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Cigarette, Alcohol, and Coffee Consumption and Spontaneous Abortion

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A B S T R A C T

We analyzed data from a survey of occupational factors and pregnancy outcome to examine the effects of cigarette, alcohol, and coffee consumption on pregnancy outcome. Clear and statistically significant associations were found between cigarette and alcohol consumption and spontaneous abortion. There was a weaker but statistically significant association with coffee consumption: If the associations were casual, 11% of the spontaneous abortions could be attributed to smoking, 5% to alcohol, and 2% to coffee. (*Am J Public Health.* 1992;82:85–87)

Introduction

An association of spontaneous abortion has been reported with smoking[1–3] and with alcohol,[3,4] but not with coffee. To study these relationships, we further analyzed data collected for a large study of occupational factors and pregnancy outcome.[5]

Methods

Some 56 000 women were interviewed, comprising all who had had a delivery or a spontaneous abortion in 11 Montreal hospitals in a 2-year period (1982 to 1984). Questions on occupational, personal, and social factors were asked for all recently completed (current) and all previous pregnancies. Details of the study design and methods have been fully described elsewhere.[6,7]

Among current pregnancies, the spontaneous abortions occurred to women treated in hospital, and thus were only a proportion of the total and not representative. Previous pregnancies, in which spontaneous abortions are more fully reported,[8] were used in these analyses. For each pregnancy, an inquiry was made about coffee, alcohol, and cigarette consumption during the first trimester. The numbers of cigarettes and cups of coffee per day and drinks of each type per week were recorded. In calculating total alcohol consumption, one and a half glasses of wine were taken as equivalent to a glass of beer or measure of spirits ("one drink").

All previous pregnancies were included, regardless of whether the woman was employed. Abortions induced for personal reasons or for fetal defect were excluded. Of a total of 48 582 previous pregnancies, 1436 were excluded because of missing information, leaving 47 146 for analysis. However, as questions on coffee consumption during previous pregnancies were introduced after the survey began, information on this factor was available for only 35 848 pregnancies.

Possible confounding by maternal age (at each pregnancy outcome), educational level, ethnic group, and employment during pregnancy was controlled by including these factors together with those under study in logistic regression analyses of spontaneous abortion risk. Allowance was made for dependence between the outcomes of successive pregnancies in the same woman by including the number of previous live births and spontaneous abortions as a risk factor.[9] Risks attributable to specific factors were estimated from logistic regression coefficients.[10]

Results

The overall rate of spontaneous abortion in previous pregnancies was 21.6%; it varied with the factors identified as potential confounders to the extent shown in Table 1.

After control for these factors, there remained a strong association of smoking habit with abortion risk (see Table 2), compatible with a linear trend on the logistic scale in which odds ratios increased by a factor of 1.20 (1.18–1.23) for each 10 cigarettes per day.

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TABLE 1—Rates and Odds Ratios for Spontaneous Abortion (SA) by Maternal Characteristics

	No. Pregnancies	No. SAs	%	OR	95% CI
Age					
< 20 years	4 802	947	19.7	1.00	
20–29	35 500	7 057	19.9	0.88	0.81–0.96
30–34	5 774	1 713	29.7	1.37	1.24–1.52
35+	1 070	474	44.3	2.68	2.31–3.11
Number and outcome of previous pregnancies					
0	29 890	5 321	17.8	1.00	
1, 0 SA	8 705	2 169	24.9	1.56	1.47–1.65
1, 1 SA	2 855	826	28.9	1.82	1.67–1.99
2, 0 SA	2 098	596	28.4	1.81	1.63–2.01
2, 1 SA	1 590	564	35.5	2.44	2.19–2.73
2, 2 SA	456	207	45.4	3.69	3.05–4.46
3+, 0 SA	564	112	19.9	1.14	0.92–1.42
3+, 1 SA	516	193	37.4	2.59	2.15–3.12
3+, 2 SA	340	142	41.8	3.05	2.44–3.81
3+, 3+ SA	132	61	46.2	3.82	2.69–5.42
Ethnic group (color/language)					
White/English	8 959	1 826	20.4	1.00	
White/French	26 951	6 016	22.3	1.14	1.07–1.21
Other	11 236	2 349	20.9	1.06	0.99–1.14
Education completed					
< Secondary	13 619	2 873	21.1	1.00	
< College	18 977	4 056	21.4	1.10	1.04–1.17
College	14 550	3 262	22.4	1.14	1.07–1.22
Employment Status					
Unemployed	20 377	4 421	21.7	1.00	
Employed	26 769	5 770	21.6	1.11	1.05–1.16
All	47 146	10 191	21.6		

Note. OR = odds ratio, estimated by logistic regression with all factors, including cigarette, alcohol, and coffee consumption, in the model. CI = confidence interval.

TABLE 2—Rates and Odds Ratios for Spontaneous Abortion by Cigarette, Alcohol, and Coffee Consumption

		Spontaneous Abortions			
	No. Pregnancies	n	%	OR	95% CI
Cigarettes (per day)					
Nonsmoker	31 813	6 364	20.0	1.00	
1–9	2 861	572	20.0	1.07	(0.97–1.18)
10–19	4 987	1 100	22.1	1.22	(1.13–1.32)
20+	7 485	2 155	28.8	1.68	(1.57–1.79)
Alcohol (drinks per week)					
None	33 164	6 793	20.5	1.00	
1–2	9 099	2 068	22.7	1.11	(1.05–1.18)
3–6	3 069	776	25.3	1.23	(1.13–1.34)
7–20	1 527	456	29.9	1.47	(1.31–1.65)
21+	287	98	34.1	1.82	(1.21–2.34)
Coffee (cups per day)					
None	14 672	2 987	20.4	1.00	
1–2	15 035	3 196	21.3	0.98	(0.93–1.04)
3–4	4 068	981	24.1	1.02	(0.94–1.12)
5–9	1 574	442	28.1	1.17	(1.03–1.32)
10+	499	154	30.9	1.19	(0.97–1.45)
All	47 146	10 191	21.6		

Note. OR = odds ratio, estimated by logistic regression with all factors, including age, pregnancy history, ethnic group, education, and employment status, in the model. CI = confidence interval.

The consumption of alcohol was also clearly associated with elevated risk; odds ratios increased on average by a factor of 1.26 (1.19–1.33) for each drink per day. The trend in risk was not smooth but rose abruptly between 0 and 1 to 2 drinks per week, leading to a significant departure from linearity ($P = .03$).

The risk by coffee consumption increased on average by a factor of 1.017 (1.004–1.030) for each cup per day; this trend was also statistically significant ($P = .01$).

Modification of these three effects by other variables (interaction) was systematically investigated. There were a few statistically significant interactions (smoking–age, smoking–alcohol, and coffee–gravidity), but their magnitude was small. Information on these interactions is available from the authors on request.

Discussion

The overall spontaneous abortion rate (21.6%) was high, even compared with that in other studies based on mothers' recall, in which the rates were around 15%.[11–13] This high rate may be explained by women's being more likely to plan further pregnancies after a spontaneous abortion than after a live birth; pregnancies preceding a current pregnancy will thus overrepresent spontaneous abortions.

The associations observed may have been affected by biases, despite the allowance made for many confounders. The retrospective nature of the enquiry could have led to biased reporting of the use of alcohol, cigarettes, or coffee, or recall of spontaneous abortion. The plausibility of such bias is somewhat controversial,[14] but the fact that these habits are not generally believed to be associated with abortion makes bias less likely. However, the abortions occurred somewhat closer in time to the interviews than did live births, so if recall was time-related, some bias might result.

The association observed between abortion and cigarette smoking is similar to that found in other studies, with magnitude of risk in the middle of the reported range.[1–3]

The risk associated with the moderate consumption of alcohol in the present study (a factor of 1.26 per daily drink) was less than those found in other studies; for example, one study found that risk increased by a factor of 2.33 for women drinking between two and six drinks per week,[4] and another found risk increased by a factor of 1.98 for one to two drinks per day.[3] Previous studies were either case-control with hospitalized abortions as cases,[4] or prospective, following women from their first antenatal visit.[3] Differ-

ences might thus be related to biases specific to the study designs.

The small risk associated with coffee consumption might be explained by residual confounding. If caffeine were a causal agent, we would have suffered loss of power from lack of information on other caffeine intake. However, nutrition survey data show total caffeine intake and coffee consumption to be highly correlated ($r = .98$) in Quebec women (Health and Welfare Canada, personal communication). Evidence of an association between caffeine consumption and early fetal loss has been reported,[15] but no such association has been reported, so far as we are aware, with spontaneous abortion.

If the observed associations were causal, cigarettes accounted for about 11% of all spontaneous abortions (40% in women who smoked 20 or more cigarettes per day), alcohol consumption for about 5% (45% in women drinking 3 or more drinks per day) and coffee for about 2% (16% in women drinking 10 cups per day). These risks warrant concern among public health professionals.

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Cigarette, Alcohol, and Coffee Consumption and Prematurity

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ABSTRACT

We analyzed data from a survey of occupational and other factors in pregnancy to assess the effects of cigarette, alcohol, and coffee consumption on pregnancy outcome. The risk of low birth weight for gestational age was found to increase substantially with smoking. Occasional consumers of alcohol had a slightly reduced risk relative to total abstainers. In more frequent drinkers, there was a small increase in risk. Risk increased slightly with coffee consumption. (*Am J Public Health.* 1992;82:87–90)

Introduction

The reduction in birth weight that accompanies maternal smoking in pregnancy, first reported in the 1950s,[1,2] has been well established.[3,4] Studies of alcohol[5–12] and caffeine[13–16] consumption have given conflicting findings. We used data from a survey in Montreal of occupational and other factors in pregnancy to examine the effects of smoking and consumption of alcohol and caffeine on pregnancy outcome. The survey is described briefly in the first of this series of papers and in detail in earlier reports.[17–20]

Methods

The present analysis was confined to current (just-completed) single pregnancies. Of the 51 512 pregnancies, 10 364 were excluded because of factors known to affect length of gestation and birth weight: multiple pregnancy (475), induction of labor (6113), hypertension (1187), diabetes (154), and prenatal bleeding or illness (2435). For another 362 women smoking, alcohol, or coffee consumption were unknown, and for 341 outcome information was incomplete, leaving 40 445 pregnancies for analysis.

To separate factors that affect fetal growth from those that diminish length of gestation, we defined prematurity in three ways: (1) low birth weight (≤2500 g), (2) preterm birth (<37 weeks), and (3) low birth weight for gestational age (LBWGA; bottom 5%).

The overall rates among the pregnancies surveyed were as follows: low birth

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