What do Midwives Need to Understand about Smoking in Pregnancy?

Abstract

Aim: This paper seeks to help midwives more fully understand smoking in pregnancy, particularly from a midwifery partnership perspective.

Method: Using the midwifery philosophy of partnership as a framework for reviewing literature on smoking in pregnancy, we explored the literature on nicotine metabolism and addiction in general, and the changes that occur in pregnancy. Quit smoking interventions commonly used were examined to see if knowledge about addiction and the physiological adaptations of pregnancy are incorporated into anti-smoking efforts aimed at pregnant women.

Results: Quitting is harder for the pregnant woman because the physiological adaptations of pregnancy increase the clearance of nicotine thus lowering nicotine levels and increasing the desire to smoke. Women who continue to smoke generally have fewer external sources of pleasure and satisfaction in their lives, which, when combined with the physiological and emotional challenges of pregnancy, means that they are less likely to quit smoking and remain abstinent. These factors do not appear to be taken into account for pregnant smokers. The concept of partnership between women and midwives during anti-smoking interactions is lacking.

Conclusion: Midwives are in a position to support women and their families in all health related issues, including smoking cessation. We recommend that midwives ask permission before making enquires about sensitive issues such as smoking. When discussing smoking with pregnant women, midwives work within the philosophy of midwifery, with the emphasis on building trust and maintaining relationships. Great
sensitivity is required and as much as possible the conversation should be a dialogue, not a monologue.

Introduction

In this paper we argue that women find quitting physiologically (1) and psychologically (2) more difficult during pregnancy. We examine nicotine metabolism and addiction explicit to pregnancy so that midwives might better understand the issues surrounding smoking in pregnancy. First, the role that nicotine plays in women feeling pleasure and satisfaction is presented. Next, the physiological adaptations to pregnancy and alterations to nicotine metabolism are discussed. The research showing the link between low socioeconomic status and continuing to smoke during pregnancy is examined. Finally, anti-smoking interventions employed during pregnancy are considered from the perspective of their compatibility with the Midwifery Partnership model of care.

Pregnancy is seen as an opportunistic teaching moment (3), in which health professionals, including midwives, attempt to persuade (4) women to quit smoking. A smoker is defined as a person reporting to have smoked at least 100 cigarettes during their lifetime and currently smoking ‘everyday’ or ‘some days’ (5). In relation to pregnancy, a smoker is defined as a woman who smokes one or more cigarettes at any time during her pregnancy (6). Health professionals, often assume pregnancy is a time when women find it easier to quit smoking because they have the added motivation of having a baby. This assumption is not based on evidence and, as we argue below, this baby-centric view is often unhelpful. Well-designed quit smoking interventions in pregnancy have been extensively studied using randomised controlled trials. A Cochrane review showed that, on average a 6% increase in quit rates compared with
standard care.(7) This is a very modest improvement in quitting. The quitters are more likely to be educated, middle-class, married women; which leave a large proportion of women still smoking after the intervention has been delivered. (8-14) This paper seeks to help midwives more fully understand smoking in pregnancy; particularly from a midwifery partnership perspective.

**Dopamine, Pleasure and Addiction**

Dopamine is a neurotransmitter that is most commonly associated with the pleasure system of the brain. It is a key regulator of behavioural adaptation and anticipatory processes required for actions taken because of the intention to gain pleasure\(^{(15)}\). A dopamine release provides temporary feelings of enjoyment. Ordinary, daily activities like eating, seeing, socialising, creating art or craft, dancing and making love all produce dopamine releases\(^{(16)}\). People who obtain their dopamine via activities that promote and/or maintain health and well-being are less likely to acquire dopamine responses through actions based on addiction\(^{(16)}\).

Dopamine is responsible for positive reinforcement responses that provoke repetition of particular behaviours. Any action or substance metabolised that produces a sense of well-being or satisfaction will activate the release of dopamine thus strengthening the gratification or ‘feel good’ sensation associated with the experience\(^{(17)}\).

Dopamine appears to be involved in all addictive behaviour\(^{(16)}\). Nicotine provides women with limited internal and/or external sources of ‘feel good’ experiences capable of activating a dopamine release and therefore a temporary feeling of satisfaction\(^{(18)}\). People who have experienced life traumas, who live in stressful and/or
abusive situations or who lack love and companionship are much more likely to turn to maladaptive sources to provide their dopamine\(^{(16)}\).

Addiction may be defined as a “persistent substance use in the face of cumulative costs, such as psychological distress, social conflict and physical harm to health”\(^{(19)}\). This definition is inclusive of the pregnant woman’s existence in a social world that abhors smoking in pregnancy, the health risks associated with smoking for the woman and her baby, and the shame and guilt often cited by women who are unable to quit during pregnancy\(^{(2, 20)}\).

Addiction is often linked with terms such as ‘uncontrollable’ and ‘irresistible cravings’\(^{(21)}\). Yet these terms may be describing an individual’s response to their environment at a particular point in time\(^{(21)}\). The person is motivated to react in a specific way within that context. Motivational theory suggests people are motivated to feel good by acquiring positive reinforcements or to reduce the possibility of feeling bad by minimising negative reinforcements\(^{(22)}\). A positive reinforcement may be explained as follows. A person inhales the smoke from a cigarette. Nicotine in the smoke triggers the brain’s nicotinic receptors and a flood of dopamine results in a feeling of satisfaction\(^{(21)}\). As the time increases since the final inhalation of the cigarette, dopamine levels drop until the person feels discontented, unsatisfied or bad. To stop the negative feelings associated with low levels of dopamine the person is motivated to obtain another dopamine release initiated by nicotine and so another cigarette is lit.
Smoking & Nicotine Addiction

Nicotine is delivered to the Central Nervous System via arterial circulation within 10-20 seconds following inhalation of tobacco smoke\(^{(18)}\). Nicotine activates nicotinic acetylcholine receptors in the brain. Specifically the effect occurs in the mesocorticlimbic dopaminergic system that projects into the nucleus accumbens and prefrontal cortex from the ventral tegmental area. Initially nicotinic acetylcholine receptor activation produces a cascade of actions resulting in a dose dependant increase in dopamine levels\(^{(16)}\); a euphoric state of being results.

Tolerance to nicotine occurs over time, with increasing amounts of nicotine being required to satisfy the activation requirements of the nicotinic acetylcholine receptors. Over time the body increases the number of receptors available for activation. This process is called up-regulation\(^{(23, 24)}\) and may explain the short-term intensity of withdrawal symptoms experienced by persons who are physiologically addicted to smoking. Withdrawal is experienced within hours of abstaining, with the half-life of nicotine being 120 minutes\(^{(18, 24)}\).

The act of smoking tobacco involves both positive and negative reinforcements\(^{(21)}\). The positive reinforcement occurs with the inhalation of tobacco smoke and the anticipated feelings of satisfaction. The negative reinforcement occurs with the person’s desire to abstain from the dissatisfied feelings associated with withdrawal\(^{(25)}\). The discursive practice of addictive behaviour involves a ‘feel good’ and a ‘feel bad’ binary with people dipping in and out of states of feeling good or feeling bad. In binaries one is always valorised over another\(^{(21)}\). For the pregnant woman, ironically, her feel good state involves a behaviour sanctioned as ‘bad’ by the
general public and the health care workers with whom she must interact throughout her pregnancy.

Regular smokers become conditioned to the anticipated positive reinforcement associated with smoking. They anticipate a ‘feel good’ sensation following a cigarette and as such are conditioned to certain cues associated with smoking. Cues often linked with smoking are rising in the morning, coffee and lunch breaks, driving home, following dinner, and when the children have been put to bed\(^{24}\). These cues incite an anticipated ‘feel good’ positive reinforcement. Smoking at these times is pre-conditioned and often the hardest to resist when abstaining.

Persons attempting to quit smoking often cite withdrawal symptoms such as increased stress and anxiety as the reason for their relapse\(^{26}\). Withdrawal is a stressor for individuals and as such initiates the release of cortisol-releasing factor (CFR) in the nucleus accumbens. Cortisol-releasing factor increases the individual’s drive to feel good by a negative reinforcement of the anxiety associated with abstaining\(^{23}\). Therefore, persons endeavouring to stop smoking have to overcome the anticipated positive reinforcement or conditioned cues as well as the augmented negative reinforcement drive.

**Nicotine, Hormonal Adaptation and Pregnancy**

Nicotine levels are similar in male and female smokers, although women may smoke fewer cigarettes\(^{24}\). The comparable nicotine readings are the result of slower nicotine clearance mechanisms in non-pregnant females\(^{24}\). During pregnancy, nicotine metabolism accelerates, with nicotine clearance increasing by 60% and cotinine clearance increasing by 140%\(^{1}\). The increase in nicotine clearance makes the
physiological/addictive aspect of quitting or reducing tobacco intake during pregnancy more difficult. Blood levels of nicotine decrease at a faster rate hastening the experiences of physiological withdrawal. The increase in cotinine clearance also has implications for researchers validating smoking cessation interventions. Using cotinine measurements calibrated on non-pregnant persons who smoke as validation is flawed. Measuring reductions in nicotine or cotinine levels may reflect faster clearance mechanisms rather than actual drops in consumption (1, 27).

In addition, smoking patterns during pregnancy and childbirth are affected by hormonal adaptation which alter taste sensation (28). Many women who quit smoking spontaneously during pregnancy experience an aversion to the taste and smell of tobacco (23, 29). Normal taste and smell return quickly following birth (28). This physiological occurrence coincides with the large number of women resuming smoking within 3 months after birthing (14, 28, 30). Current anti-smoking interventions and health care professionals delivery of such interventions largely ignore the physiological barriers specific to quitting during pregnancy.

**Smoking During Pregnancy and Socioeconomic Status**

Smoking during pregnancy is compellingly linked with a woman’s socioeconomic status and level of education, (13) employment status, (11, 12, 13) relationships and socialisation with other smokers, (9, 10) perceived lack of social support. (9) Women’s concern for personal safety, financial security and feelings of emotional isolation also impacts on smoking behaviour (8). Low socioeconomic status restricts potential sources of satisfaction, and so alternative sources may be sought. “Because satisfaction cannot be stored, it must continually be renewed” (16, p. 22), women with limited access to
sources of socially acceptable dopamine triggers are at greater risk of seeking maladaptive sources such as smoking, alcohol, gambling and risk taking\textsuperscript{(16)}.

Socioeconomically disadvantaged women cite addiction, habit and stress (especially during pregnancy) as a reason for continued smoking during pregnancy\textsuperscript{(31)}. Health risks associated with smoking are considered distant in relation to the immediate gratification experienced with smoking for these women\textsuperscript{(28, 32-35)}. Pregnancy is not seen by women as a good time to quit because they view smoking as one of the best ways to deal with stress, depression, anxiety and the additional pressures of motherhood. Women state that smoking helps relaxation and weight control practices\textsuperscript{(33)}. The inability to quit when societal expectations are high reinforces the negative stigma associated with smoking and pregnancy.\textsuperscript{(8, 9, 11, 13, 36)} Drug use, such as smoking, is a response to a state of personal, social breakdown. Escape from the daily stress and hardship of economic disadvantage appears to correlate with higher smoking rates and lower quit rates among smokers\textsuperscript{(37)}. Smoking in turn predisposes to poorer health and poorer birth outcomes for the woman and baby\textsuperscript{(38, 39)}.

People who smoke refer to the benefits of smoking. There is anecdotal evidence that stress is reduced, with anxiety and mood being improved by smoking. People who smoke also claim that motivation and concentration is superior following a cigarette\textsuperscript{(18, 24)}. These claims are partly supported by research, with motor function, cognitive functioning and visual perception being enhanced after a cigarette\textsuperscript{(24)}. This strengthens the positive reinforcement attained via the dopamine feedback mechanism and may account for a person’s desire to maintain a habit that is considered unhealthy.
The links between adverse pregnancy outcomes and poverty, independent of smoking, are becoming clearer. There is a growing body of knowledge regarding the correlation between poor birth outcomes and poor maternal nutrition\textsuperscript{(40, 41)}, low socioeconomic status, low level of education\textsuperscript{(42)}, periodontal disease\textsuperscript{(43-47)}. Despite research identifying poverty as a key factor in adverse outcomes during pregnancy and birth, the emphasis of quit interventions is still on women’s smoking behaviour rather than their socioeconomic status and lack of support.

**Quit Programs and Pregnant Women**

Women are expected to be knowledgeable about health issues related to pregnancy, birthing and mothering; including the impact of smoking on health. The sources of knowledge available can be problematic for the woman because the focus of most anti-smoking information is based on the assumption that smoking is a lifestyle choice rather than an addiction.\textsuperscript{(48)} The life-style choice assumption shifts the focus from addiction as a public health issue to one of individual blame. Polices and programs that are delivered authoritatively by doctors and midwives absolves the State of responsibility for providing real assistance to women who are addicted to nicotine.\textsuperscript{(49)} The life-style choice assumption also makes the woman responsible for any adverse pregnancy outcomes that may be associated with smoking.

Anti-smoking campaigns are designed to inform, shock, or shame smokers into quitting.\textsuperscript{(2, 4, 7, 24)} The campaigns rarely take into account low self-esteem, low self-efficacy, poverty, stress and increased caring responsibilities that are common among women who continue to smoke in pregnancy\textsuperscript{(48)}. The problem is that unless individual factors are taken into account the health promoting opportunity is wasted. Emily Gilbert conducted research with young women who smoke.\textsuperscript{(48)} She concluded that
when anti-smoking programs are discordant with the value system of the individual, the person tends to alleviate the incompatibility through separating the self. Alternately, the smoker may amend the received messages to maintain their own view of themselves which, at the time includes being a smoker.\(^{48}\) For women who face emotional, financial or physical challenges on a day-to-day basis, long-term health problems associated with continued smoking are a distant concern when weighed against their immediate problems and the potential relief gained from smoking.\(^{50}\) Being in command of risk taking behaviours such as smoking may be the only instance in which control may be exerted in an otherwise uncontrollable existence\(^{48}\).

**Quit Smoking Interventions and Midwifery Practice**

Smoking and smoking cessation advice is discussed most often during the first antenatal visit.\(^{51}\) There is generally no negotiation of when and how anti-smoking interventions will be discussed. Consent to broach the subject is not expected by the data system or hospital antenatal record that midwives uses. One Australian study showed the midwives did not seek permission before asking questions about smoking behaviours.\(^{52}\) Expected documentation is limited to recording if the woman smokes and if so, how many per day. The woman’s response to the intervention is not usually documented.\(^{52}\)

What happens during a standard antenatal visit in relation to smoking is most often based on a cognitive behavioural or educational model of change.\(^{7, 17, 18}\) Midwives who follow the instructions given in standard quit smoking campaigns, focus primarily on the ill effects for the unborn baby.\(^{7}\) A focus on the baby is more akin to a medical model of care. A midwifery philosophy, in contrast, focuses holistically on the woman’s health and wellbeing, which of course incorporates the
Indeed, the competency standards for midwifery state the midwife “plans and evaluates care in partnership with the woman” (competency 3, element 3.3). This competency, when applied to quit smoking interventions, would mean listening to the woman; involving her in decision-making and documenting outcomes, including the woman’s response to the quit smoking interaction.

The woman’s desire to smoke is not considered in standard antenatal quit smoking interventions. However, pleasure and desire are at the centre of addictive behaviour. Desire and pleasure are shaped through discursive and interactive practices. When considering health professional interventions with people who have addictions, Sterling claims that, “the most successful interventions do not deny the sense of need. Rather they find ways to satisfy it by enlarging positive social interactions and reviving the sense of connectedness.” (16, p. 29). This view is consistent with a midwifery philosophy and opens up possibilities to assist women in positive ways. Midwives are in a position to support women and their families through their role as social network facilitators. Women would gain a greater sense of control or agency by supporting each other.

**Discussion**

Health authorities grant health professionals the power to attempt to persuade women into changing their lifestyles. Midwives are in a unique position. They have an opportunity to establish and maintain a relationship with women over a long period of time. Health authorities however, see the first few moments as a time to teach to a captive audience. We are arguing that this is an exercise of power over the women, not a partnership of power-sharing and joint decision-making. Use of antenatal visits as teachable moments for smoking cessation when women have not attended the
health service specifically for their smoking behaviour may be inappropriate.\(^{(4)}\) Indeed, delivering an anti-smoking message may be seen as judgemental and patronising: this alone could be the basis for not attending follow-up antenatal visits.\(^{(59)}\)

If what happens in standard antenatal visits is not good enough, what should midwives be doing instead? We are not in a position to have all the answers, but a good place to start is a discussion with the woman is from a base of partnership philosophy. The midwife who is committed to partnership practice believes that the woman is the best person to care for her baby. Attempts by midwives to care for the baby without the woman’s full involvement and consent are, we believe, both futile and disempowering. Consent seeking is consistent with the Australian Nursing and Midwifery Council Competencies that the midwife should obtain informed consent for midwifery interventions.\(^{(54)}\)

We suggest that midwives should be aiming for a sensitive and supportive discussion. Treating women sensitively and supportively is even more crucial when dealing with what is often a shameful personal behaviour such as smoking. Ideally, anti-smoking interventions employed within a Midwifery Partnership model of care would begin with a request to engage in a discussion about smoking. For example “Is it O.K. if I ask you about smoking?”

**Conclusion**

This paper put forward the concepts of addiction in relation to women and pregnancy. It was revealed that nicotine metabolism is altered during pregnancy with increased nicotine clearance causing pregnant women to physiologically withdraw faster. In addition to the physiological barriers to quitting, pregnant women face
increased psychological and emotional hardships associated with the mothering and caring roles. Continued smoking during pregnancy is also linked to low socioeconomic status. Women, therefore, experience added difficulties when attempting to quit while pregnant. Current anti-smoking interventions are based on health professional’s understanding of the risks or harm of smoking and the dissemination of that information. Smoking behaviour, however, may not be just an issue of information dissemination. The psychological issues related to addictive conduct and behaviour change is more important\(^{(60)}\). Approaches aimed at changing the smoking behaviour of pregnant women are based on strategies employed for non-pregnant smokers. They are brief and delivered didactically\(^{(61)}\). We recommend that midwives ask permission before making enquires about smoking. When discussing smoking with a pregnant woman, great sensitivity is required and as much as possible the conversation will be a dialogue; not a monologue.
References


43. Boggess KA, Moss K, Murtha A, Offenbacher S, Beck JD. Antepartum vaginal bleeding, fetal exposure to oral pathogens, and risk for preterm birth at <35


