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The effects of multivitamin use during pregnancy on birth weight

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Abstract

Objective: In Turkey, multivitamin supplements are prescribed to pregnant women from all socioeconomic levels. In our study, we aimed to determine the effects of multivitamin and antianemic use on birth weight.

Methods: A total of 595 pregnant women who were fulfilling inclusion criteria among those who delivered term single baby were included in our study. Types and period of use of multivitamins and period of antianemic use within first 24 hours after delivery by puerperant women included in the study were investigated. The demographics, delivery and newborn information of patients were accessed through patient files.

Results: In our study, the mean age of pregnant women was 26.9±5 and mean hematocrit value of all cases was 35.68±3.7. Mean periods of antianemic and multivitamin use were 16.45±10.5 and 14.18±10.8, respectively. Mean weight gained by cases during pregnancy was 12.9±5.3 kg and mean birth weight was 3400±440 g. There was a statistically significant difference between the mean birth weight (3435 g) of those who received multivitamin during pregnancy (n=326) and the mean birth weight (3358 g) of those who did not receive (n=266). Also, no statistically significant difference was found between the mean birth weight (3418 g) of those who received antianemics (n=461) and the mean birth weight (3338 g) of those who did not receive (n=131). Birth weight and period of multivitamin use, and the weight gained by mother during pregnancy and maternal BMI were associated with a positive correlation. No statistically significant correlation was found between birth weight and maternal hematocrit value before delivery and period of antianemic use.

Conclusion: In our study, fetal birth weight in pregnant women who used multivitamin during pregnancy is 77 g higher. Although this difference is statistically significant, the correlation is poor. However, we found no relationship between antianemic use and birth weight.

Keywords: Birth weight, multivitamin supplement, pregnancy.

Özet: Gebelikte multivitamin kullanımının doğum ağırlığına etkisi

Amaç: Ülkemizde yaygın olarak her kesimden gebeye multivitamin takviyesi reçete edilmektedir. Biz de çalışmamızda multivitamin ve antianemik kullanımının doğum ağırlığına etkisini saptamayı amaçladık.

Yöntem: Çalışmamıza term doğum yapan tekil gebelerden çalışmaya dahil edilme kriterlerine uyan 595 gebe dahil edildi. Çalışmaya dahil edilen lohusaların, doğumdan sonra ilk 24 saat içinde gebelikte kullandıkları multivitamin çeşidi, kullanım süresi, antianemik kullanımı ve süresi sorgulandı. Hastaların demografik bilgileri, doğum bilgileri ve yenidoğan bilgilerine ise hasta dosyalarından ulaşıldı.

Bulgular: Çalışmamızdaki gebelerin ortalama yaşı 26.9±5 ve tüm olguların ortalama hematokrit değeri 35.68±3.7 idi. Ortalama antianemik ve multivitamin kullanım süreleri sırasıyla 16.45±10.5 ve 14.18±10.8 hafta olarak saptandı. Olguların gebelik boyunca ortalama aldıkları kilo 12.9±5.3 kg, ortalama doğum ağırlığı ise 3400±440 g idi. Gebeliğinde multivitamin kullananların (n=326) ortalama doğum ağırlığı (3435 g) ile kullanmayanların (n=266) ortalama doğum ağırlığı (3358 g) arasında istatistiksel olarak anlamlı farklılık mevcuttu. Ancak antianemik kullananların (n=461) ortalama doğum kilosu (3418 g) ile kullanmayanların (n=131) ortalama doğum kilosu (3338 g) arasında istatistiksel olarak anlamlı farklılık saptanmadı. Doğum ağırlığı ile multivitamin kullanım süresi, annenin gebelikte aldığı kilo ve anne VKİ ilişkili saptanmış olup pozitif korelasyon mevcuttu. Doğum ağırlığı ile annenin doğumdan önceki hematokrit değeri ve kullanılan antianemik süreleri arasında istatistiksel olarak anlamlı bir ilişki saptanmadı.

Sonuç: Çalışmamızda, gebelik boyunca multivitamin kullanan gebelerde fetal doğum ağırlığı 77 g daha fazladır. Bu fark istatistiksel olarak anlamlı olsa da zayıf ilişki bulunmuştur. Ancak antianemik kullanımı ile doğum ağırlığı arasında bir ilişki gösterilememiştir.

Anahtar sözcükler: Doğum ağırlığı, gebelik, multivitamin desteği.

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Introduction

In general, nutritional status of women who eat three meals a day consuming vegetable, fruit, cereal products, foods low in fat and protein is considered sufficient. Additional daily calorie intake requirement during pregnancy is 340 kcal in second trimester and 452 kcal in third trimester. Pregestational weight and weight gain during pregnancy affect fetal weight and gestational period. Underweight women who cannot gain sufficient weight during pregnancy have the risks of delivering low-weight fetus and preterm labor. The supplementation on the diet and nutrition during pregnancy is considered beneficial for women with nutritional deficiency. In countries with low income levels, macronutrient and micronutrient supplements in pregnant women are considered to have a positive effect on gestational outcomes and early childhood outcomes. However, this relationship is complex and controversial. Multivitamin supplement is recommended for pregnant women who have high risk for nutritional deficiency, those with multiple pregnancy, heavy smokers, adolescents, full vegetarians, and those with lactase deficiency. In well-nourished pregnant women, micronutrient supplement is not considered to have a certain effect on gestational period and birth weight.[1,2]

Periconceptional folic acid supplement is recommended to prevent neural tube defects. During preconceptional period and first trimester, daily intake of 0.4–0.8 mg folic acid is recommended. It is recommended for pregnant women in high-risk group to increase the dose and take 4 mg daily. Full calcium and iron stores are important for bones and erythrocyte development. Iron supplement during pregnancy decreases maternal anemia in delivery. However, the effects of iron supplement on the delivery outcomes of pregnant women, who are not anemic and nourished well, are unclear. Low or high levels of iodine may cause fetal goiter. High dose of vitamin A (10,000 IU) during pregnancy is teratogenetic.[3]

In Turkey, multivitamin supplements are prescribed to pregnant women from all socioeconomic levels. In our study, we aimed to determine the effects of multivitamin and antianemic use on birth weight.

Methods

A total of 595 pregnant women, who were fulfilling inclusion criteria among those who delivered term single baby at Zeynep Kamil Maternity and Pediatrics Training and Research Hospital, were included in the study. The cases with multiple pregnancies, those who have high-risk pregnancies such as chronic diseases, structural/chromosomal anomalies, intrauterine growth retardation, gestational diabetes and preeclampsia, and the cases smoking and consuming alcohol were excluded from the study.

Types and period of use of multivitamins and period of antianemic use within first 24 hours after delivery by puerperant women included in the study were investigated. The demographics, delivery and newborn information of patients were accessed through patient files.

SPSS 22.0 (Statistical Package for the Social Sciences; SPSS Inc., Chicago, IL, USA) was used for the statistical analyses. When evaluating the study data, Spearman correlation analysis, independent samples t test and Kolmogorov-Smirnov test as well as definitive statistical methods (mean, standard deviation) were used. Significance was considered at $p<0.01$ and $p<0.05$ levels.

Results

In our study, the mean age of pregnant women was 26.9±5 years, mean gravida was 2, the period between two pregnancies was 2.4±3 years and mean body mass index (BMI) was 29.29±4. Mean hematocrit value of all cases was 35.68±3.7 (**Table 1**). Mean periods of antianemic and multivitamin use were 16.45±10.5 and 14.18±10.8, respectively. The weight gained by the cases during pregnancy was found 12.9±5.3 kg.

Mean birth weight was 3400±440 g. The difference between the mean birth weight (3435±430 g) of those who received multivitamin during pregnancy (n=326) and the mean birth weight (3358±450 g) of those who did not receive (n=266) was 77 g and it was statistically sig-

Table 1. Demographic variables.

	Mean	Minimum	Maximum	SD
Age (year)	26.98	16.00	44.00	5.61
Gravida	2.16	1.00	9.00	1.38
Period between two pregnancies (year)	2.42	.00	19.00	3.36
BMI (kg/m^2)	29.29	17.60	52.40	4.45
Birth weight (g)	3400	2000	4720	440.62
Maternal Htc	34.68	21.00	45.70	3.79
Antianemic period (week	16.45	.00	40.00	10.56
Multivitamin period (week)	14.18	.00	39.00	10.87

BMI: Body mass index, **Htc:** Hematocrit, **SD:** Standard deviation

nificant (p=0.035). However, the correlation was poor. The difference between the mean birth weight (3418±435 g) of those who received antianemics during pregnancy (n=461) and the mean birth weight (3338±454 g) of those who did not receive (n=131) was 80 g and it was not statistically significant (p=0.066) (**Table 2**).

There was a positive correlation between birth weight and the period of multivitamin use, and between weight gained by mother during pregnancy and maternal BMI (rs=0.108, p=0.029; rs=0.057, p=0.172; rs=0.223, p<0.01).

No statistically significant correlation was found between birth weight and maternal hematocrit value before delivery and period of antianemic use (rs=0.077, p=0.062; rs=0.310, p=0.533).

Discussion

While routine multivitamin supplement is not recommended generally, clinicians prescribe prenatal vitamin in order to compensate potential dietary deficiencies. The micronutrient need during pregnancy increases depending on the physiological changes.[4,5] Common nutritional deficiency during pregnancy depends on various demographic characteristics such as young maternal age, low income and low educational level.[4] Maternal nutritional status at pregestational and early gestational periods decreases poor gestational outcomes such as birth defects, premature labor and low birth weight. Improving pregestational nutritional status affects neonatal and pediatric outcomes positively.[6]

Insufficient maternal micronutrient level is associated with premature labor, low-birth-weight delivery, increased perinatal mortality, small head circumference, neural tube defect and anemia in newborn. In order to prevent these conditions, World Health Organization recommends 60 mg elementary iron and 400 µg folic acid daily. Jabbari et al. showed in their study that iron supplement during pregnancy increased heights and weights of newborns and the birth weights and heights of newborns of mothers who received iron sulfate more than 120 mg daily were higher than those of the mothers who did not receive iron supplement. Also, they showed that multivitamin supplement had no effect on birth weight or height.[7] In our study, however, we found that the birth weight in pregnant women who received multivitamin was 77 g higher and this difference is statistically significant. Also, we found 80 g difference in the mean birth weights of women who received antianemics during pregnancy compared to those who did not receive, but this difference was not statistically significant.

Preconceptional multivitamin supplement decreases the incidence of neural tube defect; however, no significant effect was observed on gestational outcomes.[8] Andrew et al. showed in their study that periconceptional multivitamin supplement decreased the rate of neural tube defect, but had no significant effect on gestational outcomes. However, they reported that it may decrease monozygotic twin pregnancy, extremity anomaly, congenital pyloric stenosis and some heart diseases.[8] Greenberg et al. reported in their study that folic acid use during conceptional period decreased neural tube defect as well as the risk for premature labor and congenital heart diseases.[9]

Janet et al. found that regular multivitamin use just before conceptional period decreases premature labor risk in overweight pregnant women and similarly, it decreases low-birth-weight deliveries independent from BMI.[10]

Multivitamin use 6 weeks before and after conception decreases preeclampsia incidence, growth retardation and premature labor incidence. However, it is considered that regular periconceptional multivitamin use slightly increases the risk of early fetal death (<20 weeks) but regular use after conception decreases late fetal loss risk.[11]

Table 2. Relationship between vitamin use and birth weight.

	Antianemic use	N	Mean	SD	p*
Birth weight (g)	Yes	461	3418.65	435.47	0.066
	No	131	3338.39	454.44	
	Multivitamin use	**N**	**Mean**	**SD**	**p***
Birth weight (g)	Yes	326	3435.27	430.20	0.035
	No	266	3358.75	450.28	

*Independent samples t test. **SD:** Standard deviation

It is taught that regular multivitamin use by pregnant women in developed countries has no effect on birth weight and multivitamin use at third trimester increases premature labor risk. Yet, multivitamin supplement is recommended to women with pregnancy potential in some developed countries such as the USA. Alwan et al. showed in their study that daily intake of multivitamin-mineral during any period of pregnancy has no effect on low birth weight. On the other hand, they showed that multivitamin mineral supplement at third trimester is 3 times more associated with premature labor. It was also reported that the relationship is more distinct in primiparous women.[12] Some studies reported that antioxidant vitamin supplements such as vitamins C and E may have a negative effect on the gestational outcomes of pregnant women who receive sufficient micronutrient in their diets. Smedts et al. showed in their study that periconceptional vitamin E supplement increases the risk of congenital heart diseases for 9 times in pregnant women who receive high amount of vitamin E with their diet.[13] Another study reported that vitamins C and E supplement is associated with increased EMR risk.[14] In the meta-analysis performed, vitamins C and E supplement has no positive effect on maternal and neonatal outcomes and increases gestational hypertension risk in pregnant with preeclampsia risk.[15] In the study carried out, multivitamin and mineral supplement at third trimester is associated with premature labor risk but not associated with birth weight. In the light of these results, Alwan et al. at least recommends to prescribe multivitamin-mineral supplement carefully to pregnant women, who have no micronutrient deficiency, especially in the last periods of pregnancy.[12]

It was shown that multivitamin supplement for HIV-negative pregnant women in Tanzania increased gestational weight gain and that the increased gestational weight gain increased the newborn birth weight.[16]

Hashemipour et al. demonstrated in their study that vitamin D supplement in pregnant women with vitamin D deficiency increased the height, weight and head circumference of newborn.[17]

In their study, Ozturk et al. reported that there was no statistically significant difference in terms of birth weight and obstetric outcomes between pregnant women who have and do not have B12 deficiency. They showed that maternal B12 deficiency had no effect on birth weight and week of gestation.[18]

Conclusion

In our study, fetal birth weight in pregnant women who used multivitamin during pregnancy is 77 g higher. Although this difference is statistically significant, the correlation is poor. However, we found no relationship between antianemic use and birth weight. Birth weight and period of multivitamin use, and the weight gained by mother during pregnancy and maternal BMI were associated with a positive correlation. However, no statistically significant correlation was found between birth weight and maternal hematocrit value before delivery and period of antianemic use. Pregnant women without chronic disease who keep a balanced diet are not recommended using multivitamin supplement during pregnancy.

Conflicts of Interest: No conflicts declared.

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