Nicotine & Tobacco Research, 2017, 652–655
doi:10.1093/ntr/ntw254
Brief report
Received June 3, 2016; Editorial Decision September 13, 2016; Accepted September 28, 2016

Brief report

The Influence of Smoking on Breast feeding Among Women Who Quit Smoking During Pregnancy

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Abstract

Introduction: Understanding factors related to breast-feeding intention, initiation, duration, and weaning among women who quit smoking as a result of pregnancy may inform interventions to increase breast-feeding rates among women who smoke.

Methods: Women ($N = 300$) who quit smoking as a result of pregnancy and enrolled in a postpartum relapse prevention trial were interviewed about breast-feeding intention prior to delivery. Breast-feeding initiation, duration, reasons for weaning, and relapse to smoking were assessed at 12-weeks postpartum.

Results: The majority of pregnant former smokers intended to breastfeed (68%), and actual rates of breast feeding were higher (74%). Among women who initiated breast feeding, weaning before 2 months was common (41%). For most women (69%), smoking had no effect on breast-feeding decisions. Among the 31% of women who reported that smoking influenced their feeding decisions, 83% indicated that they did not smoke or decreased smoking frequency in order to breastfeed while 17% did not breastfeed or quit breast feeding in order to smoke. Women who decided to forgo breast feeding to smoke were significantly more likely to have a high school education or less ($p < .001$) and to be African American ($p < .0001$) than those who had other reasons not to breastfeed.

Conclusions: Most women who quit smoking during pregnancy initiate breast feeding, and the majority report smoking did not influence feeding decisions. Importantly, among women for whom smoking did influence feeding decisions, most reported changing smoking behavior to enable breast feeding. Interventions to increase breast-feeding initiation and duration may decrease postpartum relapse and improve maternal and infant health.

Implications: This study extends the literature on women's perception of the influence of smoking on breast feeding by assessing breast-feeding intent, initiation, duration, and reasons for weaning longitudinally among women who quit smoking as a result of pregnancy. The results support a need for additional research to determine the effectiveness of breast feeding supports as a component of interventions to reduce postpartum smoking relapse.

Introduction

Breast feeding confers many benefits to mothers and infants. Breast-feeding mothers have greater postpartum weight loss and lower rates of medical concerns, including type 2 diabetes mellitus, hypertension, hyperlipidemia, cardiovascular disease, ovarian cancer, and breast cancer.[1–6] Breastfed infants are at lower risk for obesity, ear, respiratory, or gastrointestinal infections, eczema, leukemia, and sudden infant death syndrome.[7–12]

Given the benefits, the American Academy of Pediatrics recommends exclusive breast feeding for 6 months and continuation of breast feeding until age 1 year.[13] Although 79% of infants are ever breastfed, rates of exclusive breast feeding are only 41% at 3 months.[14] Breast-feeding initiation rates are lower among women who are unmarried, of low socioeconomic status, African American, or had an unintended pregnancy.[15–17] Understanding demographic and health-related factors linked to breast-feeding initiation and the behavior changes mothers make around pregnancy may help to increase rates of breast feeding.

Maternal smoking is one such behavior with deleterious effects on breast-feeding initiation and duration and is associated with many of the health risks of not breast feeding. Although many women quit smoking in pregnancy, relapse rates are high and postpartum smoking has been linked to feeding style.[18–19] Women report that smoking was the strongest predictor of not initiating breast feeding, and mothers who smoke are more likely to wean early (i.e., before 3 months) than are mothers who do not smoke.[20–21]

Despite the passage of nicotine through breast milk, the American Academy of Pediatrics supports breast feeding regardless of smoking status.[22] Understanding the relationship between breast feeding and smoking status can inform interventions aimed at decreasing postpartum relapse to smoking and increasing breast feeding among women who quit smoking during pregnancy. Thus, we sought to examine breast-feeding intention, initiation, and duration in women who had quit smoking as a result of pregnancy. We hypothesized that pregnant former smokers would report high intent to breastfeed prior to delivery but ultimately would have low breast-feeding initiation rates. We further predicted that women would report early weaning as a consequence of relapse to smoking postpartum.

Methods

Participants

Participants were enrolled in a relapse prevention trial among women who had quit smoking as a result of their pregnancy.[23] Pregnant women who smoked daily for at least 1 month during the 3 months prior to becoming pregnant, at least five cigarettes per day before quitting, had not smoked during the past 2 weeks, and were motivated to stay quit were recruited. At enrollment, smoking cessation was documented using the timeline follow-back methodology[24] and an expired-air carbon monoxide (CO) level less than or equal to 8 parts per million (ppm). Motivation to stay quit postpartum was assessed on a four-point scale ranging from "not at all motivated" (0) to "extremely motivated" (3), and women with a score of at least 2 were considered motivated to stay quit.

Method

Women provided biochemical verification of cessation and completed demographics, breast feeding, and smoking assessments during their third trimester of pregnancy (i.e., 34–38 weeks gestation) and again at 12-weeks postpartum. The University of Pittsburgh Institutional Review Board approved this protocol, and all participants provided written informed consent.

Measures

Demographic Information

Women reported demographic and pregnancy-related information, including age, race, ethnicity, income, education, and parity at enrollment.

Breast feeding

Standard breast-feeding questionnaires do not ask about infant-feeding intention, thus a survey was adapted from existing literature.[25] During pregnancy, women were asked, "Which of the following best describes the way you intend to feed your baby?" with options of breastfeed only, both breast feed and formula feed, formula feed only, or unsure.[25] Postpartum assessments were based on a national survey. At 12 weeks postpartum, women were asked if they had ever breastfed their infant. Women who reported that they had breastfed, but were not currently breast feeding, subsequently were asked the age their infant was when they stopped breast feeding.[26] Women also were asked to report factors influencing their decision to stop breast feeding using a list of commonly reported reasons based upon the literature for why women stop breast feeding.[27–28] Finally, women were asked whether or not smoking had affected their decision to breastfeed.

Smoking Status

At both assessments, women were interviewed about smoking behavior using the timeline follow-back methodology.[24] Expired-air CO and a salivary cotinine sample were collected. Relapse was defined as the self-report of seven consecutive days of smoking, a CO >8 ppm, or a cotinine level >15 μg/L.[29]

Analysis

Frequency counts were used to calculate prenatal intention to breastfeed, actual rates of breast-feeding initiation, reasons for weaning, and the influence of smoking on breast feeding. Chi-squared analyses were used to compare demographic and health-related differences between women retained in the sample and women with missing data, women who did and did not report intent to breastfeed, and women for whom smoking influenced their decision to breastfeed and those for whom smoking did not influence breast-feeding decisions.

Results

Participant Characteristics

Women enrolled were 25.99 (*SD* = 5.65) years old on average and 54% (*n* = 163) were African American. Nearly half of the sample had a high school education or less (46%; *n* = 137). Most (71%; *n* = 214) reported that their pregnancy was unplanned, and 52% (*n* = 156) were in their first pregnancy. Relapse was common, with 59% (*n* = 167) relapsing by 12 weeks postpartum.

Intent to Breastfeed

The majority of pregnant former smokers (68%; *n* = 204) reported intent to breastfeed their infant. Of these women, 46% (*n* = 139) planned to breastfeed exclusively, 22% (*n* = 65) intended to both breastfeed and formula feed their infant, 24% (*n* = 73) reported

intent to only provide formula to their infant, and 8% (n = 23) were unsure of their feeding preference. Women in their first pregnancy were significantly [$\chi^2(1) = 11.89$; $p = 0.001$] more likely to report intent to breastfeed (77%; n = 120) than were women pregnant in their second or greater pregnancy (58%; n = 84), as shown in Table 1.

Rates of Breast feeding

Breast-feeding initiation data at 12 weeks postpartum were available for 268 (89%) women. The 32 women for whom breast-feeding data were missing at 12 weeks postpartum were more likely to have reported intent to formula feed or uncertainty regarding their feeding preference at baseline [$\chi^2(1) = 7.35$; $p = 0.007$] and to be younger in age [$\chi^2(1) = 4.11$; $p = 0.043$]. The actual rates of breast feeding following delivery were even greater than reported intent to breast feed, with 74% (n = 197) of women reporting that they initiated breast feeding.

Despite high rates of breast-feeding initiation, early weaning was common, with 15% (n = 39) of women breast feeding for 1 week or less and 41% (n =109) of women weaning their infant from breast feeding by 2 months of age, regardless of parity [$\chi^2(1) = 0.11$; $p = 0.74$]. The most commonly reported reasons for early weaning included maternal perception of insufficient milk production (11%; n = 30), pain with breast feeding (11%; n = 29), and baby refusing to breastfeed (8%; n = 22).

Relationship Between Breast feeding and Smoking

At 12 weeks postpartum, 69% (n = 186) reported that smoking had no effect on their decision to breastfeed. Among the 31% (n = 82) who reported that smoking influenced their feeding decisions, 83% (n = 68) indicated that they either did not smoke or decreased smoking frequency in order to breastfeed their infant whereas 17% (n = 14) reported that they did not breastfeed or quit breastfeeding in order to smoke. Demographic factors associated with quitting smoking or with a decrease in smoking frequency due to breast feeding were Caucasian race [$\chi^2(1) = 4.15$; $p = 0.042$] and higher educational attainment [$\chi^2(1) = 6.37$; $p = 0.012$]. Women who decided to forgo breast feeding to smoke were significantly more likely to have a high school education or less [$\chi^2(1) = 9.62$; $p = 0.002$] and to be African American [$\chi^2(1) = 9.43$; $p = 0.002$].

Discussion

The present study is the first to assess factors related to breast feeding intention, initiation, duration, and weaning among pregnant former smokers. Most women who quit smoking as a result of pregnancy report intent to breastfeed and an even greater number of women actually initiate breastfeeding. Women in their first pregnancy were significantly more likely than those with previous pregnancies to report intent to breastfeed. The effect of parity may stem from a lack of previous negative experiences, greater encouragement from health care providers, or shifts in cultural norms for new mothers, as breast-feeding rates continue to increase.[14] Despite high rates of initiation, early weaning was common. Contrary to our hypothesis, the majority of pregnant former smokers reported that smoking had no relationship to weaning. Among those who reported smoking influenced their decision to breastfeed, most reported continued cessation or decreased smoking frequency. A minority reported forgoing breast feeding in order to smoke and these women were more likely to be African American and to have had no more than a high school education.

As predicted, the reported rates of breast-feeding intent among former smokers were comparable to recent national breast-feeding initiation rates.[26] This result is surprising given that smoking has been reported as a strong predictor of not planning to breastfeed.[20] However, women enrolled in a postpartum smoking relapse prevention trial may not be representative of all women who smoke prenatally. Indeed, women who initiated breast feeding prior to hospital discharge were more likely to have quit smoking early in pregnancy,[30] which suggests that smoking cessation may correlate with motivation to improve infant health.

Consistent with previous literature on breast feeding and smoking, the current study found higher early weaning rates than reported nationally.[26] Qualitative data suggest that, among low-income women who smoked during pregnancy, early weaning is common and relates to concern about nicotine in breast milk and the influence of negative messages from health care providers about their breast feeding.[31] Importantly, however, encouragement for breast feeding by obstetricians can increase rates of breast feeding.[32] Support from health care providers may improve rates of breast-feeding initiation and duration, which may decrease rates of postpartum relapse to smoking. Focus group data indicate that African American women desire more information about breast-feeding expectations and troubleshooting than they currently receive,[33–34] and our findings suggest that additional breast feeding supports may be needed for women who are less likely to initiate and more likely to forgo breast feeding to smoke, including African American women and women with lower educational attainment.

Strengths of this study include longitudinal assessment of breast feeding, biochemical verification of smoking cessation, use of a racially and socioeconomically diverse sample, and a comprehensive assessment of women's reasons for weaning. There also are several limitations. First, women were enrolled in a postpartum smoking relapse prevention trial, which required motivation to stay quit. Thus, the findings may not be generalizable to all pregnant smokers. Second, the breast-feeding assessments required women retrospectively to report on factors that had influenced their decision to stop

Table 1. Participant Characteristics and Breast-Feeding Intent

		Intent to breastfeed		
Demographic variable	Total	Yes	No	p
Age (mean, *SD*)	25.99 (5.65)	25.81 (5.72)	24.87 (5.43)	.44
Race (% African American, n)	54 (163)	61 (99)	39 (64)	<.01
Household income (% ≤30 000, n)	78 (235)	65 (153)	35 (82)	.03
Education (% ≤HS education, n)	46 (137)	59 (81)	41 (56)	<.01
Parity (% nulliparous, n)	52 (156)	77 (120)	23 (36)	<.01

breast feeding thus the data are subject to recall bias. Finally, breast feeding was only assessed at 12 weeks postpartum. Because women's perception of the influence of smoking on breast feeding may change over time, particularly as more women relapse to smoking, longer term follow up is important to better characterize the link between postpartum smoking and breast feeding.

Nonetheless, a majority of women who quit smoking as a result of pregnancy reported intent to breastfeed and even more initiated breast feeding. Relapse to smoking and early weaning occurred in high rates by 12 weeks postpartum. Whereas most women reported that smoking did not influence their breast-feeding decision, the majority of those who reported a link explained that they remained quit or decreased smoking frequency to breastfeed. Thus, education of the risks and benefits of breast feeding while smoking, and encouragement of breast feeding by health care professionals despite smoking status may increase breast-feeding duration and, thereby, increase rates of sustained smoking abstinence postpartum.

Funding

Support for this trial was provided by grant R01DA021608 (PI: Levine) from the National Institute on Drug Abuse.

Declaration of Interests

None declared.

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