

Alcohol and breastfeeding in Australia. What are Australian mothers doing? PIFS II

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Background

Breastfeeding initiation and duration are influenced by a myriad of factors, both modifiable and non-modifiable. Maternal age, ethnicity, social class, marital status, educational attainment and parity are all non-modifiable factors shown to influence breastfeeding initiation and duration (Scott and Binns 1998; Peat, Allen et al. 2004). Deciding to breastfeed prior to pregnancy, family and partner support for breastfeeding, early return to work, mother's emotional health, access to nutritional advice and smoking are modifiable factors shown to influence breastfeeding initiation and duration (Scott, Landers et al. 2001; Giglia, Binns et al. 2006; Scott JA, Binns CW et al. 2006).

In Australia, alcohol is an accepted part of Australian culture and is widely consumed. On a daily basis approximately 6% of Australian females, and on a weekly basis 35%, of Australian males consume alcohol (Australian Institute of Health and Welfare 2005). Many of the women who consume alcohol are of childbearing age. Drinking alcohol during pregnancy is clearly implicated in the development of Foetal Alcohol Syndrome (FAS) and adverse pregnancy outcomes (O'Leary 2004; New South Wales Department of Health (Ed.) 2006). Alcohol in the breastmilk can result in a deficit in motor development, reduced lactational performance and disrupted sleep-wake behavioural patterning of the infant (Giglia and Binns 2006). However research on the relationship between alcohol consumption and breastfeeding initiation and duration is limited.

The objective of this paper was to evaluate the relationships between alcohol consumption and breastfeeding initiation and duration.

Methods

Sample

The second Perth Infant Feeding Study (PIFSII) was conducted between September 2002 and July 2003. The study was conducted in the same hospitals using the same methodology as the first PIF Study (PIFSI) and results from the PIFSII have been reported (Graham, Scott et al. 2005; Scott J A, Binns CW et al. 2006; Scott JA, Binns CW et al. 2006).

Mothers were contacted within the first three days following the birth of their infant. Women were considered eligible for the study if they had delivered a live infant free of any serious health conditions requiring transfer to the neonatal intensive care unit at Perth's major maternity hospital.

Those women agreeing to participate in the study completed the self-administered baseline questionnaire while in hospital or shortly after discharge. Women declining to participate were asked to provide some basic socio-demographic data in order to determine the representativeness of the sample. All women regardless of their chosen infant feeding method were followed up by telephone interview at four, 10, 16, 22, 32, 40 and 52 weeks postpartum.

In the baseline questionnaire women were asked if they consumed alcohol before pregnancy and during pregnancy. At each postpartum follow up telephone interview participants were asked if they were drinking alcohol at present, how often they had consumed alcohol in the previous two weeks, and how many standard drinks and the type of alcoholic beverage they had on these drinking occasions. One Australian standard drink is equivalent to 10g (12.5ml) alcohol (National Health and Medical Research Council 2001). Questions were modelled on the 1989 National Health Survey (NHS) (Australian Bureau of Statistics 1991).

Statistical analysis

Data were entered and analysed using the Statistical Package for Social Sciences, Version 11.0 (SPSS for Windows, SPSS Inc., Chicago, IL, USA). The χ^2 test was used to examine the crude association between sociodemographic, biomedical and psychosocial factors of breastfeeding and drinking alcohol at four, 16, 22 and 52 weeks postpartum.

Multiple logistic regression was applied to adjust for potential confounders in the relationship between breastfeeding initiation and alcohol intake before and during pregnancy. Variables previously identified by the research team as being associated with breastfeeding initiation for this sample population were examined and included in the development of the statistical model (Scott J A, Binns CW et al. 2006).

Those women reporting 'any breastfeeding' were included in the analysis. Any breastfeeding includes those infants who receive both breastmilk and other milk feeds or solid foods (World Health Organization 1991). This level of breastfeeding was

chosen in order to capture the majority of breastfeeding women throughout the study period.

Analysis of the relationship between breastfeeding duration of at least six months and the level of postpartum alcohol intake was investigated in a regression analysis using Cox's proportional hazards model. To include into this analysis that participants may change their alcohol consumption over time, this variable was introduced in the model as a time-dependent variable. The six month time period was chosen based on national and international recommendations for exclusive breastfeeding and was considered to be a significant reference point for infant feeding duration (World Health Organization 2001; National Health and Medical Research Council 2003).

In Australia, the National Health and Medical Research Council (NHMRC) recommend lactating women *'not to exceed the levels of drinking recommended during pregnancy, and to consider not drinking at all'*. That is *'if they choose to drink, over a week, should have less than 7 standard drinks, AND, on any one day, no more than 2 standard drinks (spread over at least two hours)'* (Guideline 11, p16) (National Health and Medical Research Council 2001).

The level of alcohol intake was defined using the NHMRC guidelines for risk of harm in the long term for the general population. For this categorisation it was assumed that 'per occasion' consumption of alcohol corresponded to 'per day' consumption of alcohol. The number of drinks were categorised for 'low risk' (up to two standard drinks per day); 'risky' (three to four standard drinks per day); and 'high risk' (five or more standard drinks per day). The categories of risky and high risk consumption

were grouped together for ease of comparison with Guideline 11 (National Health and Medical Research Council 2001). It should be noted that the NHMRC does not recommend these levels of consumption for pregnant women. Missing values were not recoded as zero as this would falsely elevate the number of women who reported not drinking.

Ethical considerations

The PIFSII was approved by the Human Ethics Committee of Curtin University and the Research Ethics Committees of the two participating hospitals. Signed informed consent was obtained from participants.

Results

A total of 540 women reported any breastfeeding at discharge. This represents 92% of the 587 women who participated in the PIFSII. Throughout the study period the number of women reporting any breastfeeding decreased as the number of infants being weaned from breastmilk increased.

Overall, in the PIFSII 870 women of the 1068 contacted were eligible to participate and 587 completed baseline questionnaires and were maintained throughout the study period, representing 68% of women contacted. A similar proportion of eligible women participated in the PIFSI (58%) and the PIFSII (55%) studies. No significant differences were found in the age or level of education of participants compared with non-participants in either study (Scott, Binns et al. 1997; Graham, Scott et al. 2005).

Table 1 outlines the characteristics of the women who drank alcohol and reported any breastfeeding throughout the postpartum period. Women who consumed alcohol during lactation were more likely to have consumed alcohol during pregnancy (72.5% at four weeks, 69.9% at 16 weeks, 65.9% at 22 weeks and 77.1% at 52 weeks) and to have a partner who consumed alcohol during pregnancy (94.4% at four weeks, 97% at 16 weeks, 95.9% at 22 weeks and 97.9% at 52 weeks). A greater proportion of women who drank alcohol and breastfed were from a higher income family and were born in Australia or New Zealand. Alcohol consumption was also associated with attendance at antenatal classes. Further details on drinking prevalence before and during pregnancy, and levels of drinking have been reported elsewhere (Giglia and Binns 2006).

The association between drinking alcohol before and during pregnancy and initiating breastfeeding was explored using multivariate logistic analysis. Drinking during pregnancy is significantly associated with initiating breastfeeding, however this is no longer significant when adjusting for potential confounding covariates (OR = 3.6, 95% CI [1.4 – 9.5], $p < 0.010$, adjusted OR = 2.3, 95% CI [0.8 – 6.4], $p = 0.108$).

Table 2 shows that women who drink at risky/high risk levels are almost twice as likely not to breastfeed for more than six months (HR = 1.9, 95% CI [1.1 – 3.0], $p < 0.05$), even after adjustment for potential confounders. A graphical representation of this information is presented in Figure 1.

Discussion

This study shows that alcohol intake above levels recommended by the NHMRC during lactation is associated with an increased risk of breastfeeding for less than six months. This is in accordance with previous research in which breastfeeding at three months postpartum was generally associated with less drinking, especially less binge drinking (Little, Lambert et al. 1990).

Further to this, later research shows drinking alcohol more than six times per week in the postpartum period was equally associated with breast or formula feeding, whereas consuming less than six drinks per week doubled the likelihood of a mother breastfeeding (OR 1.9; $p < 0.05$). Early cessation of breastfeeding was most often reported by women with the highest frequency of all drinking patterns, including binge drinking, at three months postpartum than women who were continuing to breastfeed (Howard and Lawrence 1998).

The shortened duration of breastfeeding with intakes above two standard drinks per day may potentially be explained by a number of factors. Firstly, exposure to small amounts of alcohol in the mother's milk has been shown to disrupt infant sleeping patterns (Mennella and Gerrish 1998; Mennella and Garcia-Gomez 2001). This in turn may prompt the mother to commence formula feeding and discontinue breastfeeding at this critical time in an effort to placate the infant. Secondly, alcohol is known to decrease the milk ejection reflex through the inhibition of oxytocin. This results in a diminished milk yield in lactating mothers and a decrease in the volume of milk received by the infant, which may further exacerbate their unsettled behaviour (Mennella 1998; Mennella 2001; Mennella, Pepino et al. 2005). Finally, mothers may

be wary of the health risks associated with drinking alcohol and breastfeeding. In an effort to reduce these risks and continue to consume alcohol they may voluntarily stop breastfeeding.

Internationally recommendations for alcohol intake during pregnancy vary. The United States Institute of Medicine National Academy of Sciences (National Academy of Sciences 1991) advises lactating women not to exceed 0.5 g/kg of maternal weight¹ due to the possible harmful effects on the infant, and partly because of a potential reduction in milk volume.

Without giving specific recommendations, the American Academy of Pediatrics, states that alcohol intake is 'compatible with breastfeeding'. However the following effects are noted on the infant; 'with large amounts, drowsiness, diaphoresis, deep sleep, weakness, decrease in linear growth, abnormal weight gain; and maternal ingestion of 1g/kg daily decreases milk ejection reflex' (p780) (American Academy of Pediatrics 2001).

The Health Council of the Netherlands states in their most recent report that alcohol use during breastfeeding has adverse effects on the infant. The Council recommends that mothers who have consumed a standard measure (10g ethanol) of an alcoholic beverage can avoid exposing the nursing child to ethanol by abstaining from breastfeeding for a period of three hours from when the alcohol was consumed or using expressed milk. If the mother has consumed a higher amount, the Council suggests the period until the next breastfeed should be longer, and can be calculated

¹ Equivalent to approximately three Australian standard drinks in a 60kg woman.

by multiplying the three hour period by the number of standard measures of alcohol consumed (Health Council of the Netherlands 2005).

The United States Department of Health and Human Services recommends, without giving specific volumes, that on the basis of alcohol being transferred into the breast milk, alcohol intake should be limited to protect the health of the mother and infant (U.S. Department of Health and Human Services 2000).

The government of the United Kingdom (UK) recommends avoiding drinking shortly before a baby's feed. They further propose that breastfeeding women follow the recommended daily benchmark for all women of between two and three units (one unit equals 8g pure alcohol) of alcohol a day. The benchmark applies whether women drink every day, once or twice a week, or occasionally (Directgov).

The Health Council of the Netherlands and the UK government are the only institutions providing a guide to the timing of alcohol intake, which supports breastfeeding in women who want to drink alcohol. Interestingly, the amounts of alcohol recommended by the United States Institute of Medicine National Academy of Sciences, the American Academy of Pediatrics, and the upper volume recommended by the UK government, are amounts that in this study have been implicated with the early cessation of breastfeeding.

The literature is limited with regard to the characteristics of women consuming alcohol during lactation. However, evidence from previous studies on alcohol intake during pregnancy and lactation support our finding that alcohol intake was more

common in women from higher income and employment levels (Kwok, Correy et al. 1983; Counsell, Smale et al. 1994; McLeod, Pullon et al. 2002; Giglia and Binns 2006). It is not surprising that women who were drinkers during lactation had also been drinkers during pregnancy, together with their partners, as this dyad relationship has also been shown for women who smoke during pregnancy. There was also a predominance of drinkers who were of Australian and New Zealand descent and had attended antenatal classes. Together, the characteristics of these women do not fit the stereotype of women at risk of high alcohol intake and consequently providing information on alcohol intake and optimum breastfeeding outcomes during antenatal classes would be an excellent opportunity for educating women on alcohol intake during lactation.

This study is the first Australian study to assess the relationship between drinking alcohol before, during and after pregnancy and the associated effect on breastfeeding initiation and duration. However, it needs to be replicated to verify our results, as several limitations of this study exist.

All alcohol intake data were self-reported during a telephone interview and drinking alcohol may have been underreported particularly during the antenatal period when there is an increased stigma associated with drinking. Nevertheless, self-reported alcohol consumption using a telephone interview is considered to be reasonably accurate compared with self-administered questionnaires (Kesmodel and Frydenberg 2004). In addition, volumes of alcohol may be further elevated and true risk levels of alcohol consumption may be higher than presented here as under-reporting of alcohol

consumption is common, both in terms of persons identifying as having drunk alcohol in the defined time period, and in the quantities reported (Carruthers and Binns 1992; Kaskutas and Graves 2001). Future cohort studies should include more detailed and descriptive questions to ascertain more comprehensive data on alcohol intake at this time, particularly time of alcohol intake in relation to time of breastfeeding.

Finally, consideration of factors contributing to residual confounding, were not measured in this research. Future research should examine potential factors that may help explain the relationship between drinking during pregnancy and lactation on breastfeeding duration.

Overall, alcohol intake in the postnatal period of more than two standard drinks per day was significantly associated with breastfeeding duration of less than six months. Many Australian women are unaware of the appendage to the NHMRC's Guideline 11, which urges lactating women to drink at the same levels of pregnant women (up to 2 standard drinks/day) or to consider not drinking at all . Furthermore many would probably not consider drinking above this level as a health risk to their infant or be aware of the long-term consequences of shortened breastfeeding duration.

Conclusions

Breastfeeding women who continue to consume alcohol at levels above those recommended are at risk of not meeting national and international recommendations for breastfeeding and of compromising their own health and the growth and development of their infant. Considerable public health gains can be achieved by

developing alcohol intake guidelines specific to lactating women, which support safe alcohol intake that promote extended breastfeeding.

Competing interests

The authors have no financial or other competing interests to disclose.

Authors' contributions

RCG had primary responsibility for the data analysis and writing the manuscript.

CWB supervised the design and execution of the study, and contributed to writing the manuscript.

HA participated in the final data analyses and contributed to writing the manuscript.

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Table 1. Predictors of drinking alcohol at 4, 16, 22 and 52 weeks postpartum in breastfeeding women. Figures are a percentage unless stated otherwise.

	Drink alcohol at wk 4 n=160	Drink alcohol at week 16 n=136	Drink alcohol at wk 22 n=123	Drink alcohol wk at wk 52 n=48
Maternal age (yr)				
<20	1.3	2.9%	2.4	2.1
20 – 24	18.8	15.4%	15.4	10.4
25 – 29	28.1	27.2%	23.6	25.0
30 – 35	33.8	4.6%	36.6	41.7
35+	18.1	19.9%	22.0	20.8
Maternal education level				
did not complete highschool	30.6	30.9	29.3	27.1
completed highschool or trade	56.3	50.7	52.8	50.0
bachelor degree or higher	13.1	18.4	17.9	22.9
Family income level (AUD)	*	**	**	**
<\$15000	13.9	11.2	10.7	10.6
\$15000 - \$25000	25.9	28.4	30.3	23.4
\$25 000 - \$40000	18.4	20.1	22.1	23.4
>\$40000	41.8	40.3	36.9	42.6
Mother's occupation		**	**	

admin/mgr/professional/pa raprofessional	25.0	26.5	26.8	22.9
clerical/sales/personal services	59.4	57.4	57.7	62.5
trades/labourer/plant operator	9.4	9.6	11.4	10.4
other ^b	6.3	6.6	4.1	4.2
Marital status				
never married	2.5	2.9	1.6	2.1
married/defacto	96.9	95.6	97.6	97.9
divorced/separated/widow	0.6	1.5	0.8	0
Mother's country of birth	*	**	**	**
Aust/New Zealand	73.8	77.9	70.7	72.9
UK/Ireland	12.5	9.6	12.2	14.6
Asia	3.1	2.9	5.7	8.3
Other ^c	10.6	9.6	11.4	4.2
Maternal alcohol intake during pregnancy	*	*	*	*
Non-drinker (ref)	27.5	30.1	34.1	22.9
Drinker	72.5	69.9	65.9	77.1
Paternal alcohol intake during pregnancy	*	*	*	**
Non-drinker	4.4	3.0	4.1	2.1
Drinker	94.4	97.0	95.9	97.9
Maternal smoking status				

during pregnancy				
Non-smoker	78.1	83.8	84.6	89.6
Smoker	21.9	16.2	15.4	10.4
Paternal smoking status during pregnancy				
Non-smoker	66.0	67.9	62.6	66.7
Smoker	34.0	32.1	37.4	33.3
Parity		*		
Primiparous	38.1	39.7	35.8	31.3
Multiparous	61.9	60.3	64.2	68.8
Attend antenatal classes for this or a previous pregnancy	**	**	**	
No, never	21.4	21.6	15.7	22.9
Yes	78.6	78.4	84.3	77.1
Maternal Iowa Score(IIFAS)				*
Low score	31.9	31.6	28.5	14.6
High score (ref)	68.1	68.4	71.5	85.4
Timing of pregnancy		**		
Planned	56.1	61.1	54.9	57.4
Mistimed	27.1	25.2	37.0	19.1
Unplanned	16.8	13.7	18.0	23.4

* $p < 0.0001$

** $p < 0.05$

Table 2 Breastfeeding duration of at least six months and the level of postpartum alcohol intake

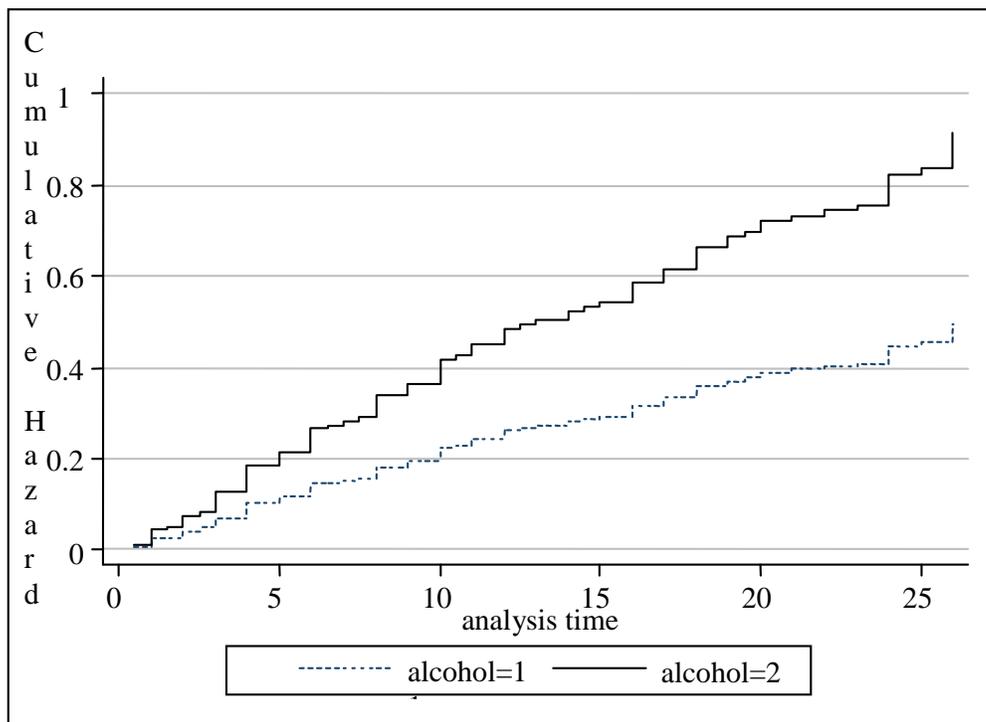
	Breastfeeding >4 months HR; 95% CI	<i>p</i> -value
Drinking alcohol ^a	2.2 (1.4-3.5)	<0.001
Drinking alcohol ^{a, b}	1.9 (1.1-3.0)	0.012

HR: hazard ratios were calculated using Cox's regression model with time-dependent covariates

^areference group is 'drinking at low risk levels' (up to 2 std drinks/day)

^badjusted for breastfeeding problems at six weeks, age at which a pacifier was introduced, maternal smoking during pregnancy and maternal IIFAS score (IOWA)

Figure 1. Adjusted incidence of stopping breastfeeding by alcohol risk



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