



Substance abuse during pregnancy: effect on pregnancy outcomes

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ABSTRACT

Objective: To determine the contribution of drug use to maternal and perinatal complications, controlling for social confounders.

Study design: This is a retrospective cohort study of 247 drug-using women and 741 controls over a 4-year period from 1997 to 2000. Cases were identified from the drug dependency register. Three controls for each woman with substance abuse were selected from the delivery suite records, with calliper matching by year of delivery (any control patient who delivered within 6 months before or after the date of delivery of a drug-using woman was considered as a potential match) and district of residence (post code). The primary outcomes of interest were preterm birth, abruption, pre-eclampsia, intrauterine growth restriction and low birth weight.

Results: There were statistically significantly more preterm births amongst drug-using women (relative risk (RR) 2.5, 95% confidence interval (CI) 1.6–3.8), with preterm births complicating 25% of births amongst drug users. The incidence of low birth weight was 30.8% amongst drug-using women compared to 8% in control women (RR 3.6, CI 2.4–5.4), and the incidence of growth restriction was 25%, significantly higher than the control group (RR 3.82, CI 2.4–6.1). The risk of abruption was also higher (RR 2.74, CI 1.1–7.0). Of note is the extremely low incidence of pre-eclampsia among drug users, even after controlling for the confounder effects of parity and smoking.

Conclusions: Despite multidisciplinary co-ordinated antenatal care, women with substance abuse during pregnancy are at significant risk of adverse obstetric and perinatal outcome, controlling for social confounders. A limitation of the study is that the sample size was not large enough to clearly assess individual drugs. This is the first study to highlight low incidence of pre-eclampsia among drug users over and above the effect of smoking. Further research is needed to elucidate the underlying biological reason for the lack of pre-eclampsia in women with substance abuse during pregnancy.

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1. Introduction

Substance abuse during pregnancy continues to be a major problem, with 90.7% of female drug abusers presenting to agencies being 15–39 years old [1]. Preterm labour, miscarriage, abruption and postpartum haemorrhage are the obstetric complications which have been associated with women who are dependent on opiates. Fetal effects include intrauterine growth restriction, prematurity, stillbirth and neonatal abstinence syndrome. Women are at increased risk of medical problems such as poor nutrition, anaemia, urinary tract infection, sexually transmitted infection, hepatitis, HIV and problems related to infection.

The adverse outcome is often attributed to lack of provision of or lack of access to maternity care [2]. Many of the complications

and outcomes seen in the pregnancies of substance misusing women have epidemiological relationships with socio-economic factors.

There is some evidence that among women on a methadone programme with comprehensive prenatal care and support from drug dependency units, pregnancy outcome is as good as non-drug dependent women [3]. Other factors in the lifestyle of substance abusers, such as poor nutrition or smoking, in addition to limited prenatal care may contribute to an increased risk of adverse pregnancy outcome and often complicate the ability to examine effects of the drugs themselves.

Care of the pregnant drug user in central and south Liverpool is based on a model of care where the central point of contact is the multidisciplinary drug dependency service. Midwifery support in addition to the general community provision is given by specialist midwives, and obstetric support by a single consultant.

Women frequently ask to what extent the risk to their baby is influenced by their drug 'habit' alone and within this service model we have conducted a retrospective cohort study to determine the

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contribution of drug use to maternal and perinatal complications, attempting to control for 'social' confounders.

2. Material and methods

This is a retrospective cohort study. Cases were identified from the drug dependency register from 1997 to 2000. A woman was considered a drug user if she had self-reported use of methadone, heroin, cocaine or any other drug of addiction at any time during pregnancy. Confirmation of drug history was made by limited urine testing. Three controls (for whom no history of drug use was recorded) were selected from the delivery suite records and matched with each woman with substance abuse. Calliper matching was done by district of residence (first half of the post code) and year of delivery (such that any control patient who delivered within 6 months before or after the date of delivery of a drug-using woman was considered as a potential match).

The multidisciplinary model involves a co-ordinated programme of care between hospital services and drug agencies working with drug misusers. The specialist midwife is a link for the women to the maternity service and the drug agencies. The antenatal care is available on a regular basis at the local drug dependency unit, at any other site on request, as well as within the antenatal clinic. The control group had the usual UK model of care shared between primary care and hospital specialist services. Data on attendance were not collected for either group. An ultrasound scan for fetal anomalies at 18–20 weeks in all women and scans to assess fetal growth at 28 weeks and 34 weeks are offered to women using drugs or where other risk factors for poor fetal growth are present. Indications for elective birth (induction of labour or caesarean section) are not different from the general obstetric population save for an offer of induction of labour at term (40 weeks gestation) rather than term plus 10 days. The treatment regime for pregnant opiate dependent women by the local drug clinic is one of stabilisation on to an amount of daily methadone in the first trimester. Women are always encouraged to reduce their overall drug use (prescribed and illicit) during the pregnancy, which includes their use of tobacco and alcohol. Given the system of normalisation of care, the hospital and community social service departments, the paediatric liaison health visitor and specialist midwife meet regularly to discuss social issues such as child protection.

The following information was extracted from the computerised medical records and the drug history register: demographic details, smoking, past and present drug history and current antenatal problems. The information in drug history register is recorded by the specialist midwife. Smoking history was classed into four groups: none, 1–10, 11–20, and >20 cigarettes per day. Dosage of the drug methadone in each trimester was recorded. Delivery details included gestation at delivery, duration of labour, onset of labour and mode of delivery. The neonatal data recorded were birth weight, umbilical artery cord pH, Apgar scores, admission to the neonatal unit and perinatal death. The primary outcomes of interest were

preterm birth, abruption, pre-eclampsia, intrauterine growth restriction and low birth weight. The WHO criterion of birth weight less than 2500 g was used to define low birth weight. Intrauterine growth restriction was defined as a birth weight less than the 3rd centile for gestation. The birth weight centile charts are those published by Gairdner and Pearson [4] and for infants born below 32 weeks are those based on data of Lucas [5]. Secondary outcomes were gestational hypertension, antepartum haemorrhage, spontaneous rupture of the membranes and the presence of meconium.

Data were recorded in a pre-designed data sheet and entered into a database conforming to the Data Protection Act. Analysis was carried out using Stata (version 8.2). A univariate analysis was initially performed to examine the baseline characteristics of the drug users and controls, using Pearson's Chi-squared test or Fisher's exact test to compare the profiles of categorical explanatory variables between drug users and controls. The two-sample *t*-test or Mann–Whitney test were used for normally distributed and skewed continuous variables accordingly. Poisson regression was used to calculate relative risks of each outcome for drug users compared to controls, and robust standard errors were estimated to deal with underdispersion. The analysis did not adjust specifically for matching, as the calliper matching approach was not considered strong enough to warrant it. Instead the matching was adjusted for by adding deprivation score and year of delivery into the Poisson model. The Townsend Maternal Deprivation Score was used as an index of social deprivation. Other potentially confounding variables, namely age, parity and smoking, were also adjusted for in the Poisson regression.

3. Results

Details of baseline characteristics of drug dependent women are shown in Tables 1 and 2. There were 247 cases and 741 controls (as three matched controls were obtained for each case). There were significantly more multiparous women in the drug user group compared to controls (relative risk (RR) 1.43, 95% confidence interval (CI) 1.30–1.57).

The most common drug used was methadone, primarily as a result of the methadone substitution programme. A very small number of drug users (3/214, 1.4%) who were taking methadone at booking were no longer taking methadone at delivery. The majority of women on methadone also used other substances during pregnancy (155/214, 72.4%). The common drugs were heroin (66.8%), cocaine (33.2%) and benzodiazepines (11.3%). Approximately half of the drug dependent women used intravenous drugs during pregnancy (122/238, 51.3%). Drug users were significantly more likely to smoke cigarettes than controls (97.6% vs. 34.1% respectively) and the proportion of drug users who smoked more than 10 cigarettes per day was significantly higher compared to controls (64.8% vs. 5.9% respectively).

There were no statistically or clinically important differences with regard to onset of labour and mode of delivery between the

Table 1

Baseline characteristics: values are number (%) or \bar{x} mean (SD) (range). *p*-Values are obtained from Pearson's Chi-squared test or the \bar{x} two-sample *t*-test.

Baseline characteristics	Drug user (<i>n</i> = 247)	Controls (<i>n</i> = 741)	Relative risk or \bar{x} difference in means (95% CI)
Age \bar{x}	29.9 (4.8) (17–43)	28.9 (5.9) (16–45)	1.0 (0.2, 1.8)
Parity			
Primigravida	54 (22.6)	333 (45.7)	0.49 (0.39, 0.63)
Multigravida	185 (77.4)	395 (54.3)	1.43 (1.30, 1.57)
Cigarettes smoked per day during pregnancy			
None	6 (2.4)	488 (65.9)	0.04 (0.02, 0.08)
1–10	59 (23.9)	209 (28.2)	0.85 (0.66, 1.09)
11–20	129 (52.2)	38 (5.1)	10.18 (7.31, 14.19)
>20	31 (12.6)	6 (0.8)	15.50 (6.54, 36.71)
Yes (unspecified)	22 (8.9)	0 (0)	–

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