Assessing pregnant women's compliance with different alcohol guidelines: an 11-year prospective study

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ABSTRACT

Objective: To assess women's compliance with different Australian guidelines on alcohol intake during pregnancy and examine factors that might influence compliance.

Design, setting and participants: We analysed prospective, population-based data on women aged 22–33 years who were pregnant before October 2001, when guidelines recommended zero alcohol ($n = 419$), or were first pregnant after October 2001, when guidelines recommended low alcohol intake ($n = 829$). Data were obtained from surveys conducted in 1996, 2000, 2003 and 2006 as part of the Australian Longitudinal Study on Women's Health.

Main outcome measures: Relative risks (RRs) for zero alcohol intake, low alcohol intake and compliance with alcohol guidelines, estimated by a modified Poisson regression model with robust error variance.

Results: About 80% of women consumed alcohol during pregnancy under zero and low alcohol guidelines. Compliance with zero alcohol guidelines or low alcohol guidelines (up to two drinks per day and less than seven drinks per week) was the same for women who were pregnant before October 2001 and women who were first pregnant after October 2001 (20% v 17% for compliance with zero alcohol guidelines, $P > 0.01$; 75% v 80% for compliance with low alcohol guidelines, $P > 0.01$). Over 90% of women drank alcohol before pregnancy and prior alcohol intake had a strong effect on alcohol intake during pregnancy, even at low levels (RR for zero alcohol, 0.21 [95% CI, 0.16–0.28]; RR for low alcohol, 0.91 [95% CI, 0.86–0.96]). RR for compliance with guidelines was 3.54 (95% CI, 2.85–4.40) for women who were pregnant while low alcohol intake was recommended, compared with those who were pregnant while zero alcohol guidelines were in place.

Conclusion: The October 2001 change in alcohol guidelines does not appear to have changed behaviour. Risks associated with different levels of alcohol intake during pregnancy need to be clearly established and communicated.

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Current research on alcohol intake during pregnancy has focused on the lack of an established "safe level" of alcohol intake during pregnancy,[1,2] with little attention paid to compliance with alcohol guidelines.

Data collected in the Australian Longitudinal Study on Women's Health (ALSWH) cover a change in alcohol guidelines for pregnant women. In 1992, Australian guidelines recommended abstinence, consistent with current United States guidelines.[2] In October 2001, the Australian guidelines were revised to recommend avoidance of a high maternal blood alcohol level,[3] a guideline that was consistent with the policies of the United Kingdom and Canada, where the risk from small amounts of alcohol was stated as being minimal.[4]

We assessed compliance with the two different national alcohol guidelines of zero alcohol intake and low alcohol intake, and examined factors that might influence compliance, using prospective, population-based data from the ALSWH.

METHODS

Participants

We used prospective data on women born between 1973 and 1978 who participated in the ALSWH. Participants were randomly sampled from the Medicare Australia database, which includes all permanent residents of Australia. Women living in rural and remote areas were intentionally oversampled. Data were collected from these women via mailed surveys in 1996, 2000, 2003 and 2006. Details of recruitment and response rates are available elsewhere.[5,6] Ethics approval was obtained from the Human Research Ethics Committees of the University of Newcastle and University of Queensland.

Women who were pregnant at the time of the 2000, 2003 or 2006 survey were classified in two groups: those who were pregnant before October 2001 (Group 1, those for whom zero alcohol intake was recommended) and those who were first pregnant after October 2001 (Group 2, those for whom low alcohol intake was recommended). For each woman included in our study, data from the survey when the woman was pregnant and the previous survey were used. To assess the influence of alcohol intake before pregnancy on drinking during pregnancy, women were included in the analyses if they were not pregnant nor the mother of a baby up to 1 year old at the previous survey. Also, women were included in Group 2 if they had not been pregnant before 2001.

At each survey, women reported their usual quantity of alcohol intake in standard drinks (one or two drinks per day; three or four drinks per day; five to eight drinks per day; or nine or more drinks per day) and the frequency of alcohol intake (never; rarely; less than once a week; 1 or 2 days per week; 3 or 4 days per week; 5 or 6 days per week; or every day). The average number of drinks per week for each woman was calculated by multiplying the midpoint of the frequency by the midpoint of the quantity.[7] The number of standard drinks per week and usual quantity of alcohol intake per day were used to categorise alcohol intake as: zero (compliant with the 1992 guidelines for pregnant women), low (up to two drinks per day and less than seven drinks per week [compliant with the 2001 guidelines for pregnant women]), moderate (seven to 14 drinks per week, or less than seven drinks per week and more than two drinks per day) or high (more than 14 drinks per week).[3] As women who smoke are more likely to drink,[8] smoking status at both surveys was recorded. Sociodemographic, health and pregnancy details were also recorded at both surveys.

Statistical analysis

All statistical analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC, USA).[9] As relative risk is preferred over odds ratio for prospective studies, a modified Poisson regression model with robust error variance[10] was used to estimate relative risks and 95% confidence intervals for zero alcohol

1 Pregnancies of 1458 women in the Australian Longitudinal Study of Women's Health who were pregnant at the time of the 2000, 2003 or 2006 survey

	Group 1, pregnant before October 2001	Group 2, pregnant after October 2001	
	2000	2003	2006
Total number of pregnancies	486	649	910
Number of ineligible pregnancies			
Woman was pregnant or the mother of a baby up to 1 year old at previous survey, or status unknown at previous survey	67	53	236
Woman was pregnant before 2001	na	291	150
Number of eligible pregnancies	419	305	524

na = not applicable. ◆

intake during pregnancy, low alcohol intake during pregnancy, and compliance with alcohol guidelines (compliance was defined as zero alcohol intake for women pregnant before 2001, and zero or low alcohol intake for women pregnant after 2001). Relative risks were adjusted for maternal age, area of residence, education, marital status and birth order, regardless of significance levels. Other variables were only included if they were significant in at least one of the three models. *P* values of less than 0.01 were considered significant.

RESULTS

Of 1458 women who were initially classified into Group 1 or Group 2, 2045 pregnancies were reported at the time of the 2000, 2003 or 2006 survey (Box 1). We excluded 356 pregnancies from our analysis because the woman was pregnant or the mother of a baby up to 1 year old at the previous survey, or because status was unknown, and 441 pregnancies from Group 2 were excluded as the woman had been pregnant before 2001. Our study therefore included 419 women in Group 1, who were pregnant before the 2001 change in alcohol guidelines, and 829 women in Group 2, who were first pregnant after the change.

Characteristics of women in Groups 1 and 2 are shown in Box 2. In Group 1, 20% of women were compliant with the recommendation of zero alcohol intake, whereas 80% of women in Group 2 were compliant with the low alcohol guideline.

Box 3 shows relative risks for zero alcohol intake, low alcohol intake and compliance with alcohol guidelines during pregnancy for women in Groups 1 and 2. The risk of drinking zero or low amounts of alcohol was the same for women who were pregnant before 2001 and women who were first pregnant after 2001. Pregnant women were over three times more likely to comply with the recommendation of low amounts of alcohol than with abstinence. Prior alcohol intake was the strongest determinant of alcohol intake during pregnancy. Relative to women who did not drink before pregnancy, women who drank any amount of alcohol before pregnancy were about five times less likely to drink no alcohol during pregnancy. Women who drank moderate or high amounts of alcohol before pregnancy were 1.5 times less likely to drink low amounts of alcohol during pregnancy.

DISCUSSION

We found that guidelines for low alcohol intake or abstinence had little effect on women's alcohol intake during pregnancy, whereas prior alcohol intake had the strongest effect. As few women abstained from alcohol before pregnancy, it was not surprising that pregnant women were less likely to comply with guidelines for abstinence than to comply with guidelines for low alcohol intake.

These data need to be viewed in the context of the study's limitations and strengths. Respondents tended to be more highly educated and were less likely to smoke than non-respondents.[11] However, women with lower levels of education and those who smoked were adequately represented. Although these response biases may have resulted in an underestimate of the prevalence of drinking during pregnancy, the findings that indicate low compliance with the guidelines remain valid. It could be argued that women were under-reporting their alcohol intake during pregnancy, but this is unlikely. Response bias depends on several factors including the method of data collection, social desirability and the actual level of alcohol intake.[12,13] In this prospective study, data were collected by mailed questionnaires that were identified only by a unique code providing participants with a high degree of confidence in the anonymity of their response, conditions which have been found to elicit high rates of self-reporting of risk behaviour.[12] Furthermore, the higher percentage of women reporting alcohol intake during pregnancy in this study than that reported by Australian women who were pregnant in the 1980s and 1990s[14,15] suggests that under-reporting was not a serious issue.

To our knowledge, this is the first study to use prospective, population-based data on pregnant women to assess compliance with two different national alcohol guidelines. The strengths of the study include its population base, which was broadly representative of women who are of peak child-bearing age (22–33 years). In addition, data on alcohol intake (both before and during pregnancy) were collected using the same methodology over the whole study period.

Few studies have investigated differences between alcohol intake before and during pregnancy and these have not been population based. Cessation of alcohol intake during pregnancy appears to differ by country. For example, 37%–46% of Spanish women attending an antenatal clinic or a university hospital either stopped drinking or did not drink regularly during pregnancy,[16,17] whereas 80%–87% of American women attending antenatal clinics or in a special care program ceased drinking during pregnancy.[18,19] The difference between the results of the American and Spanish studies may be due to differences in policy. Spain has no official policy on intake of alcohol during pregnancy, whereas the United States has had a persistent recommendation of abstinence for more than 30 years.[20] However, study design might also be a contributing factor. For example, an American longitudinal survey that included pregnant women aged 22–33 years, conducted in the 1980s and 1990s, found that 23%–41% of pregnant women drank alcohol and those who drank before pregnancy had more than three times the odds of drinking during pregnancy.[21] In our study, women who drank any alcohol before pregnancy were least likely to abstain during pregnancy, a finding that is more consistent with population-based longitudinal study findings than results of studies restricted to antenatal and hospital settings.

2 Sociodemographic, health and pregnancy characteristics of women who were pregnant before and after October 2001*

	Group 1, pregnant before October 2001 (*n* = 419)	Group 2, pregnant after October 2001 (*n* = 829)
Mean (95% CI) age when pregnant, years†	25.1 (25.0–25.2)	29.6 (29.5–29.8)
Highest qualification achieved†		
Year 10 or lower	63 (13%)	45 (5%)
Year 12, trade, apprenticeship, certificate or diploma	247 (61%)	319 (35%)
Degree	92 (25%)	455 (60%)
Marital status†		
Married	299 (71%)	721 (89%)
De facto	79 (19%)	82 (9%)
Single, separated, divorced, widowed	40 (10%)	23 (2%)
Very or extremely stressed about money†	85 (21%)	99 (12%)
Consultations with a GP or specialist in the past year		
0	4 (1%)	5 (1%)
1 or 2	23 (4%)	51 (6%)
3 or 4	56 (13%)	122 (15%)
⩾ 5	335 (82%)	650 (79%)
Private hospital insurance†	140 (38%)	536 (68%)
Trimester†		
First	150 (37%)	202 (25%)
Second	146 (32%)	329 (40%)
Third	123 (31%)	298 (35%)
Pregnant with first child†	267 (66%)	629 (76%)
Smoking		
Before pregnancy†	118 (28%)	163 (19%)
During pregnancy†	62 (13%)	55 (6%)
Alcohol intake before pregnancy†		
Zero	38 (9%)	44 (5%)
Low‡	145 (36%)	393 (49%)
Moderate§	211 (52%)	360 (43%)
High¶	16 (3%)	25 (3%)
Alcohol intake during pregnancy		
Zero	82 (20%)	149 (17%)
Low‡	218 (55%)	502 (63%)
Moderate§	106 (25%)	159 (19%)
High¶	1 (0)	9 (1%)

GP = general practitioner. * Percentages (but not numbers) were weighted for purposeful oversampling of women from non-urban areas. † $P < 0.01$ (Group 1 v Group 2). ‡ Up to two drinks per day and less than seven drinks per week. § Seven to 14 drinks per week, or less than seven drinks per week and more than two drinks per day. ¶ More than 14 drinks per week. ◆

The finding that compliance with low alcohol guidelines was better than compliance with zero alcohol guidelines may be due to differences between the two groups of pregnant women. Compared with women who were pregnant while low alcohol guidelines were in place, those pregnant while zero alcohol was recommended were younger, less highly educated, more likely to be single, earlier in pregnancy and later in their mothering career — factors that have been found to be associated with a higher risk of alcohol intake during pregnancy[14,21,22] — and were also more likely to smoke before pregnancy. However, women in the two groups were equally likely to drink low amounts of alcohol during pregnancy. Hence, it could be argued that the stricter guidelines resulted in a greater reduction in alcohol intake during pregnancy.

Poor compliance with zero or low alcohol guidelines may be due to several factors. Personal factors may outweigh the influence of guidelines on alcohol intake. The finding that prior alcohol intake had the greatest impact on women's alcohol intake during pregnancy has been reported elsewhere.[17,23] Other research has indicated that a history of abuse, poor psychological wellbeing, use of other drugs, having a substance-using partner, and not seeing alcohol as potentially harmful also contribute to alcohol intake during pregnancy.[22] An unclear message about safe alcohol intake is unlikely to counteract the influence of these predisposing factors.

The inconsistency of Australian alcohol guidelines is confusing for pregnant women and health practitioners, with the message changing from abstinence in 1992 to low alcohol in 2001 and back to abstinence in 2009.[24] These vacillations most likely reflect the lack of evidence around the effects of low to moderate alcohol intake. Clearly, high alcohol intake during pregnancy is harmful to the infant.[25] Few women were consuming more than 14 drinks per week, yet 80% were consuming some alcohol during pregnancy. The effects of low to moderate alcohol intake on the unborn child are unclear,[1,2] which leaves most pregnant women in a "no-person's-land" where guidelines are not backed up by clear consequences and the guidelines themselves are poorly communicated.[26] Whatever the research eventually shows, the current situation is untenable.

In a public health sense, it is important that the large group of women who drink alcohol at low to moderate levels receive clear and consistent messages from health professionals. Currently, the overwhelming research need is to clearly establish the risks associated with different levels of alcohol intake during pregnancy. Given that this is likely to take some time, delivering a clear message about safe alcohol intake is of paramount importance.

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3 Factors associated with zero alcohol intake, low alcohol intake and compliance with alcohol guidelines during pregnancy*

	Relative risk (95% CI)		
	Zero alcohol intake ($n = 1181$)	Low alcohol intake ($n = 1181$)	Compliance with guidelines ($n = 1181$)
Trimester			
First	Reference	Reference	Reference
Second	1.26 (0.94–1.70)	1.08 (0.99–1.17)	1.07 (0.97–1.19)
Third	1.51 (1.13–2.03)†	1.14 (1.05–1.23)†	1.13 (1.02–1.25)
Smoking during pregnancy			
No	Reference	Reference	Reference
Yes	0.81 (0.50–1.31)	0.84 (0.71–0.99)†	0.92 (0.74–1.15)
Alcohol intake before pregnancy			
Zero	Reference	Reference	Reference
Low‡	0.21 (0.16–0.28)†	0.91 (0.86–0.96)†	0.71 (0.63–0.81)†
Moderate§	0.17 (0.14–0.22)†	0.68 (0.63–0.73)†	0.53 (0.46–0.61)†
High¶	0.17 (0.07–0.38)†	0.66 (0.51–0.86)†	0.49 (0.33–0.72)†
Alcohol guidelines at time of pregnancy			
Zero alcohol intake (Group 1, pregnant before October 2001)	Reference	Reference	Reference
Low alcohol intake (Group 2, pregnant after October 2001)	1.03 (0.73–1.43)	0.98 (0.88–1.09)	3.54 (2.85–4.40)†

* All models adjusted for maternal age, area of residence, education, marital status and birth order; women who drank no alcohol or low alcohol during pregnancy were compliant with low alcohol guidelines. † $P < 0.01$ (compared with reference category). ‡ Up to two drinks per day and less than seven drinks per week. § Seven to 14 drinks per week, or less than seven drinks per week and more than two drinks per day. ¶ More than 14 drinks per week. ◆

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COMPETING INTERESTS

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