Alcohol consumption and outcome of pregnancy

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SUMMARY In a prospective study 1256 pregnant women at their first antenatal visit were asked if they drank alcohol every day, occasionally, or not at all, both at that time and before the diagnosis of pregnancy. There were no significant differences, among the three alcohol groups, in the proportions having miscarriages, perinatal deaths, congenital anomalies, or premature births. Women who reported drinking every day before pregnancy was diagnosed had heavier babies than those who did not drink at all, but there were no differences in mean birth weight according to alcohol use at the first antenatal visit. There were statistically significant differences among the three groups in important background characteristics, such as social class, age, smoking, and marital status. When adjustment was made for these factors, both occasional and daily consumption of alcohol before pregnancy appeared to have significantly positive effects on birth weight. These results illustrate the difficulty of evaluating the effects of alcohol in observational studies, and imply a need for caution in attributing either negative or positive effects of alcohol on the outcome of pregnancy.

Epidemiological studies of the consequences of maternal drinking during pregnancy confirm clinical reports that alcohol in high doses is teratogenic.^{1–3} There is, however, controversy concerning the effects of drinking at lower levels, which are often described as “social.” Some workers have suggested that alcohol consumed at such levels is associated with intrauterine growth retardation, increased risk of congenital anomalies, behavioural problems in infants and children, and increased risk of fetal wastage.^{4–10} Others have reported no such associations.^{11–14} One explanation for the conflicting results is that it is difficult to adjust for the effects of all potentially confounding factors, such as smoking and social class.¹⁵ It has also been suggested that alcohol has different effects when consumed at different periods during pregnancy.^{5, 16–18} Using information collected prospectively on the social and personal characteristics of 1256 pregnant women, the relation between alcohol consumption, birth weight, and fetal and perinatal loss was investigated.

Data and methods

In 1972–3 as part of a controlled clinical trial to assess the relation between antismoking advice given in

pregnancy and birth weight consecutive series of women who contacted one of three London maternity units for their first antenatal visit were sent a reply paid postal questionnaire with the hospital administrative documents. Details of the main study were described by Donovan.¹⁹ All information was obtained on or before the first antenatal visit. Women were asked to supply details of their drinking habits before pregnancy and at the time of their first antenatal visit. For both periods they were asked whether they drank alcohol occasionally, every day, or not at all. Other information requested included parity, maternal age, the use of tobacco before and during pregnancy, and the occupations of their partners and themselves. Using the Registrar General's Classification of Occupations²⁰ the women were grouped into social classes according to their partner's occupation. Pregnancy outcome information and birth weights of infants were taken from hospital records.

There were 1197 singleton live births (of which 11 were neonatal deaths) and 10 stillbirths. Forty nine women were known to have miscarried after their first antenatal visit. Seventeen pairs of twins were excluded from the analysis. Except when looking at birth outcome, the results presented here refer only to those 1197 women who had singleton live births.

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Results

Women who drank every day before pregnancy was diagnosed had babies who were, on average, significantly heavier than those who did not drink at all ($p<0.05$) (table 1). The mean birth weight of babies born to mothers who drank occasionally lay between the other two groups. There were no significant differences in mean birth weight according to alcohol use at the first antenatal visit nor were there significant differences in the proportion who had miscarriages, perinatal deaths, congenital anomalies, or premature births (table 2).

Table 1 Birth weight of singleton live births according to alcohol use of mother

	Alcohol use before pregnancy		
	None (n = 224)	Occasional (n = 872)	Every day (n = 101)
Mean birthweight(g) ± standard error	3155 35	3237 18	3322 57
Proportion weighing 2500 g or less	8.0%	7.6%	7.9%

Table 2 Pregnancy outcome according to alcohol use

	Alcohol use before pregnancy		
	None	Occasional	Every day
Miscarriages	9 (3.8%)	38 (4.1%)	2 (1.9%)
Perinatal deaths:			
Stillbirths	3	6	1
Neonatal deaths	4	8	0
Total	7 (3.1%)	14 (1.6%)	1 (1.0%)
Proportion born prematurely (before 37 weeks)	8.5%	7.5%	5.0%
Proportion of live born with congenital malformations	4.5%	2.9%	1.0%

There were important differences in background characteristics (table 3). Women who drank every day tended to be older, primiparous, and to smoke more cigarettes. In addition, most partners of women who drank daily were from social classes I and II, none were from social classes IV and V, and this pattern differed significantly from the other two groups ($p<0.01$). Within each social class there was a consistent, but non-significant, trend for mean birth weight to increase with increasing alcohol use (table 4). Among women who did not report a partner's occupation, however, this relation was reversed.

To adjust for the effects of parity, social class, maternal age, and cigarette smoking on birth weight, multiple linear regression was used. Smoking and

Table 3 Characteristics of women according to alcohol use before pregnancy

	Alcohol use		
	None (n = 224)	Occasional (n = 872)	Every day (n = 101)
Partner's social class (%)			
No partner's occupation recorded	7%	16%	23%
Social classes I-II	21%	26%	57%
Social class III	43%	39%	18%
Social classes IV-V	25%	15%	0%
Other†	5%	4%	2%
Cigarette consumption:			
Proportion who smoked (at first antenatal visit)	62%	66%	63%
Proportion of smokers smoking 2 packs a day	8%	8%	19%*
Primipara (%)	42%	58%	66%*
Age at last menstrual period (years ± standard error)	25 ± 0.3	25 ± 0.2	26 ± 0.4
Proportion single	10%	16%	20%
Proportion with 1 or more previous miscarriages (women with previous pregnancies)	25%	22%	27%
Mean gestational age (days) ± standard error	280 ± 1.4	280 ± 0.6	294 ± 2.5

* $p<0.05$

†Includes students, unemployed, and members of armed forces.

Table 4 Mean birth weight (g)* of infants according to mother's alcohol use and social class

	Alcohol use before pregnancy		
	None	Occasional	Every day
Partner's social class:			
Social classes I-II	3166 ± 53 (n = 47)	3292 ± 32 (n = 229)	3354 ± 68 (n = 58)
Social class III	3149 ± 63 (n = 96)	3253 ± 29 (n = 338)	3588 ± 157 (n = 18)
Social classes IV-V	3128 ± 74 (n = 55)	3223 ± 55 (n = 134)	— (n = 0)
No partner's occupation recorded	3132 ± 74 (n = 16)	3140 ± 48 (n = 135)	3021 ± 123 (n = 23)
Other†	3329 ± 198 (n = 9)	3176 ± 96 (n = 33)	3132 ± 127 (n = 2)

*±Standard error.

†Includes students, unemployed, and members of armed forces.

parity had a significant effect but, surprisingly, age and social class did not. After adjusting for these factors, both occasional ($p<0.05$) and daily ($p<0.01$) consumption of alcohol had significantly positive effects on birth weight.

The mean birth weight of babies born to those who changed their alcohol consumption by the time of the first antenatal visit was examined (table 5). No clear pattern emerged, although those who had drunk every day and stopped completely had, on average, the heaviest babies. When change in alcohol consumption was added to the multiple regression

Table 5 Mean birth weight (g)* of infants according to mother's alcohol use

	None	Alcohol use at first antenatal visit		
		Occasional	Every day	Total
Alcohol before pregnancy:				
None	3163 ± 34 (n = 214)	3009 ± 308 (n = 9)	2722 ± 0 (n = 1)	3155 ± 35 (n = 224)
Occasional	3235 ± 36 (n = 209)	3237 ± 21 (n = 661)	3342 ± 342 (n = 2)	3237 ± 19 (n = 872)
Every day	3602 ± 180 (n = 31)	3334 ± 85 (n = 41)	3233 ± 83 (n = 47)	3321 ± 57 (n = 101)
Total	3211 ± 35 (n = 436)	3240 ± 20 (n = 711)	3227 ± 79 (n = 50)	

* ± Standard error.

model, neither reducing nor increasing consumption had a significant effect on birth weight

Discussion

The data presented here have the advantage that since the information was collected early in pregnancy, there is no possibility that reports of alcohol consumption could be altered by knowledge of the outcome of pregnancy. Information was only available, however, about three categories of drinking, and so the quantity of alcohol in each drink, the number of drinks consumed on each occasion, and the type of beverage could not be considered. Details of drinking habits were not obtained after the first antenatal visit, and hence no evaluation can be made of changes later in pregnancy. Furthermore, as in all epidemiological studies to date, the estimate of alcohol use was from self report, the accuracy of which probably varies with the level of drinking.¹⁵ Simple frequency data as presented here, however, are probably relatively accurate, if somewhat crude, measures of consumption.²¹

Taken at face value the findings presented here seem to imply that drinking daily at the time of conception is beneficial to the outcome of pregnancy. These results are in apparent disagreement with those reporting an increased risk of low birth weight and intrauterine growth retardation with increasing alcohol consumption.^{4, 5} Some workers have, however, noted no deleterious effects unless consumption exceeded two drinks daily,^{11, 13} and others have found no association between drinking habits and birth weight.^{12, 14} Moreover, Kuzma and colleagues reported that the volume of alcohol consumed did not relate significantly to adjusted birth weight, although the components of maternal drinking behaviour had some influence.²¹ They noted that the frequency of wine and spirits drinking was

significantly and positively correlated with infant birth weight whereas beer drinking appeared to have a negative effect. Similarly Kaminski *et al* found that low birth weight was related primarily to heavy beer consumption as opposed to wine drinking.¹³ Unfortunately, in our study no information on type of beverage was obtained. It may be that the women who reported daily drinking, who were primarily from social classes I–II, drank mostly wine or spirits rather than beer.

The social class distribution of our sample is similar to that reported for other studies in England and Wales. Wright and colleagues found that twice as many heavy drinkers were from social classes I and II rather than social classes III to V.¹⁸ The report of the General Household Survey of 1978 showed that abstinence was twice as common among women whose husbands were manual workers compared with non-manual workers and the proportion of frequent to light drinkers was higher among the wives of non-manual workers.²² These differences in social class distribution do not explain our results, however, since within each social class group women who reported drinking tended to have heavier babies, and adjusting for social class differences did not alter the positive association.

Our results clearly show the difficulty of evaluating the effects of alcohol in observational studies. Human drinking is an extremely complex behaviour. Many factors may influence a woman to abstain or change her drinking patterns. Social and ethnic factors may affect the level of drinking, how it is reported, and the type of beverage consumed. One should be cautious in attributing either negative or positive effects of alcohol on outcome of pregnancy, particularly at levels of drinking that could be defined as "social." In view of this the current recommendation^{23, 24} of total abstinence immediately before and during pregnancy should, perhaps, be investigated further.

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