Original Study

Maternal and Perinatal Outcomes Among Adolescents and Mature Women: A Hospital-Based Study in the North of Mexico

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A B S T R A C T

Study Objective: To compare maternal and newborn pregnancy outcomes from adolescents and mature women.
Design, Setting, and Participants: A cross-sectional study was carried out in a public hospital, including women with singleton pregnancies, who were classified according to their age, as follows: group 1: younger than 16 years old (n = 37), group 2: 16-19 years old (n = 288), and group 3: 20-34 years old (n = 632).
Interventions and Main Outcome Measures: Information on clinical characteristics, gynecological and obstetric history, pregnancy complications, and perinatal outcomes was obtained through interviews and from clinical records.
Results: Thirty-four percent of deliveries were from adolescents. Mature women were more likely to have prepregnancy overweight or obesity than adolescents (odds ratio [OR] = 2.4, 95% confidence interval [CI], 1.7-3.4). The frequency of maternal complications during pregnancy or delivery was not different between groups. Birth asphyxia was more frequent in group 2 (P = .02). Women with inadequate prenatal care had an increased risk of preterm deliveries (OR = 1.64; 95% CI, 1.06-2.54) and of having newborns with low birth weight (OR = 2.02; 95% CI, 1.22-3.35). Weight of newborns from noncomplicated pregnancies was lower in group 1 (P = .02), after adjustment for prepregnancy body mass index, gestational weight gain, preterm delivery, and newborn sex.
Conclusion: The frequency of maternal and perinatal complications was similar in adolescents and mature women. Birth weight was decreased in noncomplicated pregnancies of adolescents younger than 16 years of age. Adequate prenatal care might be helpful in prevention of some adverse perinatal outcomes.
Key Words: Adolescent pregnancy, Pregnancy outcomes, Perinatal outcomes, Birth weight, Birth weight predictors, Asphyxia

Introduction

Adolescent pregnancy is an important public health problem worldwide. In developed countries, pregnancy rates range from 8 to 57 per 1000 adolescents aged 15-19 years, whereas among developing countries, outside sub-Saharan Africa, Mexico has the highest pregnancy rate of 130 per 1000 adolescents aged 15-19 years.[1] In 2009, 18.8% of births in Mexico were from adolescent mothers (younger than 20 years old). This proportion has increased in the past years (19.4% in 2013).[2]

Adolescence has been reported to play a significant role in numerous adverse maternal and perinatal outcomes. However, several cutoffs have been applied to maternal age to define adolescent groups. Adolescence has been defined in groups of 10-14[1] and 15- 19 years of age,[1,3] and some authors have further classified adolescents in subgroups (ie, ≤15, 16-17, 18-19 years,[4–7] or ≤15 and 16-19 years[8]). Several studies have shown that for the mother, adolescence has been associated with an increased risk of preeclampsia, eclampsia, instrumented vaginal delivery, episiotomy, postpartum hemorrhage, puerperal endometritis, systemic infections, and death.[5–7] For the newborns, adolescent pregnancy has been associated with increased risk of preterm delivery,[9] low birth weight (LBW), small for gestational age (SGA), and neonatal death.[4–6,10–13] Young maternal age has also been associated with nonchromosomal birth defects, varying from ear defects (odds ratio [OR] = 1.28) to gastroschisis (OR = 7.18).[14] Adverse perinatal outcomes have been reported to be more severe as the maternal age decreases.[5]

Recent studies on complications in adolescent pregnancies have found nonincreased risks for maternal outcomes such as pre-eclampsia,[15,16] eclampsia,[15] instrumental vaginal delivery,[11] postpartum hemorrhage,[15] or for adverse perinatal outcomes including preterm delivery[16] and SGA.[9] The reasons for differences among studies, beyond study design and sample size, are still unclear. However, they could be related to population characteristics. Adverse perinatal outcomes in adolescent pregnancies might be associated with socioeconomic factors such as disadvantaged background, lower level of education,[13] or being single,[11] which tend to be more prevalent in adolescents. In addition, several authors have reported that prenatal care significantly influences pregnancy outcomes.[3,10,17]

Other factors, such as maternal growth status, prepregnancy nutritional status, and weight gain, have been related

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to pregnancy outcomes, particularly to birth weight.[18–22] Nutrient requirements increase during adolescence to support growth and development. Thus, adolescents, who continue to grow during pregnancy, might be competing with the developing fetus for nutrient supply. In this case, maternal metabolic needs seem to have priority over fetal requirements, which possibly could lead to decreased birth weight.[18] In addition, adolescent prepregnancy body mass index (BMI)[20] and gestational weight gain (GWG) have been identified as the main predictors of birth weight.[19,21] The greater prevalence of low BMI before pregnancy in adolescents compared with mature women[5,7,16] highlights the importance of considering its role in the relationship between birth weight and maternal age. The objective of this study was to compare maternal and newborn pregnancy outcomes in adolescents and mature women.

Materials and Methods

A cross-sectional study was carried out in a public hospital in Chihuahua City, Mexico, between September 2014 and March 2015 and included 957 women in their immediate puerperium. Women younger than 35 years old, with a singleton pregnancy were asked to participate and to sign an informed consent after an explanation of the study procedures. The study was approved by the institutional ethics board.

The following maternal variables were obtained through an informational interview: age, occupation, education, socioeconomic status, gynecological and obstetric history, self-reported prepregnancy weight and height, attendance to prenatal care, iron and folic acid supplement intake, smoking habit, and alcohol consumption. Maternal morbidity, obstetrical complications, mode of delivery (classified as spontaneous vaginal delivery, nonemergency cesarean, and emergency cesarean section), and biochemical variables (hemoglobin, hematocrit, and glucose, measured at the moment of admission to the hospital), were obtained from clinical records. Newborn's diagnosis at birth, gestational age, anthropometry, and the Apgar scores were also obtained from clinical records. Maternal and perinatal outcomes were classified according to the International Classification of Diseases, 10th revision.

Maternal age was defined as the age of the mother in completed years at the time of delivery. Women were classified according to their age in 3 groups of study: group 1 included adolescents aged 16 years and younger (n = 37), group 2 included adolescents aged 16-19 years (n = 288), and group 3 included mature women aged 20-34 years (n = 632). We used these cutoffs because adverse maternal and perinatal outcomes differ between mothers aged 16-19 years and those younger than 16 years, with the youngest at higher risk, as reported in several studies.[4,5,8]

Socioeconomic status was classified into 6 socioeconomic levels, after integrating 13 variables, described thoroughly elsewhere.[23] Prepregnancy BMI was calculated using self-reported weight and height. We compared these measures with clinical records (obtained before pregnancy or first trimester of pregnancy) in a subsample of 79 women to calculate the intraclass correlation coefficient (ICC), as a measure of agreement, and obtained an ICC = 0.90 for weight and an ICC = 0.82 for height measures. For mature women, BMI was classified according to the World Health Organization recommended cutoffs.[24] For adolescents, we used the US Center for Disease Control and Prevention age-adjusted BMI charts, and applied the following percentile cutoffs: $<5^{th}$ for underweight; 5^{th} to 85^{th} for normal weight; $>85^{th}$ to 95^{th} for overweight; and $>95^{th}$ for obese. Maternal anemia was defined as hemoglobin concentration less than 11 g/dL.[25] Prenatal care was considered adequate if the women attended 5 or more visits during pregnancy.[26] LBW was considered when the newborn's weight was less than 2500 g.[5,16,17] Newborns were classified according to Rios et al,[27] using birth weight for gestational age percentiles for children in the North of Mexico, with the following percentile cutoffs: less than 10^{th} was considered SGA, 10^{th} to 90^{th} as adequate for gestational age, and greater than 90^{th} as large for gestational age (LGA).

Statistical Analyses

Data are presented as mean with standard deviation or frequencies and percentages. To compare groups we used analysis of variance or Kruskal-Wallis test. To evaluate the difference in frequencies (nominal and ordinal variables) we used χ^2 or Fisher exact test. OR was used as a measure of association between maternal age group and prenatal care, preterm delivery, LBW, and BMI category. We evaluated the relationship between maternal age and birth weight (transformed to logarithmic scale) and excluded results from stillbirths, neonatal death, congenital defects, neonatal morbidity, drug use during pregnancy, and maternal gestational diabetes mellitus or hypertension. The relationship between maternal age and birth weight was adjusted for potential confounders, including variables biologically and/or statistically relevant using multiple linear regression. We carried out a residual analysis and a heteroscedasticity test. A P value less than .05 was considered statistically significant. Statistical analyses were performed using STATA 11.0 software for Windows (StataCorp, College Station, TX).

Results

The frequency of deliveries from adolescents (≤19 years old) was 34%. Mature women were more likely to be married and with higher schooling level than adolescents ($P < .01$; Table 1).

Table 2 shows maternal gynecological and obstetric characteristics. Age at menarche and at sexual initiation increased with maternal age ($P < .01$). Adolescent mothers had a trend toward initiation of prenatal care at later gestational ages than mature women ($P = .06$), but the total number of consultations was not significantly different ($P = .30$). In group 1, 74% of adolescents initiated prenatal care in the first trimester compared with 76% and 77% in groups 2 and 3, respectively ($P = .83$). Prepregnancy overweight or obesity were more frequent in mature (OR = 2.4, 95% confidence interval [CI], 1.7-3.4) than in