studies conducted in our country, the incidence of vitamin D deficiency and nutritional rickets was found to be between 1.67-19% in different regions (8). Since 2005, the Ministry of Health has started providing free vitamin D supplementation to children under one year of age at a dose of 400 IU / day (10). After one year of age, children who can benefit from sunlight can reach adequate vitamin D levels. Likewise, a circular issued by the Ministry of Health in 2011 established a program to provide vitamin D support to pregnant women and nursing mothers. According to this program, 1200 IU (9 drops) vitamin D was recommended to be taken as a single daily dose from the 12th week of pregnancy to the end of the 6th month after birth (11).

Materials and Methods

In this study, we prospectively investigated healthy mothers, who gave birth vaginally or by cesarean section during the 37th to 42nd weeks of gestation and their term babies at the Duzce University Medical faculty Hospital. We investigated the correlation between the serum vitamin D levels of the mother and the baby and the baby's percentiles, and the reflections of this deficiency on the babies from the mothers with vitamin D deficiency. Conducting a survey, we questioned the mothers' educational status, age, socioeconomic level, occupation, features of the house they live in, nutritional behaviors, presence or absence of additional disorders and use of medication, use of multivitamins, presence of previous vitamin D deficiency diagnosis, duration of daily sun exposure, use of sun protection creams, and the history of headwear use. This study was conducted with the approval of Duzce University Clinical Research Ethics Committee. Written informed consent was obtained from patients who participated in the study.

Results

Serum vitamin D levels of 45 mothers and 45 babies were investigated. Based on the recommendations of the American Pediatrics Academy, a value ≤ 15 ng/mL was considered to represent vitamin D deficiency while a value of 15.0 – 20.0 ng/mL indicated insufficiency with normal values being accepted as 20 – 100 ng/mL.

The mean vitamin D level was 13.4 ng/mL among the participating mothers. While only 8 mothers (17.8%) had a normal vitamin D level, 32 mothers (71.1%) had deficiency and 5 mothers (11.1%) had insufficiency.

The mean vitamin D level of the participating babies was 8.6 ng/mL. While there were no babies with a normal vitamin D level, 39 babies (86.7%) had deficiency and 6 babies had (13.3%) insufficiency.

There were no cases of Rickets or hypervitaminosis. No significant correlation was found between vitamin D levels and infants' weight, height and head circumference percentiles. Significant relationship was found between whether mothers used protective cream when going to the sun and vitamin D levels of mothers and babies ($p = 0.039^*$, $p = 0.003^*$). There was a statistically significant correlation between the vitamin D levels of the mothers and babies ($p < 0.001^*$). (Table-1) This result indicates that one of the major causes of the vitamin D deficiency in neonates is the vitamin D deficiency in the mothers.

Table-1: Vitamin D levels of the mothers and babies

		Vitamin D Level of Babies (ng/dl)			p
		<15.0	15.1-20.0	>20.0	
Vitamin D Level of Mothers (ng/dl)	<15.0	32(100.0)	0(0.0)	0(0.0)	<0.001
	15.1-20.0	5(100.0)	0(0.0)	0(0.0)	
	>20.0	2(25.0)	6(75.0)	0(0.0)	

Conclusion

The USA Endocrine Community has set a target value of 30 ng / ml for serum vitamin D levels during pregnancy. To achieve this goal, it is suggested that mothers should take 1500-2000 IU vitamin D supplements per day (12).

In a study conducted in Canada on 307 pregnant women and their babies, it was found that every 40 IU vitamin D taken by the mothers caused an 11 g increase in the birth weight of the baby (13). In a study conducted in Australia, the birth weight of babies born to mothers with vitamin D deficiency was found to be 200 g lower than other babies (14). In our study, no significant difference was found between the vitamin D levels of the mothers and the weight, height, head circumference percentiles of the mothers.

If applicable, D vitamin level should be investigated in mothers prior to planning of pregnancy and treatment initiated in case of deficiency; if this is not applicable, vitamin D level should be evaluated as a routine control parameter during pregnancy. We believe that timely diagnosis and treatment of vitamin D deficiency of the mother could prevent potential vitamin D deficiency in the baby. However, none of the mothers who participated in our study received this support. When asked why they did not use vitamin D during pregnancy, it was learned that they do not have information about this subject.

The simplest way of preventing vitamin D deficiency is adequate exposure of the mother and the baby to the sun. We believe that the mothers, who do not expose themselves to the sun adequately, also do not get their babies out in the sun, causing an increase in the risk of vitamin D deficiency. With respect to prevention of vitamin D deficiency, it would be beneficial to inform mothers on the benefits of the sunlight, and explain them when and how to get their babies out in the sun.

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