

# Maternal Body Mass Index and the Course of the Labor

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**OBJECTIVE:** To examine the effect of body mass index(BMI) on the progress of the labor and maternal, fetal outcome with preceding a normal pregnancy.

**STUDY DESIGN:** A total of 96 women admitted to delivery ward with an uncomplicated pregnancy were included in this prospective study. After calculation of body mass index (BMI), patients were divided to groups as normal weight ( $20.0 \leq \text{BMI} < 24.9$ ), overweight ( $25.0 \leq \text{BMI} < 29.9$ ) and obese ( $30.0 \leq \text{BMI}$ ). The incidence of labor complications, requirement of oxytocin augmentation, cesarean delivery and neonatal outcomes were assessed.

**RESULTS:** There was no differences between groups in the frequency of occurrence of dysfunctional labor patterns, induced labor and primary cesarean section. The increase in average weight gain during pregnancy ( $p=0.053$ ) and fetal birth weight ( $p=0.013$ ) was observed in the obese group. Perinatal outcome was not different among groups.

**CONCLUSION:** Obese women with an uncomplicated pregnancy is not at significant risk for labor complications and adverse perinatal outcome.

**Key Words:** Body mass index, Labor, Obesity, Pregnancy.

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## Introduction

Obesity has long been reported to have adverse effects on the health and well-being of a pregnant woman and her fetus.

Many reports have shown, obese pregnant women are at increased risk for certain complications during pregnancy such as hypertension, diabetes mellitus, thromboembolic disorders, prolonged pregnancy<sup>1-3</sup> and adverse perinatal outcome.<sup>4-6</sup> However, the effects of obesity on labor complications are not extensively investigated and disagreement persists about this subject. While some authors have failed to demonstrate an adverse effect of obesity on labor,<sup>7,8</sup> the others have found an increase in intraoperative complications.<sup>3,9-12</sup> However, most of these investigations have consisted of preceding complicated pregnancies.

This study was performed to examine the effects of body mass index on the progress of labor and neonatal outcome with uncomplicated pregnancies.

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## Material and Method

A prospective trial was carried out at Zekai Tahir Burak Women's Health Education and Research Hospital, Department of Obstetrics and Gynecology. Ethical approval was obtained from the Educational Planning Committee and informed consent was given by all patients. On admission for delivery, maternal characteristics including demographic factors, prior medical obstetric history were recorded.

Women with previous cesarean sections, multiple gestations, preterm labor and any registered complication in actual pregnancy, i.e. diabetes mellitus, hypertension, plasental pathologies, intrauterin growth retardation were excluded. Pre-pregnancy weight was self-reported. Each participant's weight and height were determined on admission to the delivery ward and body mass index (BMI) was calculated by the use of the following equation:

$$\text{Body mass index (kg/m}^2\text{)} = \frac{\text{Weight in kilograms}}{[\text{Height in meters}]^2}$$

Based on the WHO classification, we characterized women as underweight ( $\text{BMI} < 20.0 \text{ kg/m}^2$ ), normal weight ( $\text{BMI}$  between 20.0 and 24.9  $\text{kg/m}^2$ ), overweight ( $\text{BMI}$  between 25.0 and 29.9  $\text{kg/m}^2$ ) and obese ( $\text{BMI} \geq 30.0 \text{ kg/m}^2$ ).

Gestational age was recorded according to the last menstrual period and was confirmed by previous ultrasound records.

Maternal outcomes were assessed for the mode of delivery, the incidence of obstructed labor, postpartum hemorrhage and necessity of labor augmentation with oxytocin. The criteria for the diagnosis of dysfunctional labor patterns (prolonged latent phase, protracted active phase and prolonged second stage) are based on according to Friedman.<sup>13</sup>

Neonatal outcomes included mean infant birth weight, the incidence of Apgar score  $\leq 3$  at minute-one and  $\leq 7$  at minute-five and neonatal death.

Statistical analysis was calculated with Statistics Package for Social Sciences for Windows, version 14.0. Differences in variables were assessed by Chi-square-test for categorical datas or by One-way Anova test for continuous datas. A p value of  $<0.05$  was considered statistically significant.

## Results

The study population consisted of 96 women with term pregnancy. Of these, 26 (27.08%) were normal weight, 53 (55.20%) were overweight and 17 (17.70 %) were obese. In study population, there was not underweight woman.

Maternal characteristics of all weight subgroups are presented in Table 1. The groups were not significantly different, with regard to maternal age, gravidity and gestational age at delivery, but in the obese group, average weight gain during

pregnancy was much more than the normal weight and overweight groups, at the border of the statistical difference ( $15.2 \pm 7.8$  kg versus  $11.0 \pm 4.7$  kg and  $11.9 \pm 5.3$  kg respectively;  $p=0.053$ ).

There was no difference between the groups in the frequency of use of oxytocin for labor augmentation and the rate of cesarean section (Table 2). There was no difference between the groups in the frequency of dysfunctional labor patterns. In normal weight group, one prolonged latent phase, four prolonged active phase and one protracted second phase were experienced. In overweight group, four prolonged latent phase, ten prolonged active phase and one protracted second phase were observed. In obese group, one prolonged latent phase and two protracted second phase were determined.

Maternal and fetal outcomes are presented in Table 3. Obese women, gave birth to heavier babies than the normal weight and overweight groups. ( $3.642 \pm 427$  gr versus  $3.262 \pm 426$  gr and  $3.360 \pm 399$  gr respectively;  $p=0.013$ )

Neonatal outcome was equally good in all groups. There was no severely asphyxiated baby in this study. There was only one case of perinatal mortality and this was due to neural tube defect. Of the complications associated with delivery; shoulder dystocia and severe postpartum hemorrhage were not observed in this study.

Table 1: Characteristics of groups

Weight category

	20.0≤BMI<24.9 n:26	25.0≤BMI<29.9 n:53	30.0≤ BMI n:17	p-value
Age (years)	24.51±3.01 <sup>a</sup>	24.7±1.01	27.1±3.02	NS
Parity (n) <sup>b</sup>	17	36	7	NS
Nulliparous	9	17	10	
Multiparous				
Gestational age (weeks)	39.32±2.01	40.0±3.02	39.14±2.85	NS
Weight gain (kg)	11.0±4.7	11.9±5.3	15.2±7.8*	0.053

<sup>a</sup>:Values given are mean±SD(One-way Anova test). <sup>b</sup>: Categorical datas were assessed by Chi-square test. \* $p=0.053$

Table 2: Comparison of groups for the rate of induced labor and cesarean section

Weight category

	20.0≤BMI<24.9 n:26	25.0≤BMI<29.9 n:53	30.0≤ BMI n:17	p-value
Oxytocin augmentation				
latent phase (n,%)	2 (7.69%)	13 (24.52%)	4 (23.52%)	NS
active phase (n,%)	17 (65.38%)	32 (60.37%)	10 (58.82%)	NS
Cesarean section(n,%)	4 (15.38%)	8 (15.09%)	2 (11.76%)	NS

Statistical method: Chi-square test.

Table 3: Maternal and fetal outcomes

Weight category

	20.0≤BMI<24.9 n:26	25.0≤BMI<29.9 n:53	30.0≤ BMI n:17
Birth weight (g)	3.262±426 <sup>a</sup>	3.360±399	3.642±427**
Vaginal laceration, third degree (n)	-	1	-
Low apgar score (n)	1	2	1
Perinatal mortality (n)	-	1	-

<sup>a</sup>: values given are means±SD. (One-way Anova test). \*p= 0.013

## Discussion

It has been well known that, obese women are at increased risk for some complications during the pregnancy. In most investigations, increased risk of adverse perinatal outcome among obese women has been attributed to pregnancy complications such as pregnancy-induced hypertension, gestational diabetes and varicose veins.<sup>1-3,5,8</sup> In addition, many clinicians believe that, labor abnormalities are seen more commonly in obese women.<sup>3,9-12</sup> But much less attention has been drawn to the influence of obesity on delivery.

In some previous studies, there were significant increases in the incidence of prolongation of first and second stage of labor, requirement for oxytocin stimulation, primary cesarean delivery among the obese patients.<sup>3,4,9,11,12,14,15</sup> It has been stated that obese women may be refractory to labor because of a relatively narrow bony pelvis or increased amounts of soft tissue deposits and additionally due to dilution effect, obese women may have tendency to weaker contractions.<sup>3,14,16,17</sup> Also, Zhang et al. showed that there was an increase in the rate of cesarean section for delay in the first stage of labor in overweight and obese women.<sup>11</sup> They have suggested that high cholesterol levels in obese women may affect the effectiveness of uterine contractions in labor. In these reports, study groups were consist of preceding risk factors such as hypertension and diabetes.

Jensen et al. examined the influence of BMI on the incidence of labor complications in a population of women with a normal pregnancy and they found that significantly more women with primary and secondary inertia in the obese group and labor augmentation was much more common.<sup>17</sup> But, they have determined that BMI are only weak predictor of perinatal morbidity and mortality.

On the otherhand, Kiran et al. reported that an increased risk of postdates, induction of labor, cesarean section, macrosomia and shoulder dystosia in the group of obese women with otherwise normal pregnancies.<sup>18</sup> They stated that, an increased BMI increases the need for obstetric interventions and consequent morbidity in mother and baby.

In this study, we didn't found an increase in the incidence of obstructed labor, primary cesarean delivery and requirement for oxytocin stimulation. Also, no increase in perinatal mortality was found. We have suggested that, in the previous studies, the increased incidence of oxytocin augmentation of labor and operative delivery might be related to the higher incidence of medical problems.

We confirm the findings of some other investigators that the frequency of labor abnormalities and perinatal mortality was not different in the obese group, also some of them were with medical complications.<sup>7,8</sup>

In conclusion, obesity with an uncomplicated pregnancy, is not a major risk factor for labor progress and perinatal mortality. But obese patient should be aware of the specific complications during antepartum period..They should be screened for carbohydrate tolerance and careful serial blood pressure measurements should be taken. Also careful attention should also be paid to measurement of estimated fetal birth weight with ultrasound examination.

We suggest that, obesity is the one of the most important preventable risk factors for adverse maternal and fetal outcome. After a uncomplicated pregnancy overweight women can be delivered with a less risk for labor abnormalities and fetal morbidity and mortality than it was previously considered.

## Vücut Kitle İndeksinin Doğum Eylemine Etkisi

**AMAÇ:** Komplikasyonsuz gebeliği olanlarda; vücut kitle indeksinin, doğum eylemine, maternal ve fetal sonuçlara etkisini araştırmak

**GEREÇ VE YÖNTEM:** Gebelikleri sorunsuz seyreden ve hastanemizin Doğum Ünitesine başvuran toplam 96 kişi bu prospektif çalışmaya dahil edildi Gebeler, Vücut Kitle İndekslerine göre normal kilolu(20≤BMI<24,9), fazla kilolu (25≤BMI <29,9) ve obez (30≤BMI) olmak üzere 3 gruba ayrıldı. Doğum eyleminin fazlarında uzama, oksitosin ihtiyacı, sezaryen oranı, maternal ve fetal sonuçlar açısından gruplar karşılaştırıldı.

**BULGULAR:** Doğum eylemi patolojileri, oksitosin gereksinimi,

sezaryen oranı ve perinatal sonuçlar açısından gruplar arasında farklılık saptanmadı. Obez grupta, gebelikte ortalama kilo alımı ( $p=0,053$ ) ve ortalama fetal doğum ağırlığı ( $p=0,013$ ) daha yüksek bulundu.

**SONUÇ:** Sorunsuz gebelik seyri olanlarda, obezite, doğum eyleminin seyrinde ve perinatal- maternal sonuçlarda belirgin risk faktörü oluşturmamaktadır.

**Anahtar Kelimeler:** Vücut kitle indeksi, Doğum eylemi, Obezite, Gebelik.

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