

Pregnancy in teenagers and low birthweight infant: is there an association?

Gravidez na adolescência e baixo peso ao nascer: existe associação?

Embarazo en la adolescencia y bajo peso al nacer: ¿existe asociación?

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ABSTRACT

Objective: To study the association between teenage pregnancy (ten to 19 years old) and low birthweight.

Methods: Cross-sectional study carried out at a tertiary center from June 2000 to June 2001. A simple random drawing selected teenagers and adult mothers who were interviewed during the first day after birth. Multivariate analysis using logistic regression of variables related to low birthweight was applied.

Results: 539 pairs (mothers and their newborns) were studied – 331 (61.4%) women with 20 years old or more and 208 (38.5%) <20 years old. Among the adolescents, 50 (24%) infants had gestational age <37 weeks, whereas among mothers over 20 years old, 52 (15.7%) were preterm (OR 1.58; 95%CI 1.00-2.51). Among the adolescent and adult women, there were respectively 52 (25%) and 56 (16.9%) newborns <2500g (OR 1.64; 95%CI 1.05-2.56). Among those who had adequate prenatal care, low birth weight was detected in 12.3 and 22.1% of mothers with adequate and inadequate prenatal care, respectively. The association found in the univariate analysis between low birth weight and maternal age was not sustained in the multivariate analysis.

Conclusions: Low birth weight in teenage pregnancies can not be attributed only to maternal age.

Key-words: pregnancy in adolescence; infant, low birth weight; morbidity.

RESUMO

Objetivo: Verificar a associação entre gravidez na adolescência (dez a 19 anos) e baixo peso ao nascer.

Métodos: Estudo transversal realizado em maternidade terciária entre junho de 2000 a junho de 2001. Por sorteio aleatório simples, foram selecionadas mães adolescentes e não adolescentes entrevistadas no primeiro dia após o parto. Aplicou-se a análise multivariada por meio de regressão logística das variáveis implicadas com o baixo peso ao nascer.

Resultados: Foram selecionadas 539 duplas (mães e seus respectivos recém-nascidos), sendo 331 (61,4%) mulheres com 20 anos ou mais e 208 (38,5%) abaixo de 20 anos. Entre as adolescentes, 50 bebês (24%) tiveram idade gestacional <37 semanas, enquanto entre as mães acima de 20 anos, 52 (15,7%) eram prematuros (OR 1,58; IC95% 1,00-2,51). Entre as adoles-

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centes, ocurrieron 52 (25%) recién-nacidos con peso <2500g e, entre las adultas, 56 (16,9%) tenían bajo peso (OR 1,64; IC95% 1,05-2,56). Entre las que realizaron pré-natal adecuado, la ocurrencia de bajo peso foi de 12,3% e de 22,1% no grupo cuja assistência foi inadequada. Nesta casuística, a associação encontrada na análise univariada entre bajo peso e mãe adolescente não se manteve na análise multivariada.

Conclusões: Bajo peso ao nascer em gestações na adolescência não pode ser atribuído isoladamente à idade materna.

Palavras-chave: gravidez na adolescência; recém-nascido de bajo peso; morbidade.

RESUMEN

Objetivo: Verificar la asociación entre embarazo en la adolescencia (10 a 19 años) y bajo peso al nacer.

Métodos: Estudio transversal realizado en maternidad terciaria entre junio de 2000 a junio de 2001. Por sorteo aleatorio simple, se seleccionaron madres adolescentes y no adolescentes entrevistadas en el primer día después del parto. Se aplicó el análisis multivariado mediante regresión logística de las variables implicadas con el bajo peso al nacer.

Resultados: Se seleccionaron 539 parejas (madres y sus respectivos recién-nacidos), siendo 331 (61,4%) mujeres con 20 años o más y 208 (38,5%) abajo de los 20 años. Entre las adolescentes, 50 bebés (24%) tuvieron edad gestacional <37 semanas, mientras que entre las madres con más de 20 años, 52 (15,7%) eran prematuros (OR 1,58; IC95% 1,00-2,51). Entre las adolescentes, ocurrieron 52 (25%) recién nacidos con peso <2.500g entre las adultas, 56 (16,9%) tenían bajo peso (OR 1,64; IC95% 1,05-2,56). Entre las que realizaron prenatal adecuado, la ocurrencia de bajo peso fue de 12,3% y de 22,1% en el grupo cuya asistencia fue inadecuada. En esa casuística, la asociación encontrada en el análisis bivariado entre bajo peso y madre adolescente no se mantuvo en el análisis multivariado.

Conclusiones: Bajo peso al nacer en gestaciones en la adolescencia no puede ser atribuido aisladamente a la edad materna.

Palabras clave: embarazo en la adolescencia; recién nacido de bajo peso; morbilidad.

Introduction

Adolescent pregnancy has been attracting increasing interest and is now a subject for research within the field

of public health, which is a discipline that brings together knowledge from the humanities and the biological sciences. Questions such as the perinatal risks of such pregnancies remain to be answered and the published literature on the subject provides a basis for analysis and planning of strategies to face this particular healthcare challenge.

In the majority of Latin American countries total fertility rates have undergone a significant decline over recent decades, but this is in contrast to adolescent fertility rates, which have reduced very slowly or even increased⁽¹⁻⁶⁾. Brazil's Live Births Information System (SINASC - *Sistema de Informações sobre Nascidos Vivos*) recorded an increase in the number of live births to females aged 10 to 19 years from 19.8% in 1994 to 21.1% in 2007, which is an accumulated increase of 6.8%. Data from 1996 and 2007 on show a 6.5% increase in mortality directly due to pregnancy, delivery and puerperium and their complications among adolescents aged 15 to 19 years⁽⁷⁾.

Between 1996 and 2006, the average number of children per woman reduced from 2.5 to 1.8. During this period, there were a total of 26,752 (0.9%) live births to the youngest adolescent mothers (under 14), while there were 634,385 live births (20.9%) to women aged 15 to 19 years⁽⁸⁾. According to data for 2006 from the Brazilian National Health Service's Hospital Information System (*Sistema de Informações sobre Nascidos Vivos da Sistema Único de Saúde*), pregnancy, delivery and puerperium were responsible for 68.5% of hospital admissions, by cause of admission, among females aged 10 to 19 years.

The Brazilian state of Ceará's Primary Care Information System (SIAB - *Sistema de Informação da Atenção Básica*) shows that in 2000, 24% of expectant mothers registered were less than 20 years old. For 2005, the Ceará SIAB records a total of 268 births to mothers aged up to 14 years (0.7%) and 7,422 among those aged 15 to 19 years (19.1%), which are similar to the figures from national Brazilian data. In 2006, pregnancy, delivery and puerperium were responsible for 65.3% of hospital admissions, by cause of admission, among females aged 10 to 19 years in Ceará.

Maternal age cannot alone be considered responsible for all adverse pregnancy-related events in adolescents^(2,9). However, studies indicate significant associations between maternal age and perinatal complications such as eclampsia, hypertension, surgical deliveries, perineal injuries, premature rupture of membranes, cephalopelvic disproportion, acute fetal suffering, miscarriage, urinary infection, anemia, malpresentation, placenta previa, prematurity, low birth weight, infections and early neonatal mortality^(4,10-17). The determinants of adolescent gestational risk are not only

biological, in fact they are primarily psychological, cultural and socioeconomic^(2,5,9,10).

The major impact of adolescent pregnancy is psychosocial^(2,18) and is manifest in school absenteeism and low educational level, larger numbers of children, greater likelihood of unemployment, failed relationships with partners (greater risk of separation, divorce and desertion) and a lower probability of earning a good salary throughout life. Data from the Pan American Health Organization shows that adolescent pregnancy contributes to perpetuating the cycle of poverty and the "feminization" of poverty⁽¹⁹⁾. In some people poverty can exacerbate these risks^(1,15,20-23).

The objective of this study is to investigate the association between adolescent pregnancy (maternal age 10 to 19) and low birth weight in a public maternity unit in Fortaleza, Ceará, in the Northeast of Brazil.

Method

This was a cross-sectional study undertaken at the *Maternidade Escola Assis Chateaubriand* (MEAC), which is a tertiary center of excellence at the state level that provides care and is both a teaching and research hospital, part of the medical faculty at the *Universidade Federal do Ceará* (UFC).

Women who had given birth at the MEAC/UFC between June 2000 and June 2001 were selected by simple randomization (drawing lots). EPI INFO 6.0 was used to estimate sample size for a 95% confidence interval and statistical power of 80%, given an estimated prevalence of low birth weight infants born to adolescents of 19%, an estimated prevalence among non-adolescents of 10% and an odds ratio of 2.0. The resulting sample size was 265 mothers and newborn infants in each group, making a total of 530 pairs. The following exclusion criteria were applied: mothers who had had multiple pregnancies, who had a history of miscarriage, who were severely ill, who refused to take part or whose records did not mention birth weight were all excluded.

Data were collected from June 2000 to June 2001. Adolescent (10 to 19 years) and adult mothers (20 years or older) were identified in the teaching hospital's admission records, which contain names, ages, diagnosis on admission and other details. After identification of eligible patients, the sample was selected by simple randomization and each mother was interviewed after providing informed consent. A total 340 adult women were interviewed, but only 213 adolescents were interviewed because there was a break-down in the

supervision of the student interviewers when the patients were selected. As a result, the intended ratio of adolescent to adult mothers was not achieved.

The interviews were conducted during the first 24 hours after birth, using a structured and pre-tested form. In parallel, student field researchers consulted obstetric medical records and the newborn infants' patient charts to collect clinical data on the patients and their children. The pediatricians at the maternity unit took neonates' anthropometric measurements soon after birth. Gestational age was assessed on the basis of a physical examination conducted by the unit's pediatricians using the Capurro method⁽²⁴⁾. The quality of prenatal care was assessed in terms of the month when the mother attended her first prenatal consultation and the total number of consultations during pregnancy.

The dependent variable in this study was low birth weight (less than or equal to 2500g). The preliminary descriptive analysis built up a profile of the mothers and indicated which variables were of importance to the association being studied. A bivariate analysis was conducted in order to rule out the possibility that differences between groups in terms of the proportion of low birth weight infants were the result of prematurity. Logistic regression was used to adjust for confounding variables. The following variables were identified as possible confounding factors on the basis of their clinical and epidemiological importance as described in the literature: mother's educational level (<5 years or ≥5 years), nutritional status at start of gestation (BMI <18 or BMI ≥18), presence or absence of partner, good prenatal care (a minimum of 6 prenatal consultations with first during the first trimester), parity (categorized as primiparous or multiparous mothers) and prematurity (categorized as <37 or ≥37 weeks). Variables were defined as potential confounding factors if they changed the odds ratio by 10% (more or less).

All the questionnaires were input to a database using Epi-Info 6.0. Data were verified using consistency analysis and by searching for amplitude errors. Errors were corrected in the database after referring back to the original MEAC archives. Data were analyzed using Epi-Info 6.0 and STATA 7.0.

The study design complies with the principles of bioethics laid out in National Health Council (*Conselho Nacional de Saúde*) resolution number 196/96 and was approved by the Research Ethics Committee at MEAC/UFC.

Results

A total of 539 mother-infant pairs were selected, 331 (61.4%) women aged 20 or older and 208 (38.5%) adolescent mothers

Table 1 - Distribution of newborn infants by gestational age

	NB of adolescent mothers		NB of adult mothers		Total	
	n	%	n	%	n	%
Adequate for GA	150	72.1	247	74.6	397	73.6
Small for GA	50	24.0	52	15.7	102	18.9
Large for GA	8	3.9	32	9.7	40	7.5
Total	208	100.0	331	100.0	539	100.0

NB: newborns; GA: gestational age

Table 2 - Frequency of low birth weight and inadequate birth weight by maternal age

Maternal age	Low birth weight		Inadequate birth weight		Total	
	n	%	n	%	n	%
10-16 years	20	38.4	15	32.6	35	35.7
17-19 years	32	61.6	31	67.4	63	64.3
Total (adolescents)	52	100.0	46	100.0	98	100.0
20 -34 years	49	87.5	52	85.2	94	85.4
35 years or more	7	12.9	9	14.8	16	14.5
Total (adults)	56	100.0	61	100.0	110	100.0
Total	108		107		208	

aged less than 20 years were selected. Mean birth weight was 3,067g (SD=681g). Infants born to adolescent mothers had a mean birth weight of 2,951±644g and the infants of adult mothers had a mean birth weight of 3,139± 695g.

As will be observed from Table 1, the adolescent mothers gave birth to 52 (25%) infants with birth weights below 2500g while the adult mothers had 56 (16.9%) low birth weight children (OR 1.64; 95%CI 1.05-2.56). Total prematurity in the population studied was 102 (18.9%) cases, with 50 (24%) born to the adolescents and 52 (15.7%) born to adult mothers (OR 1.58; 95%CI 1.00-2,51). Table 2 shows the proportions of low birth weight (≤ 2500 g) and inadequate birth weight (> 2500 and < 3000 g) among the offspring of the women studied, stratified into four groups by mother's age: adolescents less than 16 years old; adolescents aged 17 to 19; adults from 20 to 34 and adults aged 35 years or older.

The percentage of mothers who had attended prenatal consultations was very high: just 5 (2.4%) adolescents and 4 (1.2%) adults did not receive prenatal care. The mean number of prenatal consultations was five for the adolescents and six for the adults. It was observed that 269 (48.6%) expectant mothers attended at least 6 prenatal consultations, breaking down to 90 (42.3%) adolescents and 179 (52.6%) adult women. Mean gestational age at the start of prenatal care was 12 weeks for children of adolescents and 14 weeks for the offspring of adult women. It was found that 207 (37.4%) expectant mothers had started prenatal care during the first trimester: 74 (34.7%) adolescents and 133 (39.1%) adults. On the basis of the minimum criteria for prenatal

care to be considered adequate (starting in the first trimester and a minimum of 6 consultations), low birth weight was associated with the variable adequate/inadequate prenatal care: 12.3% of patients whose prenatal was adequate had low birth weight infants (< 2500 g), compared with 22.1% of those whose prenatal care was inadequate.

Body mass index (BMI) was used to classify the mothers by nutritional status at the start of their pregnancies. Women with BMI < 18 were considered to have some degree of malnutrition. Sixty-four of the women in the entire sample met this criterion for malnutrition, 49 (76.6%) of whom had babies with birth weights > 2500 g and 15 (23.4%) of whom had low birth weight babies. Further subdividing the BMI < 18 subset, 37 (57.8%) were adolescents who gave birth to 10 (27%) low birth weight infants, while and 27 (42.2%) were adults and they had 5 (18.5%) low birth weight infants.

With regard to marital status, 42 (20.1%) adolescent mothers were married, 110 (52.8%) were in consenting relationships, 2 (0.9%) were separated and 24 (11.5%) were single and had no partner. This situation is different to that of the mothers aged 20 or over: 122 (36.8%) were married, 153 (46.2%) were in consenting relationships, 5 (1.5%) were separated and 32 (9.6%) were single and had no partner.

Taking the association detected between low birth weight and young maternal age as the parameter, a bivariate analysis was conducted of the variables prematurity, primiparity, educational level, adequate prenatal care and with/without partner (Table 3) in order to determine whether other conditions contributed to the independent associations between

these variables and adolescent mothers giving birth to low weight infants. The analysis showed that none of these variables were confounding factors.

The logistic regression analysis indicated that prematurity was the greatest cause of low birth weight and that it had such a great influence on the other variables that they all lost significance. Another model was therefore constructed without prematurity. In this analysis the association between low birth weight and adolescent mothers indicated by the bivariate analysis was no longer retained in the multivariate model (Table 4).

Discussion

The percentage of low birth weight infants born in a given population has been considered to be a marker of perinatal health and of quality of life and has a clear relationship with infant morbidity and mortality, particularly in developing countries^(6,25-27). Some of the findings reported in the literature indicate that birth weight increases with maternal age and that and the incidence of low birth weight is greater among the children of adolescent mothers^(2,22,23,28-30). In contrast, some studies consider that the influence of maternal age on birth weight is contradictory, which has meant that attempts are being made to identify the true determinants of low birth weight.

The results of a multivariate analysis of this sample (with prematurity excluded from the model) showed that adolescent pregnancy was not associated with low birth weight, when adjusted for other variables that affect this outcome. Similarly, Mariotoni and Barros Filho⁽³¹⁾ conducted a case-control study at a maternity unit in the Brazilian city of Campinas and concluded that adolescent pregnancy did not increase the risk of low birth weight in that population. Another study, based on live birth registration data, found that infants carried to full term by older mothers (>34) were more likely to have low birth weight⁽³²⁾. A survey conducted in Ribeirão Preto, SP, Brazil, found that when the risk of being born low-weight and full term was adjusted for certain variables related to reproductive behavior, such as race, educational level, parity, marital status and prenatal care, there was actually lower risk for adolescent mothers and risk increased as maternal age advanced, suggesting that the high likelihood of low birth weight among the children of adolescent mothers is a reflection of a cluster of other risk factors that are present in this age group⁽³³⁾.

Several different studies have found a relationship between the expectant mother's weight gain and the weight of her infant when born. A retrospective cohort study conducted at a

Table 3 - Results of the bivariate analysis by relationship between adolescent mother and low birth weight

	OR	Adjusted OR	p	Likely confounding factor
Prematurity	1.64	1.48	0.14	No
Primiparity	1.64	1.70	0.18	No
Educational level	1.64	1.72	0.33	No
Prenatal care	1.64	1.57	0.51	No
Has partner	1,64	1,56	0,96	No

OR: Odds Ratio

Table 4 - Results of multivariate analysis for the dependent variable low birth weight

	OR	95%CI	p> z
Adolescence	1.30	0.77-2.21	0.321
Maternal malnutrition	1.45	0.83-2.54	0.183
Smoking	1.50	0.67-3.35	0.315
Illiteracy	1.27	0.66-2.41	0.463
No partner	1.03	0.49-2.14	0.929
Multifarious	1.02	0.59-1.74	0.938
Adequate prenatal care	0.54	0.29-1.00	0.054

OR: Odds Ratio; 95%CI: confidence interval of 95%

private tertiary institution that treats high socioeconomic status patients in the city of São Paulo concluded that when weight gain during pregnancy is less than or equal to 10kg or greater than 12kg, the risk of inadequate birth weight is increased⁽²⁵⁾.

Data from the Latin American Cooperative Low Birth Weight Study (*Investigação Colaborativa Latino-Americana de Baixo Peso ao Nascer*), which was conducted across 59 public hospitals in 11 different countries, indicate that approximately 40 to 50% of the newborn infants studied were small for gestational age; i.e. they had suffered intrauterine growth restriction and began life at a disadvantage with a degree of malnutrition. This condition confers an increased risk of disease and death during the first year of life⁽³⁴⁾. In the Brazilian city of Fortaleza, a study was conducted across 17 maternity units that delivered 40,712 infants in 1995 and the frequency of low birth weight among adolescents mothers was 9.5%, breaking down to 12.2% in the 10-14 age group and 9.4% among over-fourteens, while the percentage of low birth weight among children born to adult women was 6.8⁽³⁵⁾.

A retrospective cohort study of births in Glasgow from 1992 to 1998 compared 15-to-19-year-olds with 20-to-29-year-olds after first and second pregnancies and found a significant association between natimortality and prematurity,

with second adolescent pregnancies being at a three times greater risk⁽³⁶⁾. It is extremely interesting to observe that the sample studied here included adolescents in their second and even third pregnancies: 42 of the young mothers were in their second pregnancy and 12 were in their third pregnancy, running the risk of suffering double anabolism and repeating the condition.

The results reported here suggest that maternal age alone is not associated with low birth weight. Patients aged less than 14 years, with gynecological ages of less than 2 years, and multiparous adolescents merit their own study, since there are indications that in these subsets the repercussions of pregnancy can be harmful to both mother and child.

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