

Sudden Infant Death Syndrome and Maternal Smoking

ABSTRACT

Data from Missouri for the period 1980 to 1985 suggest a dose-response relationship between smoking during pregnancy and the incidence of sudden infant death syndrome (SIDS). However, data from the National Institute of Child Health and Human Development SIDS Cooperative Epidemiological Study did not support a dose-response relationship. Neither the Missouri data nor the Cooperative Study data support a relationship between the age of occurrence of SIDS and smoking during pregnancy. (*Am J Public Health*. 1992;82:1380-1382)

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Introduction

A number of socioeconomic and demographic factors are associated with an increased risk of sudden infant death syndrome (SIDS), but few readily amenable exposure factors have been identified.¹ Reports of an association between maternal cigarette smoking during pregnancy and the subsequent occurrence of SIDS, however, do offer the possibility that reducing maternal smoking could result in a decline in the SIDS rate.²⁻⁴ Whether the association between SIDS and a history of maternal smoking during pregnancy is biological in nature or a proxy for maternal behavior is not clear. Haglund and Cnattingius reported that infants born to women who smoke during pregnancy die earlier with SIDS than infants of nonsmokers and that a dose-response association exists between maternal smoking and the risk of SIDS.⁵ Their report supports the plausibility of a biological mechanism. We attempted to confirm their observations in two large US data sets.

Methods

The Missouri data set is a linked birth and death certificate file for the period 1980 to 1985. There were 684 SIDS deaths in Missouri during this period. Complete data were available on 636 of these cases and 425 326 live births, an overall rate of 1.6/1000 live births (1.3 non-Black vs 3.1 Black). For this analysis, we excluded infants of gestational age less than 24 weeks or greater than 45 weeks and excluded cases of SIDS in which the age of death was less than 7 days. Seventy-six percent of the SIDS deaths reported between 1980 and 1985 were autopsied, but no other special review process was carried out to confirm the validity of the assignment of the diagnosis of SIDS. Additional information obtained from the birth certificate included race, maternal age, parity, maternal education, and marital status. Maternal smoking information was obtained from the birth certificate and was reported in terms of packs of cigarettes smoked per day.

The National Institute of Child Health and Human Development SIDS Cooperative Epidemiological Study was a case-control study conducted between October 1978 and December 1979 that accrued cases of SIDS across six geographic regions.⁶ The SIDS rate for this study was 1.75/1000 live births (1.10 non-Black vs 3.65 Black). All cases of SIDS were autopsied, and a panel of three expert pathologists reviewed each of the cases to determine the reliability of the diagnosis. Living controls (Control A) were selected from regional birth certificate files to match regional cases on the age of death. A second living control (Control B) was matched to the SIDS case within each region on age, race, and birthweight (≤ 2500 g). There were 757 SIDS cases and 1514 controls available for this analysis. Mothers of SIDS cases were interviewed 2 to 5 weeks after the child died. Mothers of cases and controls were asked during the interview how many cigarettes per day they smoked during the first, second, and third trimesters. For this analysis, information on smoking in the first trimester was used.

Analyses were carried out to determine whether the SIDS infants' age of death was less when the mother smoked than when the mother did not smoke by using general chi-square tests of association. The relationship between the quantity smoked and infant mortality was analyzed by logistic regression.⁷ Two-way interactions between smoking and covariates in the logistic models were exam-

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ined, but none were significant. Analyses were done with SAS.⁸

Results

In the Missouri population and in the Cooperative Study, the distribution of the age of SIDS death for smokers and nonsmokers appears quite similar (Figures 1 and 2). There were no statistically significant associations by general chi-square analysis. The median age of death for both nonsmokers and smokers was 11 weeks. This contrasts with the observation from Sweden of a median age of SIDS death among nonsmokers of 10.4 weeks compared with 8 weeks among smokers.⁵

The dose-response relationship between smoking and SIDS was examined by logistic regression (Table 1). The odds ratios were adjusted by logistic regression for race, parity, age of the mother, maternal education, marital status, and sex of the infant. For Missouri, the adjusted odds ratios were 1.98 for light smokers compared with nonsmokers and 2.86 for heavy smokers compared with nonsmokers. The odds ratio for heavy smokers compared with light smokers was 1.41 with a 95% confidence interval (CI) that did exclude 1.0.

For the Cooperative Study, the adjusted odds ratios, with the reference group being nonsmokers and using Control A (the controls matched on age alone), were 2.49, 3.24, and 3.05 for smokers of less than 10, 10 through 19, and 20 or more cigarettes per day, respectively. For Control B (the controls matched on age, birthweight, and race), the odds ratios were 2.68, 2.65, and 2.60, respectively.

Discussion

We were unable to confirm the Swedish observation of a relationship between the age of death and a history of maternal smoking during pregnancy. In the Missouri population, we did observe a relationship between the quantity smoked and the risk for SIDS. Data from the Cooperative Study, however, failed to support a dose-response relationship. Differences in results between the two populations may be due to recall bias. In the Cooperative Study women reported smoking after the death of the infant, while in the Missouri population smoking information was reported on the birth

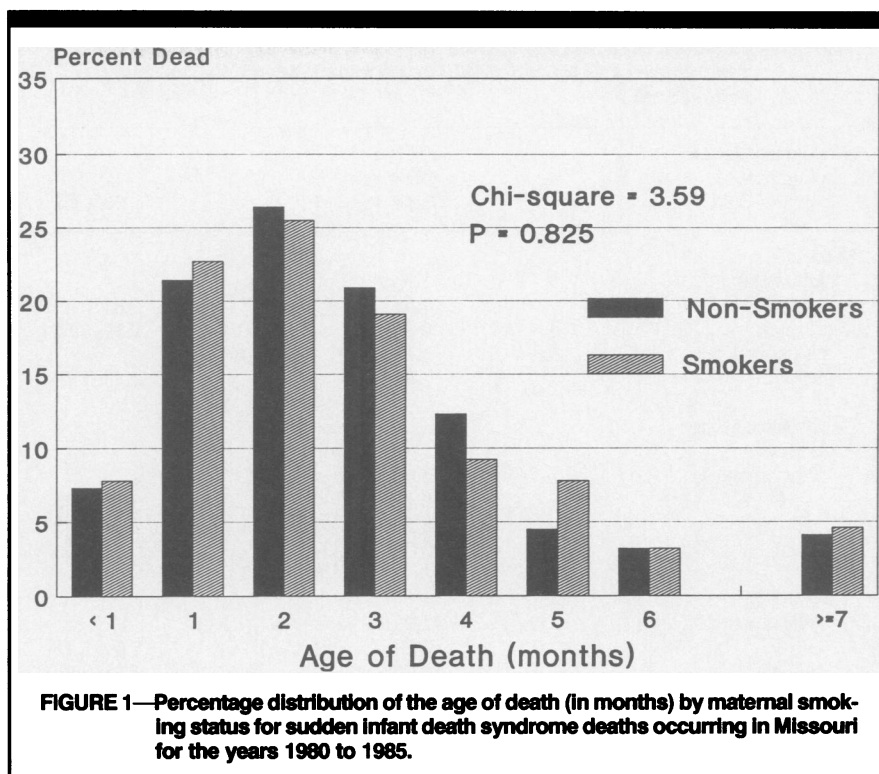


FIGURE 1—Percentage distribution of the age of death (in months) by maternal smoking status for sudden infant death syndrome deaths occurring in Missouri for the years 1980 to 1985.

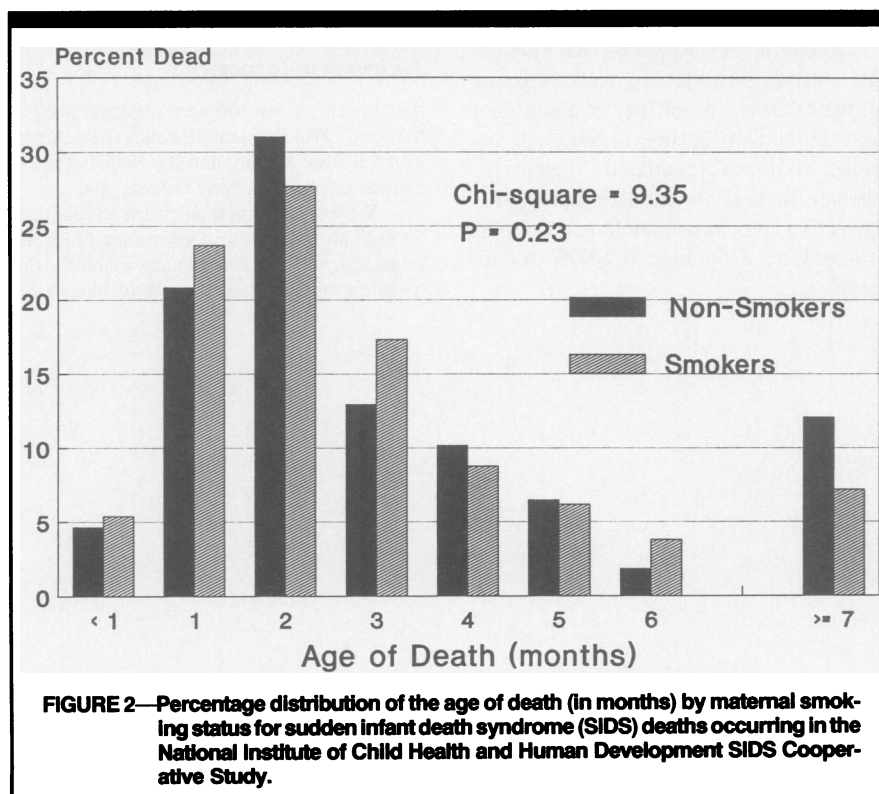


FIGURE 2—Percentage distribution of the age of death (in months) by maternal smoking status for sudden infant death syndrome (SIDS) deaths occurring in the National Institute of Child Health and Human Development SIDS Cooperative Study.

certificate prior to the death of the infant. However, the direction of this potential bias is uncertain.

Confirmation of the Swedish report of an earlier age of death among infants of smokers would support the hypothesis that the relationship between maternal

smoking and SIDS is biologic. However, we were unable to demonstrate this relationship with two large US data sets. Nevertheless, further research into biologic mechanisms and life-style factors by which maternal smoking might increase the risk of SIDS should be pursued.

TABLE 1—Adjusted Odds Ratios^a for Sudden Infant Death Syndrome (SIDS) from the Missouri and NICHD^b SIDS Cooperative Epidemiological Study Populations

Population/No. of Cigarettes Smoked Daily	Adjusted Odds Ratio	95% CI
Missouri		
Nonsmoker	1.00	...
<1 pack	1.98	1.64, 2.41
≥1 pack	2.86	2.32, 3.50
≥1 pack vs <1 pack	1.41	1.13, 1.76
Cooperative study		
Control A		
Nonsmoker	1.00	...
<10	2.49	1.79, 3.46
10–19	3.24	2.31, 4.55
≥20	3.05	2.24, 4.15
Control B		
Nonsmoker	1.00	...
<10	2.68	1.94, 3.71
10–19	2.65	1.91, 3.67
≥20	2.60	1.93, 3.52

^aOdds ratios adjusted for maternal age (< 20 vs ≥20 years), race (Black vs non-Black), parity (≥2 vs <2), educational status (<12 vs ≥12 years), marital status (single vs married), and sex of the infant.
^bNational Institute of Child Health and Human Development.

Public health programs that encourage smoking reduction for pregnant women offer the possibility of effecting a more immediate decline in SIDS. It remains to be determined, however, whether the benefits of public health programs that encourage smoking reduction will include a decline in SIDS occurrence. □

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