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Smoking cessation support and obstetric outcomes in an Irish maternity hospital

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ABSTRACT

Objective: Maternal cigarette smoking is a recognised risk factor for maternal and fetal morbidity and mortality and remains a significant problem in the Irish maternity system. Approximately 11% of Irish women will continue to smoke in pregnancy, despite awareness of the negative impact on their pregnancy. Although recommendations exist for the management of pregnant smokers, information on the antenatal care of Irish smokers in pregnancy has not been described. We reviewed the care given to smokers in a large urban maternity hospital.

Study design: This is a retrospective cohort study of 100 consecutive smokers and 110 contemporaneous non-smokers who delivered at a large urban maternity hospital of over 8200 births per year in Oct–Nov 2017. Data were obtained from both electronic patient records and chart review to ensure comprehensive capture of outcomes.

Results: In general, mothers who smoked were younger (29yrs vs 33yrs $p < 0.001$) and of higher parity (1.4 vs. 1.0 $p < 0.001$) than non-smokers. They were less likely to have a planned pregnancy (44.4% vs 79.6%, $p < 0.001$) and less likely to have taken pre-conceptual folic acid (22.2% vs 58.3%, $p < 0.001$). These mothers also had a higher rate of history of illicit drug use, particularly cannabis (19.1% vs 0.9%, $p < 0.001$) and opiates (16.1% vs 0.9%, $p < 0.001$). Mental health issues were commoner in smokers with 36.3% describing depression, postnatal depression or bipolar disorder and 34.3% experiencing anxiety disorder or panic attacks. Smoking cessation advice was identified in only 36.5% of smokers and no smokers were referred for smoking cessation interventions. Two thirds of smokers were referred for an additional ultrasound, largely due to suspected fetal growth restriction. Infants of smoking mothers had lower mean birthweights (3.16 kg vs 3.47 kg $p < 0.001$) and mean birth centile (27th vs 47th $p < 0.001$) than non-smokers. Twenty eight percent of these infants were small for gestational age, an incidence significantly higher than non-smokers at 13% ($p < 0.001$).

Conclusion: Maternal cigarette smoking appears to be a largely tolerated risk factor in the population studied, despite being associated with poor obstetric outcomes. We identified an absence of smoking cessation services and a lack of intervention and structure around care pathways.

Introduction

Cigarette smoking in pregnancy has a substantial impact on maternal and fetal health and smoking cessation is a significant intervention which improves outcomes for mother and infant [1]. Smoking is a risk factor for miscarriage, stillbirth, placental abruption, preterm birth, and low birth weight. Moreover, maternal cigarette smoking is associated with long term adverse consequences for the child in terms of neurological development, endocrine dysfunction, and oncogenesis [2]. The negative effects are multifactorial and continue into childhood. Infants of smokers have a higher incidence of Sudden Infant Death Syndrome (SIDS) and children of smokers are more likely to have childhood asthma, behavioural disorders, Attention Deficit Hyperactivity Disorder (ADHD), and poor academic performance in school [3,4]. In later life, offspring of smokers are twice as likely to smoke themselves [5]. Achieving smoking cessation in pregnancy therefore has huge potential benefits for maternal and child health.

Ireland has been recognised as a world leader in tobacco control over the past three decades. In 1998, Ireland banned smoking

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within public buildings, and this was followed by an advertising ban in 2002. In 2004 Ireland became the first country in the world to prohibit smoking in the workplace, a policy which has since been replicated globally. This was followed by restrictions on the sale of cigarettes and removal of point of sale tobacco advertising (2009); the use of graphic warnings on cigarette boxes (2011); and the introduction of plain tobacco packaging (2017).

The prevalence of smoking among adults in Ireland is currently 18.8%, with a 0.5% decrease noted year on year [6]. This compares favourably to the 29% prevalence recorded in 2008 and 33% in 1998. It reflects the success of concerted government policies which include public health campaigns, legislation and tobacco excise duty. There is currently no national collection of data on smoking in pregnancy in Ireland. However, we can infer the prevalence rates from previous studies. A large population based study conducted between 2010 and 2011 described a smoking prevalence of 12.1% at the first antenatal visit [7]. This is supported by the findings of the 'Growing Up in Ireland' study, which was a longitudinal survey conducted by the Economic and Social Research Institute using a nationally representative sample of 11,134 infants and their families [8]. It reported that 17.6% of mothers smoked at some stage during their pregnancy with 12.6% smoking during all three trimesters. More recently, the prevalence of maternal cigarette smoking in 42,509 women delivering between 2011 and 2015 at a large Irish maternity hospital was found to have decreased from 14.3% to 10.9% during the study period [9]. The prevalence of maternal cigarette smoking in Ireland has declined in the past three decades, from 28% in 1997/98 to a current incidence of approximately 11% [6].

Although we can infer smoking prevalence from these studies, there is little detail on the level of care and support offered to women who smoke in pregnancy. Specifically, there is a paucity of information regarding the individual advice or interventions provided or the effect on hospital workload.

Materials and methods

This was a retrospective cohort study of 100 consecutive smokers who delivered in October-November 2017 at a large urban tertiary maternity hospital with approximately 8200 deliveries per year. Women who were over 18 years of age, smoking at least one cigarette per day, and who delivered an infant after 24 + 0 weeks or weighing 500 g were included in the analysis. The patients were identified via the hospital electronic healthcare record and patient paper records were collected and reviewed in detail. At booking visit in this hospital, patient demographic and clinical details including self-reported smoking status are collected by trained midwives and computerised. It is hospital policy that women who smoke are verbally advised to quit and given a written information leaflet on smoking cessation. For outcomes data, the 100 smokers were compared to 110 contemporaneous non-smokers who delivered during the same period. Permission for the study was given by hospital management. Research Ethics Committee approval was not required.

Statistical analysis was performed using STATA IC15 statistical package [10]. Data were tested for normality using the Shapiro-Wilks test and then analysed for significance using Independent Samples T Test, Mann Whitney U test and Chi Square test.

Results

100 consecutive smokers who delivered in October/November 2017 were selected for a retrospective chart review, and their care was compared to 110 contemporaneous non-smokers delivering in the same period. One smoker was excluded due to significant fetal anomaly. Two non-smokers were excluded – one for significant fetal anomaly and one delivered elsewhere. This resulted in 99 smokers being compared to 108 non-smokers. Maternal height, weight, and body mass index (BMI) were similar in both groups. Smokers were younger (29yrs vs. 33yrs $p < 0.001$) and were of a higher parity (1.4 vs. 1 $p < 0.001$) (Table 1). Socioeconomic grouping of smokers and non-smokers is provided in Table 2. Smokers had an unemployment rate of 32.3%, which is significantly higher than non-smoking pregnant women (32.3% vs. 4.6%, $p < 0.001$) and the general population (6.1%, $p < 0.001$).

Smokers were less likely to have a planned pregnancy (44.4% vs. 79.6%, $p < 0.001$) and less likely to have taken pre-conceptual folic acid (22.2% vs. 58.3%, $p < 0.001$). Smokers were more likely to give a past history of illicit drug use, particularly cannabis (19.1% vs 0.9%, $p < 0.001$) and opiates (16.1% vs 0.9%, $p < 0.001$). Overall, almost one in five of the smoking cohort had a history of cannabis use. Smokers also had an increased incidence of mental health disorders such as depression, postnatal depression or bipolar disorder (36.3% vs 5.5%, $p < 0.001$), and an increased incidence of

Table 1
Demographics of smokers and non-smokers.

	Smokers	Non-smokers	p-value
Age	29yrs	33yrs	$p < 0.001$*
Height	163 cm	164 cm	0.45
Weight	69 kg	68 kg	0.86
BMI	26 kg/m [2]	25 kg/m [2]	0.30
Parity	1.4	1.0	$p < 0.001$*
Ethnicity	92.9% Irish 1.0% Western European 6.1% Eastern European	76.8% Irish 4.6% Western European 8.3% Eastern European 5.5% South Asian 3.7% Sub-Saharan Africa 1% South American	$p < 0.001$*
History of miscarriage	26.2%	33.3%	0.05
Recurrent miscarriage	2%	4%	0.29
Planned pregnancy	44.4%	79.6%	$p < 0.001$*
Pre-conceptual folic acid	22.2%	58.3%	$p < 0.001$*
Illicit drugs: cannabis	19.1%	0.9%	$p < 0.001$*
Illicit drugs: opiates	16.1%	0.9%	$p < 0.001$*
Illicit drugs: MDMA, amphetamines	5%	0.9%	0.07
Illicit drugs: benzodiazepines	4%	0.9%	0.13
Alcohol during pregnancy	1	0	N/A

* Denotes significance at $p < 0.05$.

Table 2
Socioeconomic grouping of smokers and non-smokers using Central Statistics Office employment categories [11].

	Smokers	Non-smokers
Professional and managerial	8.1%	43.5%
Skilled and non-manual	25.3%	30.6%
Semi-skilled and unskilled manual	9.1%	9.3%
Homemaker	23.2%	10.2%
Full time education	2.0%	1.8%
Unemployed	32.3%	4.6%

anxiety disorder or panic attacks (34.3% vs 6.5%, $p < 0.001$) (Table 3).

43% of smokers in the study smoked 1–5 cigarettes per day; 41% smoked 6–10 cigarettes per day and 11% smoked 11–20 cigarettes per day. No smokers reported smoking >20 per day.

Mean gestation of midwife booking history for smokers was 13 + 6 weeks, with first consultant visit at 17 + 4 weeks. 75% of smokers had combined care with their GPs, while 25% availed of midwifery led care (MLC). 68% of smokers in MLC were transferred back to their obstetric team by the end of pregnancy, predominately for small symphysiofundal height measurement (29.4%) or recurrent non-attendance at appointments (17.6%).

Only 36.5% of smokers had documented cessation advice given at the time of their booking history. Likewise, 36.5% had documented cessation advice at first visit with their obstetric team. 21.5% had further cessation advice given after their first visit. Only one smoker (1%) was documented to have stopped smoking by end of pregnancy. No smokers were offered a structured smoking cessation intervention.

Antenatal visits were spread equally between midwives, SHOs, registrars and consultants. The mean number of antenatal clinic attendances was 6.7 visits (range 2–13), and 40% of smokers had missed at least one appointment, with the mean number of missed appointments 2.5 (range 1–8) among those who did not attend.

96.7% of patients had a symphysiofundal height (SFH) measured in clinic, with a mean of 4.5 SFHs per patient. 83.8% had ultrasound measurement of abdominal circumference (AC) in the clinic, with mean of 2.75 ACs per patient during pregnancy. Only 11.8% had full biometry performed in the antenatal clinic. 66.6% were referred for a departmental ultrasound scan, and 60% of these were for suspected fetal growth restriction (FGR). 12.9% of the smokers had an antenatal diagnosis of FGR, which is double the rate of non-smokers at 6%. Despite two thirds of smokers receiving an additional growth scan, the rate of undetected growth restriction was similar to controls (64.2% vs. 61.5%, $p = 0.86$). 9.6% of smokers had a low lying placenta at anomaly scan, with 2% having a later diagnosis of placenta praevia or percreta.

The rate of hypertensive disease in pregnancy was low. 1% had a history of essential hypertension. The incidence of pregnancy induced hypertension was 5.37% and preeclampsia 2.15%. There were no cases of severe maternal morbidity in either group.

Induction of labour rate was equal in both smokers and non-smokers, at 33.3%. However, smokers were more likely to be induced for SGA (10% vs 2% $p = 0.03$) than non-smokers. Smokers had a lower mean birthweight (3.16 kg vs 3.47 kg $p < 0.001$, Fig. 1) and mean birth centile (27th vs 47th $p < 0.001$) than non-smokers. Twenty eight per cent of smokers had a birth weight less than 10th centile, a significantly higher incidence than non-smokers (28% vs 13% $p < 0.001$).

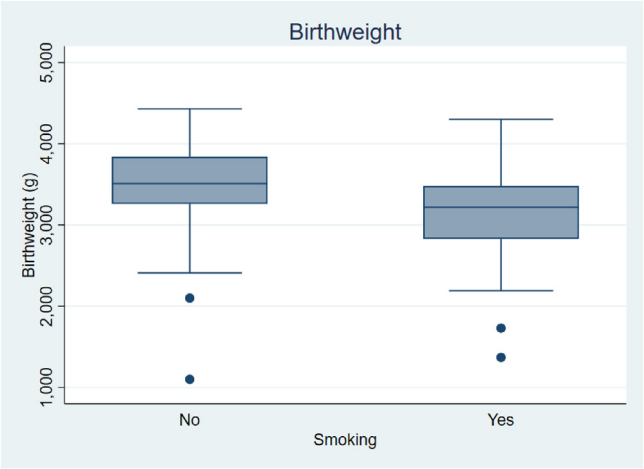

Fig. 1. Mean birthweight in non-smokers and smokers, 3.47 kg vs 3.16 kg ($p < 0.001$).

63.6% of all smokers had a spontaneous vaginal delivery (SVD), 13.1% had an instrumental delivery and the total caesarean section rate was 24.3%. 45.5% of non-smokers had an SVD, 15.4% had an instrumental delivery and 39.1% had a caesarean section. The rate of SVD was higher in smokers than in non-smokers, which may be reflective of lower birthweight and increased parity. Among primigravida, the rate of SVD was similar (Table 4).

There was no significant difference in gestation at delivery between smokers and non-smokers; the rate of iatrogenic delivery before 37 weeks; the rate of admission to neonatal intensive care unit (NICU); mean Apgar scores; or the incidence of serious postnatal morbidity (defined as hypertension requiring treatment, blood transfusion, wound infection, hysterectomy or bladder injury). Smokers were significantly less likely to be breastfeeding at discharge than non-smokers (27.2% vs 61.1%, $p < 0.001$) (Table 5).

Comment

Despite a reducing national prevalence in pregnancy, maternal cigarette smoking remains an issue of concern. Approximately 11% of Irish women smoke during pregnancy, however the actual prevalence is unknown as data is not collected at a national level. There is little information on individual advice or interventions provided or the effect on hospital workload. Our study sought to analyse the care pregnant smokers receive by investigating the individual interventions and outcomes occurring during pregnancy.

We found that only a third of pregnant women who smoke had documented cessation advice given by either a doctor or midwife at booking visit, with one fifth having cessation status re-visited

Table 3
Mental health disorders among smokers and non-smokers. 'PND' – postnatal depression.

	Smokers	Non-smokers	p-value
Depression, PND or bipolar disorder	36.3%	5.5%	$p < 0.001$*
Anxiety or panic attacks	34.3%	6.5%	$p < 0.001$*
Delusional disorder	1	0	N/A
Eating disorder	3	0	N/A

* Denotes significance at $p < 0.05$.

Table 4
Mode of delivery in smokers vs. non-smokers.

		SVD	Instrumental	LSCS
Smokers	Total	63%	11%	23.6%
	Primigravida (28.2%)	32.1%	39.3%	28.6%
Non-smokers	Total	45.5%	15.4%	39.1%
	Primigravida (32.7%)	30.5%	27.9%	41.6%

Table 5
Other delivery related outcomes in smokers vs. non-smokers.

	Smokers	Non-smokers	p-value
Depression, PND or bipolar disorder	36.3%	5.5%	$p < 0.001^{*}$
Anxiety or panic attacks	34.3%	6.5%	$p < 0.001^{*}$
Delusional disorder	1	0	N/A
Eating disorder	3	0	N/A

* Denotes significance at $p < 0.05$.

subsequently. None of the midwives or doctors providing smoking cessation advice were formally trained to do so. Only one patient, representing 1% of the sample, was documented to have stopped smoking. No smokers were offered a structured smoking cessation intervention, which is best practice internationally. While 75% of women availed of combined care between the maternity unit and their GP, 25% opted for MLC. However, two thirds of these women were transferred back to their obstetric team, predominantly for palpating small for gestational age or having multiple missed appointments. Overall, 40% of smokers had at least one missed antenatal appointment.

Despite smoking being a risk factor for fetal growth restriction, only two thirds were referred for a fetal growth scan As expected, 28% of smokers delivered a baby weighing less than the 10th centile, and smokers had a significantly lower birthweight at delivery than non-smokers.

Importantly, this research highlights significant markers of deprivation among smokers, who are more likely to be younger, parous, and have a history of illicit drug use. They are less likely to have a planned pregnancy, and to have taken pre-conceptual folic acid. In keeping with previous research, smokers had a higher rate of mental health disorders such as depression, anxiety and panic attacks.

The Irish National Maternity Strategy 2016–2026 highlights smoking as a risk factor for maternal and fetal complications [12]. It recommends that maternity hospitals have tobacco-free campuses and have access to an on-site smoking cessation service for pregnant women. Additionally, midwives and other frontline health care professionals should have formalised training in smoking cessation. However, the implementation plan for this strategy lacks detail and most maternity units in Ireland are still lacking basic smoking cessation services. Less than a third of units have midwives trained to provide smoking cessation advice, and only one unit out of nineteen has moved from self-reporting of smoking status to biologically-verified carbon monoxide screening of all pregnant women [13].

Our research shows that the needs of pregnant smokers attending one of the largest maternity hospitals in the State are largely unmet and under resourced, with the majority having no documented cessation advice and no referral to a smoking cessation service. After decades of research into smoking in pregnancy, the most effective antenatal model of care for smokers is still unclear and specific recommendations for screening for FGR are absent. This is despite smoking being one of few major preventable risk factors for maternal and fetal morbidity and mortality. Further research is needed on models of care for pregnant smokers and on what is the appropriate model for screening for fetal growth restriction.

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