Low Birth Weight in Relation to Multiple Induced Abortions

ABSTRACT

Background. Most studies report that a single induced abortion does not increase risk for delivering a low birth weight infant in a subsequent pregnancy. However, the effect of multiple abortions has not been adequately evaluated.

Methods. This relationship was studied in 6541 White women who delivered their first child between 1984 and 1987. We compared the frequencies of low birth weight (less than 2500 g) among infants born to 1999 women without prior induced abortion and 1999 women with one abortion with the frequencies of low birth weight among infants born to women with two (n = 1850), three (n = 520), and four or more (n = 173) prior induced abortions.

Results. After adjustment for confounding variables, we found no linear relationship in risk of low birth weight among women with one (relative risk [RR] = 1.2, 95% confidence interval [CI] = 0.9–1.5), two (RR = 1.5, 95% CI = 1.1–2.0), three (RR = 1.3, 95% CI = 0.8–1.9), or four or more (RR = 1.6, 95% CI = 0.9–2.9) prior induced abortions.

Conclusions. These findings confirm earlier reports of little or no evidence of harmful effects on birth weight by one or by two or more induced abortions. We further report that risk is not significantly elevated even in women with three, four, or more prior terminations of pregnancy when compared with women with one or two abortions. (*Am J Public Health.* 1992;82:391–394)

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Introduction

Since 1986, approximately 1.6 million induced abortions have been performed in the United States each year.[1] As the vast majority of women who undergo abortion eventually wish to deliver, it is important to identify possible deleterious effects of induced abortion on future pregnancy outcome. Many studies report that a single induced abortion does not increase a woman's risk for delivering a low-birth-weight infant in a subsequent pregnancy.[2–6] However, the effect of multiple induced abortions is less clear.[7] Multiple induced abortions may increase the likelihood of pregnancy loss or of preterm delivery resulting in a low-birth-weight infant in two general ways: cervical trauma from forced mechanical or rapid dilatation during the abortion procedure, or cervical and uterine adhesions due to curettage or infection.

Most studies of the risks of induced abortion on future reproductive outcome were conducted before a large proportion of women had the opportunity to have two, three, or more induced abortions. We report results from a population-based study of risk of low birth weight in women with multiple induced abortions prior to their first birth.

Methods

The Washington State birth certificate uses a check-box format to record information on demographic characteristics, complications of labor and delivery, and birth outcome. Information on history of prior induced abortions—specifically, the number of prior induced abortions and the date of the last induced or spontaneous abortion—was added to the birth certificate in 1984.

Women without a prior live birth who resided in one of the three most urban counties of Washington State (King, Pierce, and Spokane) and who delivered a live-born singleton infant between January 1, 1984, and December 31, 1987, were eligible for study. Because only a small proportion of Washington residents are non-White, this analysis was restricted to White women. Two thousand women without a history of induced abortion and 2000 women with one prior abortion were randomly sampled from the population using the birth certificate tapes. All eligible women with two (n = 1852), three (n = 522), and four or more (n = 173) induced abortions prior to their birth were identified. Six women were excluded for delivering infants with birth weights considered out of range (less than 450 g [n = 4], greater than 7000 g [n = 2]). The total study population consisted of 6541 White women.

Unconditional logistic regression[8] was used to provide parameter estimates of the risk of low birth weight (less than 2500 g) associated with one, two, three, and four or more prior induced abortions

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TABLE 1—Selected Characteristics of Women with None, One, Two, Three, and Four or More Prior Abortions

Variable	Number of Prior Abortions									
	None		One		Two		Three		Four or More	
	No.	%	No.	%	No.	%	No.	%	No.	%
Total	1999	100.0	1999	100.0	1850	100.0	520	100.0	173	100.0
Maternal age (years)										
≤19	322	16.1	223	11.2	113	6.1	14	2.7	3	1.7
20–24	685	34.3	688	34.4	572	30.9	145	27.9	44	25.4
25–29	600	30.0	620	31.0	658	35.6	190	36.5	65	37.6
30+	388	19.4	467	23.4	506	27.4	171	32.9	61	35.3
Unknown	4	0.2	1	0.1	1	0.1	0	0.0	0	0.0
Marital status										
Married	1589	79.5	1519	76.0	1339	72.4	359	69.0	114	65.9
Unmarried	409	20.5	479	24.0	510	27.5	161	31.0	58	33.5
Unknown	1	0.1	1	0.1	1	0.1	0	0.0	1	0.6
Smoking during pregnancy										
Yes	360	18.0	562	28.1	574	31.0	153	29.4	72	41.6
No	1588	79.4	1376	68.8	1212	65.5	346	66.5	92	53.2
Unknown	51	2.6	61	3.1	64	3.5	21	4.0	9	5.2
Income ($)										
<15 000	115	5.8	89	4.5	54	2.9	14	2.7	7	4.0
15–29 999	1376	68.8	1356	67.8	1273	68.8	341	65.6	116	67.0
30 000+	258	12.9	304	15.2	298	16.1	91	17.5	34	19.7
Unknown	250	12.5	250	12.5	225	12.2	74	14.2	16	9.3
Trimester prenatal care began										
First	1602	80.1	1600	80.0	1423	76.9	387	74.1	127	73.4
Second	262	13.1	286	14.3	298	16.1	103	19.7	34	19.7
Third or none	81	4.1	60	3.0	69	3.7	18	3.5	7	4.0
Unknown	54	2.7	53	2.7	60	3.2	14	2.7	5	2.9

Note.—Percentages may not add up to or may exceed 100% due to rounding.

relative to no abortion history. Variables entered into the model as confounders included maternal age (19 years and younger, 20–24, 25–29, 30 years and older), marital status (married, not married), smoking during pregnancy (yes, no, unknown), median family income based on census tract of residence (under $15 000, $15 000–29 999, $30 000–44 999, $45 000 or more, unknown), and trimester when prenatal care began (first, second, third, or no prenatal care). Tests for linear trend in the logistic model were obtained by categorizing the exposure and entering the scored variable as continuous.[8] To separate the effect of multiple induced abortions on the risk of low birth weight from the risk of ever having had an abortion, the test of trend used one abortion as the baseline category.

Results

Women with multiple induced abortions tended to be older than women with one or no prior abortion (Table 1). Marital status was also associated with frequency of prior termination of pregnancy: a higher proportion of women with four or more induced abortions was unmarried (33.5%) compared with women with one abortion (24.0%) or no history of abortion (20.5%). Women with four or more induced abortions were more likely to smoke during pregnancy (41.6%) compared with women with one abortion (28.1%) or no prior abortions (18.0%).

Consistent trends between history of induced abortion and median census tract family income or trimester when prenatal care began were not observed (Table 1). Women with four or more prior abortions were less likely to receive prenatal care during the first trimester of pregnancy than women with no prior induced abortions (73.4% and 80.1%, respectively); however, the frequency of prenatal care beginning in the third trimester or the circumstance of no prenatal care at all did not vary appreciably according to abortion history.

Risk factors for low birth weight were strongly associated with history of multiple induced abortions. For example, 3.8% of women 30 years of age and older had four or more induced abortions prior to their first birth, compared with 3.0% among women 25–29 years of age, 2.1% among women 20–24 years of age, and 0.4% among women 19 years of age and younger (Table 1). Similarly, women who smoked during pregnancy were more than twice as likely to have had multiple abortions (four or more) compared with nonsmoking women (4.2% and 2.0%, respectively).

The crude proportion of infants with a birth weight of less than 2500 g varied between 4.4% among those born to women without a prior induced abortion and 9.6% among those born to women with four or more prior abortions (Table 2). After adjustment for maternal age, marital status, smoking during pregnancy, socioeconomic status as measured by median census tract family income, and trimester when prenatal care began, there was an indication that women with a history of one or multiple induced abortions prior to first delivery were at somewhat elevated risk (20% to 60%) for having a low-birth-weight infant compared with women with no such history. Smoking during pregnancy was an important con-

founder in these data, and adjustment for this variable reduced estimates of relative risk (RR) by approximately 15%. Most of the estimates were consistent with chance, and none was significantly different from another. Additional adjustment for method of delivery of the current pregnancy and for number of prenatal visits did not alter these findings. A trend of increasing risk of low birth weight with an increased number of prior abortions was not detected ($\chi^2_1 = 2.32, p = .13$).

TABLE 2—Standardized Relative Risks of Low Birth Weight (<2500 g) According to Abortion History

Number of Induced Abortions	N[a,b]	% Low Birth Weight	RR	95% CI
None	1941	4.4	1.0[c]	—
One	1944	5.7	1.2	0.9–1.5
Two	1788	7.7	1.5	1.1–2.0
Three	506	7.1	1.3	0.8–1.9
Four or more	167	9.6	1.6	0.9–2.9

Trend test (relative to one abortion): $\chi^2_1 = 2.32$, $P = .13$.
Note.—RR = relative risk, CI = confidence interval.
[a]Excludes women with missing data in key variables: age, marital status, and trimester prenatal care began.
[b]Adjusted for age (≤19, 20–24, 25–29, 30+), smoking during pregnancy (yes, no, unknown), marital status (married, unmarried), family income (<$15 000, 15 000–29 999, $30 000–44 999, $45 000 or greater, unknown), and trimester when prenatal care began (first, second, third, or no prenatal care).
[c]Reference category.

Discussion

Several methodological issues associated with our study may have affected our findings. This analysis used information routinely collected on the Washington State birth certificate and is limited by the accuracy of that data. The check-box format on the birth certificate has improved the accuracy of reporting pregnancy complications,[9] but the reliability of other information is less certain. It is possible that underreporting of induced abortion may have occurred. Misclassification of this exposure, particularly among women categorized as having no prior abortion history, would bias our results toward little or no association. Previous studies have questioned whether women will admit to having had an induced abortion.[10–12] However, these studies were conducted during the previous decade, when women might have been more reluctant to discuss induced abortion and when some of the abortions may have been illegally obtained. Furthermore, a recent study conducted in the same geographic area[13] found that self-reported history of induced abortion obtained through personal interview agreed closely with medical chart review.

Analyzing computerized birth certificate records may be one of the few ways to study this issue using a population-based design, but such records provide limited information on confounding factors. For example, information such as maternal education, alcohol use, and illicit drug use during pregnancy is not routinely collected. Additionally, variables on the certificate, such as average family income based on census tract of residence and dichotomized smoking information, may provide inadequate statistical control for the effect of socioeconomic status and smoking behavior. Residual confounding may be present, and our estimates of relative risk may be spuriously high.

There is evidence to suggest that the frequency of late complications may vary by the abortion procedure used.[14–15] Abortion method and gestational age at termination were not known for the women in our study. It is likely, however, that most of the abortions were performed early in pregnancy and by vacuum aspiration, given that more than 95% of induced abortions performed in the United States in recent years use this method and approximately 89% are conducted during the first trimester.[16]

Among the 94 939 White women who delivered their first live-born infant in Washington State between 1984 and 1987, 16.2% had terminated one or more prior pregnancies with an induced abortion. Although most of these women had only had one prior abortion, 3.4%, 1%, and 0.3% had, respectively, two, three, and four or more pregnancies terminated. The rate of low birth weight among infants born to women with one or more prior induced abortions was higher than it was among infants born to women with no prior induced abortions. However, after adjusting for the confounding effects of maternal age, marital status, smoking, family income, and prenatal care, we found very little, if any, increased risk associated with multiple induced abortions. Most of the estimates were consistent with chance and were of a magnitude that might be explained by residual confounding. We were unable to detect a significant linear trend in risk with an increasing number of prior induced abortions.

In light of the overall lack of association reported here between previous induced abortions and low birth weight, a consideration of study power is warranted. This study could have detected a 1.4-fold elevation in risk of low birth weight among women with one prior abortion compared with women with no prior abortions at $\alpha = .05$ and $1-\beta = .80$. Comparing women with two, three, and four or more prior abortions, the same power could have detected relative risks of 1.4, 1.7, and 2.2, respectively.

The association between induced abortion and poor reproductive outcome has been well studied and reviewed;[7] however, few studies have evaluated the specific effects of multiple induced abortions. Further, no previous study has had adequate numbers of women with two, three, or more induced abortions prior to a first birth with which to estimate the risk of low birthweight associated with each of these higher frequencies of induced abortion.

Our findings closely agreed with and extended reports by other investigators, whose data have been limited to the more general grouping of two or more prior abortions. Most recently, Bracken and coworkers[4] report no evidence for a causal relationship between one (RR = 0.86) or two or more (RR = 1.14) prior abortions and low birth weight in women delivering their second or third pregnancy. Linn et al.[5] report that women with one prior abortion have a risk of 0.74 to 1.17 for having a low-birth-weight infant relative to that of women who had not undergone an induced abortion, and that women with two or more prior abortions have a risk of 0.88 to 1.79. Our results also confirm earlier findings reported by Daling and Emanuel[6] who observed no elevation in risk of low birth weight associated with one or more induced abortions.

However, these results do not agree with a study by Seidman et al.,[17] which found an excess risk of low birth weight associated with one, two, and three or more prior abortions. Based on a series of

deliveries occurring in Israel between 1974 and 1976, women with one or more prior abortions were found to have 1.3 times the rate of low birth weight relative to women with no previous abortions. Among women delivering their first child, the unadjusted percentages of low birth weight for women with one, two, and three or more prior abortions are 1.4 to 2.2 times higher than the frequencies found in our data. These conflicting findings may be due to differences in abortion procedure and in method of cervical dilatation. Induced abortions conducted in Israel between 1974 and 1976 were generally performed by dilatation and curettage or, for late abortion, intrauterine saline injections. In contrast, the majority of abortions in our sample, as previously noted, were most likely performed by vacuum aspiration during the first trimester.

An association between multiple induced abortions and very low birth weight has been reported.[18] Australian perinatal records of births between 1982 and 1983 show that women with two or more induced abortions are 3.6 times more likely to deliver an infant weighing less than 1000 g relative to women with no abortion history. Information on confounding factors such as smoking and socioeconomic status was not recorded on these perinatal records, and analysis of risk is based on crude percentages of very low birth weight. Few women in our sample (n = 36) delivered infants of very low birth weight (less than 1500 g), and it was not possible to estimate risk of this outcome independently of the effects of important confounding factors.

These results apply only to White women delivering their first child and to the risk of only one adverse pregnancy outcome. They confirm earlier findings that show little or no evidence of harmful effects on birth weight by one or by two or more induced abortions, and we further report that this risk is not significantly elevated even in women with three, four, or more prior terminations of pregnancy when compared with women with one or two abortions. Over half of all abortions conducted in the United States during the study period were performed on women without a prior live birth.[16] The results of the present study together with those of other reports suggest that, if there is any increase in risk for having a low-birth-weight infant in the first delivery following multiple induced abortions, it is likely to be modest. □

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