

ORIGINAL PAPER

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Pregestational obesity and birth alterations

Obesidad pregestacional y alteraciones del parto

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ABSTRACT

Objective: To establish the association between pregestational obesity and the risk of birth alterations. **Design:** Retrospective cohort study. **Institution:** Hospital Central "Dr. Urquinaona", Maracaibo, Venezuela. **Methods:** Obstetric outcome of patients according to pregestational mass index -obese (group A), overweight (group B), and normal weight (group C)- attended between January and December 2021. **Main study measures:** Duration of pregnancy and duration, type and alterations of delivery. **Results:** A total of 2,250 deliveries were attended during the study period, of which 226 pregnant women were selected for analysis. The majority of the pregnant women (60.5%) were assigned to group A, 47 (20.8%) to group B, and 41 (17.5%) to group C. Pregnant women in group A had a higher probability of cesarean section (odds ratio (OR) 1.76; 95% confidence interval (95%CI), 1.03 - 2.98), prolonged labor (OR 2.09; 95%CI, 1.23 - 3.53) and prolonged pregnancy (OR 2.30; 95%CI, 1.32 - 4.01) compared to pregnant women in group C. The pregnant women in group B did not show statistically significant differences in the frequency of obstetric variables compared to the pregnant women in group C ($p = ns$). **Conclusion:** There was a significant association between pregestational obesity and the risk of birth alterations. **Key words:** Body mass index, Maternal obesity, Obstetric labor complications

RESUMEN

Objetivo. Establecer la asociación entre obesidad pregestacional y el riesgo de alteraciones del parto. **Diseño.** Estudio de cohortes retrospectivo. **Institución.** Hospital Central "Dr. Urquinaona", Maracaibo, Venezuela. **Métodos.** Resultante obstétrica de pacientes según índice de masa pregestacional -obesidad (grupo A), sobrepeso (grupo B) y peso normal (grupo C)- atendidas entre enero y diciembre de 2021. **Principales medidas de estudio.** Duración del embarazo y duración, tipo y alteraciones del parto. **Resultados.** Se atendió 2,250 partos durante el periodo de estudio, de los cuales se seleccionó 226 gestantes para el análisis. La mayoría de gestantes (60,5%) fueron asignadas al grupo A, 47 (20,8%) al grupo B y 41 (17,5%) al grupo C. Las gestantes del grupo A presentaron una mayor probabilidad de cesárea (razón de probabilidad (RP) 1,76; intervalo de confianza del 95% (IC95%), 1,03 a 2,98), de parto prolongado (RP 2,09; IC95%, 1,23 a 3,53) y de embarazo prolongado (RP 2,30; IC95%, 1,32 a 4,01) comparadas con las embarazadas del grupo C. Las gestantes del grupo B no mostraron diferencias estadísticamente significativas en la frecuencia de las variables obstétricas comparado con las gestantes del grupo C ($p = ns$). **Conclusión.** Existió asociación significativa entre la obesidad pregestacional y el riesgo de alteraciones del parto. **Palabras clave.** Índice de masa corporal, Obesidad materna, Complicaciones del trabajo de parto

INTRODUCCIÓN

Obesity is one of the most common conditions in the general population. Human energy balance is regulated by genetic factors and the precise genetic mechanisms are still unknown. However, it is often considered a condition secondary to patients' eating habits, preventable with self-control and discipline⁽¹⁾.

Being underweight or obese can cause potential problems during pregnancy. Different studies have analyzed the potential effects of overweight and obesity on pregnancy and its outcome⁽¹⁾. Overweight and obese subjects are at increased risk of developing diabetes, hypertension, dyslipidemia, cardiovascular and cerebrovascular disease, gout, sleep apnea, osteoarthritis, menstrual irregularity, and some cancers⁽²⁾. Pregestational



obesity is associated with obstetric complications such as gestational diabetes, macrosomia, shoulder dystocia, and operative risks including anesthetic complications and surgical wound dehiscence and infection⁽³⁾. It may also be associated with increased risk of cesarean section⁽⁴⁻⁶⁾. Both pregestational and gestational weight gain is associated with increased frequency of fetal macrosomia, labor and fetal heart rate abnormalities, prolonged pregnancy, meconium staining of amniotic fluid and cesarean section⁽⁵⁾.

The aim of this study was to establish the association between pregestational obesity and delivery abnormalities.

METHODS

The data for this study were obtained from the medical records of pregnant women attended at the Hospital Central "Dr. Urquinaona", Maracaibo, Venezuela, between January and December 2021. Women with singleton pregnancies at term and without medical or obstetric complications such as diabetes, hypertension, preeclampsia, placenta previa and/or previous cesarean section were included.

Pregestational weight and height of the pregnant women were obtained and verified from medical history data. The formula used to calculate the body mass index (BMI) was weight in kilograms divided by height in meters squared^(7,8). The patients were classified according to pregestational BMI as obese (BMI greater than 30 kg/m²; group A) and overweight (BMI between 25-30 kg/m²; group B) and were compared with normal weight pregnant women (BMI between 20-25 kg/m²; group C). The variables evaluated were type of delivery, duration of labor, frequency of prolonged pregnancies and fetal macrosomia. Detailed information on delivery complications and neonatal outcome was obtained by reviewing medical records.

Data were analyzed using SPSS® statistical software, version 22.0. Data analysis also included logistic regression, t-test for independent samples, and chi-square test. Regression analysis was performed to control for potential confounding variables. The odds ratio (OR) with 95% confidence interval (95%CI) was used to establish the risk in the study variables on obstetric and perinatal outcomes. A value of $p < 0.05$ was considered statistically significant.

RESULTS

A total of 206 pregnant women with an average age of 27.8 +/- 7.1 years, parity of 3.2 +/- 1.8 deliveries and gestational age at delivery of 39.1 +/- 1.8 weeks were selected for the study. Of this group of patients, 138 pregnant women (61.1%) were assigned to group A, 47 women (20.8%) to group B and 41 (18.1%) to group C. The characteristics of each group are shown in Table 1. No significant differences were found in maternal age, parity, and gestational age at delivery between the groups. Body mass index was significantly higher in groups B and C compared to group A ($p < 0.001$).

Table 2 shows the obstetric outcome in each of the study groups. Pregnant women in group A had a higher probability of cesarean section (PR 1.76; 95%CI, 1.0-2.98), prolonged labor (PR 2.09; 95%CI, 1.23-3.53) and prolonged pregnancy (PR 2.30; 95%CI, 1.32-4.01) compared to pregnant women in group C ($p < 0.05$). Pregnant women in group B did not show statistically significant differences in the probability of obstetric and perinatal outcomes compared to pregnant women in group A ($p = ns$). When adjusting for confounding variables (age and parity), no significant changes were found in the odds ratio in each of the analyses. Only two cases of fetal macrosomia were found, which corresponded to group A.

TABLE 1. GENERAL CHARACTERISTICS OF EACH GROUP.

0 +/- SD	Group A Greater than 30 kg/m ² (n = 138)	p	Group B Between 25-30 kg/m ² (n = 47)	p	Group C Less than 25 kg/m ² (n = 41)
Maternal age, years	28.2 +/- 4.5	0.517	27.1 +/- 5.6	0.176	28.8 +/- 7.1
Parity	3.2 +/- 1.7	0.095	2.8 +/- 1.7	0.165	2.7 +/- 1.6
Gestational age at delivery, weeks	39.3 +/- 1.8	0.543	38.9 +/- 1.8	0.189	39.1 +/- 2.0
Body mass index	24.5 +/- 0.3	<0.001	27.5 +/- 1.5	<0.001	32.2 +/- 1.2

* Compared to pregnant women in group A



TABLE 2. ASSOCIATION OF BODY MASS INDEX AND BIRTH DISORDERS.

n (%)	Body mass index distribution						
	Group A (n = 138)	p	Likelihood ratio (95% confidence interval) *	Group B (n = 47)	p	Likelihood ratio (95% confidence interval) *	Group C (n = 41)
Cesarean section	40 (28.8)	0.04	1.76 (1.03 - 2.98)	17 (36.1)	0.365	1.27 (0.76 - 2.11)	19 (46.3)
Prolonged labor (more than 12 hours)	36 (26.1)	0.01	2.09 (1.23 - 3.53)	16 (34.0)	0.348	1.32 (0.79 - 2.20)	20 (48.8)
Pregnancy prolonged	12 (8.6)	0.01	2.30 (1.32 - 4.01)	8 (17.0)	0.170	1.69 (0.92 - 3.09)	10 (24.3)
Macrosomia	2 (1.4)	---	---	0	---	---	0

* Compared to pregnant women in group C

DISCUSSION

Factors such as pregestational obesity, weight gain during pregnancy, maternal age, increased parity, and history of cesarean section are associated with increase of dystocic deliveries⁽⁶⁾. This study analyzed the potential association between pregestational body mass index and obstetric and perinatal outcomes, demonstrating that the risk of cesarean section and prolonged labor (> 12 hours) were higher in obese patients. Although initially the differences between obese and non-obese pregestational pregnant women were significant, after controlling for confounding variables, these differences remained significant. The possible explanation for this finding is that both obstetric complications may be associated with increased soft tissue volume in both the perineum and maternal pelvis^(7,8). On the other hand, an investigation that analyzed different maternal anthropometry data confirmed the value of pregestational maternal weight, height and body mass index as a predictor of maternal and perinatal outcome⁽⁹⁾.

Perinatal complications, such as prematurity, low birth weight and death, are generally associated with pregestational low weight, low weight gain, adolescent pregnancy, nulliparity and smoking^(10,11). The consequences of pre-pregnancy BMI variations can vary widely among different population groups. As one of the markers of nutritional status, low BMI may reflect chronic nutritional deficiencies and/or acute lack of food intake. On the other hand, high values may reflect the degree of adiposity resulting from the imbalance between food intake and energy expenditure from physical activity⁽³⁾.

In the present investigation, the frequency of prolonged pregnancy was significantly higher in obese pregnant women before gestation (25%) compared with non-obese pregnant women

(10%). Previous studies have shown a strong association between obesity and prolonged pregnancy, cesarean section and macrosomia⁽⁵⁾. However, among our data, only 2 newborns with a diagnosis of macrosomia were found, both in non-obese pregnant women.

Most previous studies have shown increased risk of chronic hypertension, preeclampsia and gestational diabetes in pregnant women with excess weight and/or excessive weight gain before and during pregnancy. There is evidence that newborns of obese women are larger for their gestational age and cesarean section rates are higher. Higher birth weight is associated with increased risk of shoulder dystocia, trauma and perinatal asphyxia. There is also an increased risk of postpartum hemorrhage, puerperal infection and deep vein thrombosis. In addition, surgical morbidity and mortality increases and there are more post-anesthetic complications⁽⁵⁾.

There are numerous obstetric morbidities and complications associated with pregestational obesity⁽¹²⁻¹⁴⁾, for example, the risk of cesarean section (5 times higher), occurrence and development of hypertension (9 times higher), preeclampsia (12 times higher) and gestational diabetes (24 times higher) in patients with different degrees of obesity compared to patients with normal weight⁽¹⁵⁾. These data are supported by different analyses showing marked increases in the risks of these and other conditions such as thromboembolism, chorioamnionitis, wound infection and need for intensive care⁽¹⁶⁾.

Pregestational obesity is not a contraindication to pregnancy, but prenatal care and education by expert dietitian-nutritionists is essential to achieve a complication-free pregnancy. Obese women should receive preconception counseling on lifestyle and behavioral modifications to achieve ideal body weight before pregnancy.



During pregnancy, it is necessary to follow a proper diet and lead an active life. Therefore, decreasing obesity before and during pregnancy should lead to decreased rate of birth disturbances and reduced surgical morbidity⁽¹²⁾.

The association of pregestational obesity with birth complications is supported by other studies. Evidence indicates that primary and secondary obesity prevention measures prior to pregnancy can improve perinatal outcome⁽¹⁷⁻¹⁹⁾. The increased risk of complications in obese pregnant women provides evidence for the need to reverse current nutrition trends. The prevalence of obesity continues to increase in all countries, especially in developing countries. This is despite attempts to prevent it. Most efforts have focused on individual women or small groups, which has proven to be ineffective, as women of childbearing age are increasingly surrounded by stimuli that lead to higher caloric intake⁽²⁰⁾.

There is evidence that the risks of cesarean section are greater and more complex in obese pregnant women. Apart from having a higher probability of indication for abdominal termination of pregnancy, they also have a higher risk of postoperative complications associated with obesity (e.g., preeclampsia)⁽²¹⁻²³⁾. Although cesarean section is a good indicator of the possible effects of obesity on birth alterations, the information it can provide should be carefully analyzed, as it can be affected by multiple factors. In this research we tried to limit the knowledge provided by this indicator to only those patients who had an indication associated with pregestational obesity, in order to avoid confusion. The results of this research suggest the role of obesity in increasing the cesarean section rate, a finding that may help practitioners optimize the care of pregnant women with pregestational obesity^(24,25).

The disturbing increases in risks and probabilities suggest that the situation may become even more worrisome as the prevalence of obesity continues to increase⁽¹³⁾. The prevalence of pregestational and gestational diabetes is increasing. In addition, many women are delaying pregnancy and the rate of multiple pregnancies is increasing as a result of the widespread use of in vitro fertilization procedures. Each of these factors interacts with maternal obesity, leading to high-risk pregnancies. Prevention of excessive

weight gain in adolescents and young women would be the most effective intervention possible. However, strategies to achieve this are necessary, as the economic benefits of reducing the complications of obesity during and outside of pregnancy would be substantial.

CONCLUSION

Based on the findings of the present investigation, it is concluded that there is a significant association between pregestational obesity and the risk of birth alterations.

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