



The Effects of Pregnant Obesity in Newborn

Yeni Doğanlarda Hamile Obezitesinin Etkileri

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Abstract

Aim: In the present study it was aimed to evaluate the correlation between Body Mass Index (BMI) of pregnant women and the anthropometric measures of their newborn babies.

Materials and Methods: BMI of four hundred pregnant women who were followed up in Beykoz district between January 2011 and June 2020 and the records of the height, weight and head circumference measurements of their babies were retrospectively analyzed. During the follow-up, the study group consisted from pregnant women with a Body Mass Index (BMI) of 30 and above, and the control group among the pregnant women with a Body Mass Index (BMI) of <30. Both groups were compared in terms of neonatal outcomes

Results: A total of 347 pregnant women were included in the study. When birth weights of newborns of obese pregnant subjects and non-obese pregnant controls were compared; It was observed that babies of obese pregnant women were significantly heavier than non-obese (3424.63±510.46 vs 3105.45±397.07; p<0.001). Height and head circumference of the newborns were similar in both groups (49.54±2.46 vs 49.68±2.66 p = 0.840 and 34.71±1.85 vs 34.65±2.05 p=0.735, respectively).

Conclusion: It was shown in our study that obesity, which is an important health problem in pregnant women, also affects the newborn weight.

Keywords: Pregnancy, obesity, body mass index, newborn

Öz

Amaç: Bu çalışmada gebelerin Beden Kitle İndeksi (BKİ) ile yeni doğan bebeklerinin antropometrik ölçümleri arasındaki ilişkinin değerlendirilmesi amaçlanmıştır.

Materyal ve Metot: Araştırmamızda Ocak 2011 ve Haziran 2020 tarihleri arasında Beykoz İlçesinde takip edilmiş ve doğum yapmış gebelerin, Beden Kitle İndeksleri (BKİ) ile bebeklerinin boy, kilo ve baş çevresi ölçümlerine ait kayıtlar retrospektif olarak incelendi. İzlemler sırasında Beden Kitle İndeksi (BKİ) 30 ve üzerinde olan gebelerden (Obez) çalışma grubu, aynı tarih aralığında izlenmiş BKİ<30 olan gebelerden (Non-obez) ise kontrol grubu oluşturuldu. Her iki grup neonatal sonuçlar açısından karşılaştırıldı.

Bulgular: Toplam 347 gebe çalışmaya dahil edildi. Obez gebeler ile non-obez gebelerin bebeklerinin doğum ağırlıkları karşılaştırıldığında; obez gebelerin bebeklerinin non-obezlere kıyasla anlamlı oranda daha ağır oldukları gözlemlendi (3424.63±510.46 vs 3105.45±397.07;p<0.001). Yenidoğanların boy ve baş çevreleri ise her iki grupta benzer bulundu (sırasıyla 49.54±2.46 vs 49.68±2.66; p=0,840 ve 34.71±1.85 vs 34.65±2.05 p=0,735).

Sonuç: Gebelerde önemli bir sağlık problemi olan obezitenin, yenidoğanların doğum ağırlıklarını etkilediği çalışmamızda gösterilmiştir.

Anahtar kelimeler: Gebelik, obezite, vücut kitle indeksi, yenidoğan

INTRODUCTION

Obesity in pregnancy is defined as Body Mass Index (BMI) ≥ 30 according to the World Health Organization (WHO) criteria (1).

Keeping the Body Mass Index at a certain level during pregnancy significantly prevents the early and late complications of the pregnancy processes and the similar complications that may occur in newborns. Approximately

30-40 percent of adult women living in industrialized countries have obesity problems.

Obesity is a health problem that affects the daily routine practices and the quality of life is significantly impaired in obese women (2). Similar to the global trend, in our country the obesity rate is increasing also among women of reproductive age and pregnant women. Maternal obesity can cause serious short- and long-term complications for

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both the mother and the newborn.

Weight gain during pregnancy is a considerable issue. It is closely related to the health of the mother and the newborn from the beginning to the end of pregnancy. As women get older, more women become pregnant while they're overweight or obese. Excess weight gain during pregnancy is associated with increased birth weight of the newborns and inability to lose weight postpartum. Recommendations regarding weight gain during pregnancy aim the best outcome of pregnancy for the mother and the newborn.

MATERIAL AND METHOD

In our study, BMI of 347 pregnant women who were followed up and gave birth in Beykoz District between January 2011 and June 2020, and the records of the height, weight and head circumference measurements of the newborns were analyzed retrospectively. The study group consisted of pregnant women with BMI>30 and above during the follow-ups and the control group was pregnant women with BMI <30 who were followed up within the same period. Both groups were compared in terms of neonatal outcomes.

Mothers who gave birth at term and their newborns were included in the study.

Those who gave birth below 37 weeks (premature births) and those with multiple pregnancies were not included in the study.

The data were analyzed using the SPSS 25.0 package program. The distribution of the data was evaluated with the Kolmogorov Smirnov test. In addition to descriptive statistical methods (mean, standard deviation, frequency), Chi-Square test was used for parametric data. The results were evaluated at 95% confidence interval and 5% significance level.

RESULTS

A total of 347 pregnant women were included in the study.

The mean age of the pregnant women in the study group was 27.50±5.08 (17-44) years. 34.5% of the women were in the age group of 24 years and below, 31.7% were in the age group of 25-29 years and 33.7% were in the age group of 30 years and over. 43.5% of the participants had primary education or below, 89.9% did not work in any income-generating job, and 60.5% described their income as medium (Table 1).

There was no significant difference between the obese and non-obese groups in terms of weight gain during pregnancy regardless of duration of pregnancy ($p=0.703$ and $p=0.615$) (Table 2).

Table 1. Distribution of Pregnant subjects by Socio-Demographical Characteristics

Socio-Demographical Characteristics	Number (n=347)	%
Age		
≤ 24 years	120	34.5
25- 29 years	110	31.7
≥ 30 years	117	33.7
Education status		
Primary school and below	151	43.5
Middle School	60	17.2
High school	110	31.7
University	26	7.49
Working status		
Working	35	10.1
Not working	312	89.9
Family income status		
High	113	32.5
Middle	210	60.5
Low	24	6.91

Table 2. Comparison of weight gain and duration of gestational period during pregnancy

Weight gain during pregnancy	Obese (n=52)		Non-obese (n=295)		P value*
	n	%	n	%	
Weight gain<9kg	15	28.8	136	46.1	0.703
Weight gain 9-14kg	26	50.0	77	26.1	
Weight gain >9kg	11	21.2	82	27.8	
Gestation period	Obese (n=52)		Non-obese (n=295)		P value*
	n	%	n	%	
Gestation period<39 weeks	21	40.4	91	30.9	0.615
Gestation period≥39 weeks	31	59.6	204	69.1	

*Fisher Exact Test

HbA1c levels were statistically significantly higher in obese pregnant women ($p < 0.001$).

Total cholesterol and LDL levels in obese pregnant subjects were significantly lower than in non-obese pregnant controls ($p = 0.020$ and $p = 0.002$) (Table 3).

The mean birth weight of the babies born to mothers

in the study group was $3424.6(\pm 510.46)$ gr, and for the control group mean birth weight of the babies was $3105.45(\pm 397.07)$ gr ($p < 0.001$). When the head circumferences, heights, laboratory values and delivery types of the babies of both groups were compared, no significant difference was found (Table 4).

Table 3. Comparison of Laboratory Characteristics of the Groups

Laboratory Parameters	Obese (n=80)	Non-Obese (n=80)	P-value*
Glucose ($\mu\text{mol/L}$)	84.89 \pm 10.12	85.50 \pm 11.86	.726
HbA1C	4.91 \pm 0.38	4.26 \pm 0.32	<.001
Total Cholesterol	266.78 \pm 44.63	203.44 \pm 44.16	.020
HDL	61.19 \pm 12.84	64.74 \pm 11.85	.071
LDL	203.44 \pm 44.16	135.05 \pm 34.03	.002
VLDL	51.43 \pm 19.57	46.46 \pm 15.48	.077
Triglyceride	257.15 \pm 97.86	232.27 \pm 77.41	.077
Hemoglobin	12.25 \pm 1.36	12.22 \pm 1.27	.905
Platelets	224.58 \pm 60.71	215.63 \pm 65.92	.373

*Independent T-Test

Table 4. Comparison of the Newborns' Characteristics

	Obese (n=52)	Non-Obese (n=295)	P-value*
Newborn Birth Weight (Kg)	3424.63 \pm 510.46	3105.45 \pm 397.07	<.001
Newborn Head Circumference (cm)	34.71 \pm 1.85	34.65 \pm 2.05	0.735
Newborn Height (Cm)	49.54 \pm 2.46	49.68 \pm 2.66	0.840
Neonatal Hemoglobin	11.2 \pm 3.24	11.6 \pm 2.54	0.540
Mode of delivery	Normal vaginal delivery	21 (40.3%)	194 (65.7%)
	Caesarean	31 (59.6%)	101 (34.2%)
Gender of the newborns	Female	25 (48.0%)	145 (49.1%)
	Male	27 (51.9%)	150 (50.8%)

*Independent T Test * *Fisher Exact Test

DISCUSSION

In our study, the prevalence of obesity in pregnant women was found to be 15.0%. In a retrospective study of 1038 people, the prevalence of obesity was 2.9%, (1). In the study of İrge et al. conducted on 202 pregnant women living in the city center of Malatya province, the rate of overweight and obese women was 27.2% (2). In their retrospective study Aydın et al. found the prevalence of obesity as 13.3%, in gynecology and obstetrics clinic of İzmir Atatürk Training and Research Hospital (3). In a study conducted with pregnant women who applied to the Erciyes University Medical Faculty Hospital gynecology and obstetrics clinic, Gürel et al. found that prevalence of obesity before the pregnancy as 13.6% (4). In their study, Taşdemir et al. determined that 47.3% of pregnant women were obese and the remaining 52.6% were non-obese before delivery (5).

In the study of Driul et al., the prevalence of obesity before

pregnancy was 5.5% (6), in the study of Baeten et al. 10.1% (7), in the study of Khashan and Kenny obesity was 16.9% and morbid obesity was 1.85% (8). In the study of 349 pregnant women done by Ugwuja et al. obesity was 17.2% and morbid obesity was 5.4% (9), in a study conducted with pregnant women in England in 2006 the prevalence was 18.5%, and in the study of Susan et al. in New York and other 26 states, it varied between 13.9% and 28.9% (10). In a study by Hull et al., which examined the effects of maternal body weight on newborns, it was found that 46% of pregnant women were normal weight and 54% were obese (11). In their study, Sewel et al. also found the prevalence of obesity in pregnant women to be 38.9% (12). When these results are evaluated, it is suggested that prevalence of obesity in pregnant women may vary according to the selected sample, lifestyle and demographic characteristics of the individuals in the sample.

In the Obesity and Physical Activity guide of The Turkish

Ministry of Health at least 30 minutes of daily exercise is recommended (13). ACOG supports exercise if there are no obstetric and medical complications during pregnancy (Evidence A) (ACOG, 2015). Walking is an appropriate form of exercise for many women. In addition, swimming, physical exercises and water exercises may easily be done during pregnancy (14).

In the studies of Jain et al. and Glaser et al., it was observed that the risk of giving birth to a macrosomic baby, GDM and stillbirth risks decreased in women who lost weight between two deliveries (15,16). In our country, in a study investigating whether women receive recommendations according to the 2009 IOM guideline about weight gain during pregnancy, it was stated that approximately half of the women talked about weight gain in the prenatal period during their pregnancy follow up, but only one out of every five women received the right weight gain recommendations that is in line with this guideline. Appropriate prenatal weight gain charts (Prenatal Weight Gain Grid), which are widely used in many countries, should be used to ensure appropriate weight gain during pregnancy (17).

In our study, it was determined that the newborns of obese pregnant subjects were more overweight than the newborns of those who are non-obese. However, no significant difference was observed in terms of head circumference and height. Taşdemir et al. also found the rate of LGA newborns to be 22% in obese pregnant women and 7% in non-obese pregnant women (5). Leddy et al. also reported that the newborns of women who are obese during pregnancy are also at risk of becoming obese (18). Larsen et al. and Hull et al. in their study conducted in a USA cohort also found that obese pregnant women had larger babies (19). This relationship was similarly observed in European cohorts. For example, in Austria, Kirchengast and Hartmann found a positive relationship between BMI before the pregnancy and birth weight of the newborns (20). In the Swedish sample, Rossner and Ohlin found that maternal weight gain and initial maternal body weight were positively associated with infant birth weight (21). As a result, it is observed that there is a positive relationship between maternal obesity and birth weight of newborns in different cohorts.

In the literature, it is suggested that maternal obesity is associated with abnormal fetal growth. Heavier women are less likely to have a small for gestational age infant or a pregnancy complicated by intrauterine growth retardation, but this protective effect disappears when maternal BMI reaches the obesity level ($>30 \text{ kg/m}^2$). The most important concern in obese pregnant women is fetal macrosomia, which is defined as an estimated fetal weight of 4500g or more and it seems to increase 2 to 3 times in obese pregnant women (22). Beyond that, it is stated that there is a direct correlation between maternal obesity and fetal macrosomia. In a meta-analysis study conducted on this subject, the prevalence of fetal macrosomia was 8.3% for the control group with normal weight compared to 13.3% and 4.6% for obese and morbidly obese women,

respectively (23). Moreover, there are several studies in which results have been obtained that fetal macrosomia in obese women is not only associated with an increase in the absolute size of the fetus, but also with a change in body composition (24). Sewell et al. (31) found that newborns of mothers with a normal body mass index ($<25 \text{ kg/m}^2$) had an average fat mass (334 g and body fat composition 9.7%) (25). The average fat mass of the newborns of women with $\text{BMI} > 25 \text{ kg/m}^2$ was 416 g, and the body fat composition was 11.6%. It is stated that a large part of this effect is a result of weight gain during pregnancy.

In our study, it was observed that there was no relationship between the size of the baby (height and head circumference) and maternal obesity. In the literature, Hull et al. found that the newborns of obese pregnant women were 1.1cm shorter on average than the newborns of non-obese pregnant women in their study conducted in a USA cohort (11). In our study, although there was no significant difference, the newborns of pregnant women with normal maternal body weight were found to be taller (mean 0.14cm). Depending on our study, we may suggest that maternal obesity does not have an effect on newborn height and head circumference.

CONCLUSION

Overall, it is considered that it will be beneficial for obese pregnant women to gain an appropriate weight within a program starting from the prenatal period, and in this context, it is important to have an adequate and balanced diet during pregnancy.

Family Health Centers (FHCs) have an important role in preventive medicine in regulating diet and preventing obesity in pregnant women.

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Conflict of Interest: The authors declare that they have no competing interest.

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