EVALUATION OF LOW BIRTHWEIGHT IN AFRICAN AMERICANS

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This study evaluates risk factors associated with low birthweight in an African-American population. Records of 225 women delivering liveborn, nonanomalous singletons weighing <2500 g were reviewed. The next parturient, matched for race only, of a similar infant weighing ≥2500 g constituted the control. This case-control study was conducted among women delivering at University Hospital in New Orleans during 1996-1997. Mothers of infants weighing <2500 g were more likely to not have finished high school (49% versus 38%), to have received no prenatal care (26% versus 7%), or to have five or fewer visits if care was obtained (52% versus 33%). The mother was more likely to weigh <60 kg (49% versus 32%), to smoke (24% versus 11%), or to have used cocaine (18% versus 5%) or alcohol (11% versus 5%). Parturients of low birthweight newborns were more likely to have had a prior low birthweight infant (44% versus 19%) and themselves to have had a birthweight <2500 g (30% versus 13%). Regression analysis confirmed the importance of three parameters as associated with low birthweight: no prenatal care (odds ratio [OR]=6.0 [1.1-31.4]), alcohol use (OR=5.2 [1.1-24.8], and low maternal birthweight (OR=3.9 [1.9-7.9]. These results indicate that evaluations of low birthweight in African Americans should consider maternal birthweight and that efforts to improve pregnancy outcome should be structured in terms of generations. (*J Natl Med Assoc.* 1999;91:663-667.)

Key words: low birthweight ◆ prenatal care ◆ African Americans

Low birthweight remains a significant health problem among African Americans. In Louisiana, 14% of black infants weigh <2500 g at birth.[1] Low birthweight is the single most important determinant of neonatal mortality.[2] Reports have identified numerous conditions arising from or occurring during pregnancy that contribute to low birthweight.[2,3] Familial factors also have been identified.[4-7]

While attention has been drawn to the role of preterm labor, infection, and premature rupture of the membranes, events prior to those surrounding terminal admission and delivery have been deemphasized.[3,8] The problem of very low birthweight (<1500 g) has received limited evaluation, and differences between low birthweight and very low birthweight populations often are not considered.[2]

The primary goal of this study was to identify clinical conditions or pregnancy events associated with the increased risk of low birthweight among infants born to African-American women. Special emphasis was placed on the relationship of maternal birthweight to that of the baby. To this end, we identified antepartal parameters that may be associated with low birthweight. A secondary analysis of differences between low and very low birthweight newborns also was considered.

MATERIALS AND METHODS

The study population included all liveborn infants with birthweights <2500 g (n=225) delivered between

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Table 1. Maternal Parameter and Birthweight

Parameter	Birthweight		Odds Ratio	95% CI
	No. (%) <2500 g	No. (%) ≥2500 g		
Maternal age <20 yr	75/225 (33.3)	77/225 (34.2)	1.10	0.60, 2.04
Education <12 yr	102/209 (48.8)	83/219 (37.9)	1.56	1.06, 2.30
Not married	192/219 (87.7)	195/223 (87.4)	1.02	0.58, 1.80
Uninsured	115/225 (51.1)	98/225 (43.6)	1.36	0.93, 1.96
Nulliparous	74/225 (32.9)	88/225 (39.1)	0.76	0.52, 1.12
Weight <60 kg	78/159 (49.1)	59/184 (32.1)	2.04	1.32, 3.16
Height ≤1.6 m	73/194 (37.6)	70/213 (32.9)	1.23	0.82, 1.85
No prenatal care	58/221 (26.2)	16/223 (7.2)	4.60	2.55, 8.31
Prenatal visits (1-5)*	81/155 (52.3)	67/201 (33.3)	2.19	1.42, 3.37
Initial visit >14 wk*	82/156 (52.6)	113/200 (56.5)	0.85	0.56, 1.30
Interval between pregnancies ≤12 mo	49/140 (35.0)	33/136 (24.3)	1.68	0.99, 2.84
Prior low birthweight†	61/138 (44.2)	25/135 (18.5)	3.49	2.01, 6.04
Diabetes‡	9/221 (4.0)	17/221 (7.7)	0.51	0.22, 1.17
Hypertension‡	41/221 (18.6)	32/223 (14.3)	1.34	0.81, 2.23
Smoking	54/222 (24.3)	24/223 (10.8)	2.67	1.58, 4.50
Alcohol	25/222 (11.3)	12/223 (5.4)	2.22	1.09, 4.54
Cocaine	39/223 (17.6)	12/223 (5.4)	3.75	1.90, 7.37
Maternal birthweight <2500 g	39/128 (30.5)	22/171 (12.9)	2.97	1.65, 5.33

*For those receiving prenatal care.
†Among women with a prior delivery.
‡Includes gestationally related condition.
95% CI=95% confidence interval.

August 10, 1996 and June 1, 1997 at University Hospital, part of the Medical Center of Louisiana at New Orleans (formerly Charity Hospital) on the Louisiana State University Service. Only liveborn, nonanomalous singleton newborns were evaluated. A control group (the next delivery meeting entrance criteria) with an infant weighing ≥2500 g was selected. The study was restricted to African-American women and their infants. Patients were identified as deliveries occurred (prospectively), but some information was retrieved by delayed chart audit. All audits were conducted by a single examiner (I.R.) using a standard questionnaire. Identified data are presented in Tables 1 and 2. All variables were considered as dichotomous.

Information about mother's birthweight was obtained, when available, from the patient, existing medical records, or delivery logs for the hospital, since many patients were themselves delivered at Charity Hospital.

Bivariate analysis was by odds ratio, χ^2, or Fisher's exact test. A P value of .05 was considered significant. Identified variables with significant difference between control and study groups were retained for logistic regression. For the purpose of this regression, nulliparous women were considered not to have had a prior low birthweight delivery.

The sample size was selected to identify a two-fold increase in low birthweight if the mother herself had had a low birthweight (28% versus 14%). With β=.2 and α=.05, at least 82 patients in each group would be required.

RESULTS

The majority of reviewed patients were unmarried. About half lacked insurance (Medicaid) and had <12 years of education. Prenatal care often began after the first trimester. Many conceived <1 year following a prior pregnancy.

Low birthweight was associated with no or inadequate prenatal care (Table 1). Use of tobacco, alcohol, and cocaine were identified more often, and educational attainment was limited when a low birthweight infant was born. Maternal pre-pregnant

Table 2. Sexually Transmitted Diseases and Birthweight

Parameter	Birthweight		Odds Ratio	95% CI
	No. (%) <2500 g	No. (%) ≥2500 g		
Chlamydia	46/202 (22.8)	37/208 (17.8)	1.36	0.84, 2.21
Gonorrhea	16/197 (8.1)	8/207 (3.9)	2.20	0.92, 5.26
Syphilis	8/223 (3.6)	6/222 (2.7)	1.34	0.46, 3.93
Hepatitis B surface antigen	1/220 (0.4)	1/221 (0.5)	0.96	0.06, 15.65
Human immunodeficiency virus	3/182 (1.6)	4/186 (2.2)	0.76	0.17, 3.46
Herpes	10/214 (4.7)	6/217 (2.7)	1.72	0.62, 4.83

95% CI=95% confidence interval.

Table 3. Maternal Parameters by Low Birthweight

Parameter	Birthweight		Odds Ratio	95% CI
	No. (%) <1500 g	No. (%) 1500-2499 g		
Maternal age <20 yr	22/63 (34.9)	53/162 (32.7)	1.10	0.60, 2.04
Education <12 yr	25/60 (41.7)	77/149 (51.7)	0.73	0.40, 1.31
Not married	54/62 (87.1)	138/157 (87.9)	0.93	0.38, 2.25
Uninsured	36/63 (57.1)	79/162 (48.8)	1.40	0.78, 2.52
Nulliparous	23/63 (36.5)	51/162 (31.5)	1.25	0.68, 2.31
Weight <60 kg	19/46 (41.3)	59/113 (52.2)	0.64	0.32, 1.29
Height ≤1.6 m	16/53 (30.2)	57/141 (40.4)	0.64	0.32, 1.25
No prenatal care	16/62 (25.8)	42/159 (26.4)	0.97	0.50, 1.89
Prenatal visits (1-5)*	32/43 (74.4)	49/112 (43.8)	3.74	1.71, 8.16
Initial visit >14 wk*	19/43 (44.2)	63/113 (55.8)	0.63	0.31, 1.27
Interval between pregnancies <12 mo	15/40 (37.5)	34/100 (34.0)	1.17	0.54, 2.50
Prior low birthweight†	21/38 (55.3)	40/100 (40.0)	1.85	0.87, 3.94
Diabetes‡	3/61 (4.9)	6/160 (3.8)	1.33	0.32, 5.48
Hypertension‡	13/61 (21.3)	28/160 (17.5)	1.28	0.61, 2.67
Smoking	5/62 (8.1)	49/160 (30.6)	0.20	0.08, 0.53
Alcohol	3/62 (4.8)	22/160 (13.8)	0.32	0.09, 1.11
Cocaine	6/62 (9.7)	33/160 (20.6)	0.41	0.16, 1.04
Maternal birthweight <2500 g	8/34 (23.5)	31/94 (33.0)	0.63	0.25, 1.54

*For those receiving prenatal care.
†Among women with a prior delivery.
‡Includes gestationally related condition.
95% CI=95% confidence interval.

weight <60 kg was associated with low birthweight. Delivery of a prior infant <2500 g was strongly associated with delivery of a low birthweight newborn.

Subgroup comparison of infants weighing <1500 g (n=63) to those weighing between 1500 and 2499 g (n=162) is presented in Tables 3 and 4. The absence of gonococcal cervical colonization, lack of smoking, and an inadequate number of visits (if care was obtained) were associated with very low birthweight.

Pairs of mothers and newborns (case and control) for whom maternal birthweight was known (n=104 pairs) were evaluated. Low maternal birthweight (<2500 g) was associated with low birthweight (30.8% versus 14.4%; odds ratio [OR]=2.64; 95% confidence interval [CI], 1.33, 5.24).

Table 4. Sexually Transmitted Diseases and Low Birthweight

Parameter	Birthweight		Odds Ratio	95% CI
	No. (%) <1500 g	No. (%) 1500-2499 g		
Chlamydia	16/56 (28.6)	30/146 (20.6)	1.55	0.76, 3.13
Gonorrhea	0/55 (0.0)	16/142 11.3)*		
Syphilis	2/63 (3.2)	6/160 (3.8)	0.84	0.17, 4.29
Hepatitis B surface antigen	0/62 (0.0)	1/158 (0.6)†		
Human immundeficiency virus	1/46 (2.2)	2/136 (1.5)	1.49	0.13, 16.81
Herpes	2/60 (3.3)	8/154 (5.2)	0.63	0.13, 3.05

*$P<.01$, odds ratio could not be calculated.
†$P=.53$, odds ratio could not be calculated.
CI=95% confidence interval.

Table 5. Logistic Regression for Low Birthweight

Parameter	Adjusted Odds Ratio	95% Confidence Limits
No prenatal care	6.00	1.14, 31.42
Alcohol	5.15	1.07, 24.82
Maternal birthweight <2500 g	3.89	1.93, 7.87
Maternal weight <60 kg	1.54	0.85, 2.78
Education <12 yr	1.34	0.74, 2.43
Prenatal visits 1-5	1.15	0.62, 2.14
Smoking	0.51	0.18, 1.46
Prior low birthweight	0.46	0.20, 1.06
Cocaine use	0.21	0.06, 0.76

Logistic regression was used to correct for significant confounding variables (Table 5). Lack of prenatal care, alcohol use, and low maternal birthweight remained significantly associated with low infant birthweight.

DISCUSSION

Low infant birthweight was associated with antenatal conditions that reflect or represent basic underlying social problems and prior adverse pregnancy outcomes. Identified problems are ones that prenatal care, given or obtained, should address.[9] Unfortunately, those at greatest risk are often less likely to avail themselves of preventive health care. Low birthweight also was confirmed to be transgenerational. Newborn birthweight should be evaluated in comparison to that of the mother.

This study occurred in a background in which prenatal care was freely available to those without insurance and in which at least six community-based prenatal programs were located in metropolitan New Orleans. Formal evaluation of one such program indicates that care was appropriate.[10] Since cost and availability of prenatal care were not major barriers, Medicaid was understandably not associated with low birthweight. The lack of prenatal care was the most important associated factor with low birthweight, a finding consistent with other reports of African-American populations.[11,12]

Some factors are potentially modifiable; these include education and weight. Incomplete educational attainment, independent of maternal age, is a factor limiting pregnancy outcomes. It would appear appropriate to refer and encourage patients to complete their education. Low maternal preconceptual weight may be modified, although emphasis by the media and fashion on thinness may prove difficult to overcome.

Finally, some parameters may respond only to long-term programs. No single effort during the course of an individual pregnancy may erase the adverse association with low maternal birthweight or the prior delivery of a low birthweight newborn. This is particularly troublesome. Efforts to identify important concomitant or mediating factors are limited and causal relationships diffuse when other difficulties are evaluated.

Evaluation of low birthweight subgroups found little difference between infants <1500 g and those between 1500 and 2499 g. Only prenatal care appears to have biologic plausibility. We have no explanation for the unusual finding that gonorrhea and smoking appear protective against the poorest outcomes. These may reflect the limited sample size involved in these subgroup analyses.

This study has several limitations. Maternal birth-

weight posed a special concern, as it could not be obtained for one-third of the patients; this is a significant omission. Additionally, we depended on patients' reporting their own weight, although generally this has been reliable.[13] Nevertheless, univariate analysis and logistic regression support the relationship of maternal and newborn birthweight, as does the matched pair analysis.

This study did not address the important area of infection and its relationship to prematurity and low birthweight. Maternal bacterial vaginosis is associated with low birthweight.[14] The nature of our review (chart audit) did not lend itself to either identification or treatment for this condition. This was because lack of prenatal care occurred frequently, and there was no uniform screening for infection at the time of delivery. Hypertension, for this report, included preeclampsia and chronic hypertension. Such lumping creates problems. Moreover, our findings contrast with those of others who suggest that hypertension is an important determinant in African Americans.[3,11,15] This latter observation may have occurred because of limited sample size, since the study was not constructed to evaluate hypertension.

This study is not a population-based study, ie, a given geographic area. Rather, patients were selected only from an inner-city hospital serving poor women. While transfer was rare, self-selection because of perceived problems or delivery at the hospital because of the lack of insurance must be considered when evaluating these data. However, we believe that a careful chart audit provides more accurate information than does a review of birth certificate data.

Efforts to evaluate the prevalence of low birthweight and to associate factors in an African-American population must consider maternal birthweight. Unfortunately, preterm delivery–the more important end point–remains difficult to evaluate when the factor associated most strongly with low birthweight–no prenatal care–severely limits gestational age assessment.

CONCLUSION

The problem of low birthweight is complex. Inquiry, hypothesis development, and testing of strategies to improve prenatal care and its utilization are needed. No single approach is likely to succeed, and programs may need to be structured in terms of generations. Researchers should be encouraged to further our understanding of the familial, medical, social, and environmental processes that contribute to low infant birthweight.

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