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Associations among breastfeeding, smoking relapse, and prenatal factors in a brief postpartum smoking intervention

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Abstract

Postpartum smoking contributes to child health problems and is a barrier to breastfeeding, which promotes child health. There is a risk of postpartum smoking relapse for smokers and they are less likely to breastfeed. Understanding of smoking–breastfeeding associations must be improved. Enhancing smoking cessation advice simultaneously with breastfeeding counseling could increase smoking abstinence and breastfeeding rates. A low income sample of 31 volunteer maternal smokers and ex-smokers were recruited for this pilot intervention in an urban hospital's postpartum unit. Following pre-intervention interview, participants received either smoking relapse prevention plus breastfeeding counseling, or smoking relapse prevention only counseling. At one-month follow-up, we hypothesized that breastfeeding duration would positively relate to 7-day point prevalence abstinence rates and days to relapse and explored prenatal care and pregnancy smoking behavior associations with postpartum smoking and breastfeeding. Of the mothers, 75% completed follow-up. Days to relapse was related to duration of breastfeeding ($r = 0.92$, $p = 0.08$); however, counseling group differences in one-month smoking status were not significant. Earlier prenatal care initiation was associated with smoking abstinences at one month postpartum ($\chi^2 = 4.87$, $p = 0.05$). Early prenatal care and breastfeeding is associated with postpartum smoking abstinence.

Keywords

Breastfeeding; postpartum smoking; smoking relapse

Introduction

Maternal smoking during pregnancy and postpartum remains a global public health problem for women and children. Internationally, it is estimated that 15–20% of pregnant women smoke tobacco (1). Smoking during pregnancy can be highly variable. Most women are unable to quit smoking entirely during pregnancy, and among those who do quit, approximately 75% relapse postpartum (2). With burgeoning evidence of tobacco-related disease risk to maternal smokers and secondhand smoke-exposed infants, there appears to be

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a growing consensus that promoting smoking cessation and relapse prevention during the postpartum period is equally important as addressing smoking during pregnancy (3).

Infants and young children bear the greatest health risks associated with secondhand smoke exposure (SHSe). Numerous SHSe-related consequences range from increased frequency and severity of acute illness (such as ear and respiratory infections), to increased risk of chronic illness and death (asthma, sudden infant death syndrome, cancers) and increased exposure-related healthcare costs (4,5). Maternal smoking may interfere with infant-care behaviors known to promote child health, such as breastfeeding. Pregnant smokers who are not preparing to quit smoking are less likely to intend to breastfeed (6); and mothers who relapse to smoking postpartum are 50% more likely to wean early (< 12 weeks) when compared to mothers who maintained smoking abstinence (7).

Breastfeeding may help prevent or delay postpartum smoking relapse (7); however, researchers have not fully explored factors to explain this association. Nevertheless, this evidence suggests the potential utility of providing smoking relapse prevention counseling within the broader context of child health promotion through breastfeeding. Health education and counseling post-delivery is an efficient way to address a public health problem in a setting where mothers might be most receptive to health advice. Brief smoking interventions have been demonstrated among pregnant and postpartum patients (8–10). A study of pregnant women receiving care in a Planned Parenthood clinic demonstrated that brief smoking cessation counseling and follow-up telephone calls increased seven-day point prevalence smoking abstinence rates at six-week follow-up compared to a standard treatment group (10.2 vs. 6.9%, $p < 0.05$), even though differences in six-month, bio-verified quit rates were not significant (6.4 vs. 3.8%) (11). This suggests better short- rather than long-term effectiveness; however, even short-term smoking cessation could lead to subsequent breastfeeding initiation and elimination of child SHSe, which could improve maternal and child health.

The purpose of this study was to examine associations between breastfeeding and postpartum smoking behaviors and to pilot test an innovative postpartum smoking intervention that combined postpartum smoking cessation and relapse prevention advice with breastfeeding counseling in the broader context of maximizing infant and maternal health. We targeted a population of mothers with increased risk of postpartum smoking relapse. We hypothesized that longer breastfeeding duration in the first month after childbirth would relate to lower reported smoking rates and longer days to relapse. We then compared smoking and breastfeeding behaviors between two counseling groups: women receiving smoking plus breastfeeding counseling (S+B counseling) and women receiving only smoking relapse prevention advice (RP-only) after delivery in the postpartum clinic. Our second hypothesis was that women receiving S+B counseling would have lower smoking rates and more days to relapse than those receiving RP-only counseling. Last, we explored associations between prenatal factors and postpartum smoking relapse prevention.

Material and methods

Low-income mothers in a postpartum unit of a large, urban United States hospital voluntarily participated following informed consent. Eligible women were at least 18 years old, English-speaking, and were either current smokers immediately prior to hospital admission or recent ex-smokers, defined as those who quit within one year prior to current pregnancy. All procedures and materials were approved by the institutional review board for human subjects' protection at this university hospital. The demographic characteristics of the final sample who completed follow up ($n = 24$) were explored for any effects of lost-to-follow-up, but no differences were identified. Mothers who completed the follow-up had a

mean age of 22.7 (SD = 4.9) years, were primarily Hispanic (50%) or African American (25%), 45.8% were primiparous, and 62.5% had completed high school or higher education.

This study was a prospective, non-randomized feasibility and preliminary efficacy study, during which data were collected in-person at baseline within 72 hours of delivery and at one-month post-delivery over the phone. Directly following the baseline interview, participants alternately received one of two brief health counseling sessions, i.e. S+B counseling or smoking RP-only counseling without information about breastfeeding. A behavioral health counselor supervised by a health psychologist in the university's department of public health delivered both groups' materials and advice. Specific content of the S+B counseling consisted of breastfeeding and smoking cessation educational and self-help, take-home materials plus approximately 15 minutes of individual health counseling promoting infant health and highlighting the potential protective role of breastfeeding in contributing to smoking abstinence. S+B participants received the following written materials: one handout that explained the potential beneficial effects of breastfeeding in helping to prevent postpartum smoking relapse, the booklet entitled 'An Easy Guide to Breastfeeding', developed by the U.S. Department of Health and Human Services, and a smoking cessation pamphlet containing information on smoking cessation for postpartum mothers (12). RP-only participants received the smoking cessation pamphlet and approximately 15 minutes of relapse prevention without breastfeeding advice. All participants received normal care from the hospital staff, all of whom were unaware of group assignment.

The postpartum clinic interview (approximately 10 minutes in length) included assessments of socio-demographics, smoking history and current smoking status, breastfeeding intentions and behavior, and education. The one-month telephone follow-up (approximately five minutes in length) assessed smoking status, breastfeeding behaviors, and child health status and this occurred on average five weeks post-delivery.

We collected self-reported, 7-day point prevalence smoking status (0 = abstinent, 1 = smoking) at baseline postpartum and at one-month follow-up and cigarettes smoked per day prior to hospitalization for delivery and at one-month after delivery, as well as years of daily smoking. At the one-month follow-up, we measured days to relapse via timeline follow-back methods with prolonged abstinence criteria. At baseline, we obtained self-reported breastfeeding intentions and breastfeeding initiation. At one-month follow-up, we obtained maternal reported duration of breastfeeding. Because the supplementation rate in our sample was high, we defined breastfeeding to include both exclusive and partial breastfeeding. At baseline, we assessed factors during pregnancy that could be associated with postpartum smoking relapse. These included trimester of prenatal care initiation, smoking history during pregnancy, and timing of quit status during pregnancy. Qualitative data was also collected to explore barriers to breastfeeding and to assist in the understanding of the findings of this feasibility trial.

Data analysis

Equivalence of demographic characteristics between the two counseling groups was examined with chi-squared analyses; the relation between days to smoking relapse and breastfeeding duration by bivariate Pearson correlations. Qualitative data were evaluated to illustrate mothers' reasons for breastfeeding choices related to smoking. To examine potential efficacy of the S+B intervention, we used chi-squared tests to compare counseling group differences in smoking status and t-tests to assess differences in mean days to relapse at one month. Within-group trends related to the smoking outcomes at one month and the

association between factors in pregnancy and postpartum smoking were explored using chi-squared analyses and t-tests for mean differences in days to relapse ($\alpha = 0.05$).

Results

A total of 31 postpartum mothers enrolled and received either the S+B or RP-only intervention within 72 hours of giving birth. Table 1 shows comparisons between the S+B counseling and RP-only groups. No significant differences were identified between active participants and dropouts.

Participants reported mean lifetime years of smoking as 6.96 years (SD = 5.67) and mean daily smoking rate of 12.5 (SD = 7.7) cigarettes per day. Self-reported smoking history indicated that 33.3% smoked daily up to delivery, 51.5% quit smoking during pregnancy, and 15.2% quit smoking prior to pregnancy. Follow-up interviews showed that 48.5% of the participants reported initiating breastfeeding in the hospital and 42.4% planned on breastfeeding after leaving hospital.

There was a trend suggesting that the longer mothers breastfed during the month following delivery, the longer they remained abstinent from smoking ($r = 0.92$, $p = 0.08$). Among mothers who breastfed, 75% reported abstinence.

Across the sample, 62.5% of mothers reported smoking abstinence that was maintained through one-month follow-up. However, neither the difference in smoking abstinence rates between S+B (50%) and RP-only (75%) groups, nor the difference in mean duration (days) of breastfeeding between the S+B group (mean = 19.25 days, SD = 27.96) and the RP-only group (mean = 9.42, SD = 9.42) was significant. Within the S+B group, mothers who quit smoking shortly before or during pregnancy had higher rates of smoking abstinence than those who smoked through pregnancy ($\chi^2 = 4.00$, $p = 0.05$). No such trend was found in the RP-only group. Relationships examined between prenatal care and smoking relapse in the entire sample ($n=24$) suggested that women who initiated. Women who initiated prenatal care after the first trimester were more likely to report relapse at one-month ($\chi^2 = 4.87$, $p = 0.05$). Figure 1 illustrates the relation between trimester of prenatal care initiation and postpartum smoking status. Mean days to relapse was longer in mothers who quit smoking during pregnancy (mean = 19.75 days, SD = 16.54) compared to those who continued smoking during pregnancy (mean = 8.8 days, SD = 8.47).

Discussion

The findings of this study suggests that further investigation of associations between breastfeeding and postpartum relapse are warranted. Our hypothesis that breastfeeding would relate to postpartum smoking behaviors was supported because duration of breastfeeding and days to smoking relapse were positively related and mothers who quit smoking shortly before or during pregnancy were more likely to be abstinent one month postpartum in the group receiving education on smoking relapse prevention and breastfeeding. This finding was supported by qualitative reports collected through open-ended questions that reflected the influence of postpartum smoking intentions on breastfeeding intentions revealing smoking–breastfeeding associations based on misguided beliefs and missed opportunities to educate mothers about breastfeeding benefits. The qualitative data revealed that when mothers who never breastfed were asked what would have helped them to breastfeed at the one-month follow-up, 50% stated insufficient health information about smoking and breastfeeding from their obstetricians. For example, “Doctors told me not to smoke and breastfeed ... if I was able to quit I would have tried breastfeeding”. This also supports implementation of provider training that combines

smoking cessation and relapse prevention messages with breastfeeding education both in prenatal and postpartum clinics. The link between timing of prenatal care initiation and postpartum smoking abstinence highlights the potential importance of providing postpartum smoking prevention advice during the prenatal period. Because this association was only identified in the S+B group, it suggests a potential moderating effect of pregnancy smoking status on postpartum clinic counseling effectiveness that could be explored in future research.

Due to the small sample size and pilot nature of our study, we caution definitive conclusions. Also, low overall rates of breastfeeding in our sample undermined the ability to examine S+B versus RP-only comparisons. Nonetheless, our results were consistent with previous studies suggesting a relation between weaning and relapse to smoking (7), as well as duration of smoking abstinence during pregnancy as a predictor of length of abstinence postpartum (2). The timing of breastfeeding counseling may also be an important factor in promoting breastfeeding intent and duration. The effect of combining counseling topics earlier in the prenatal period, perhaps with follow-up or booster relapse prevention sessions during the postpartum admission following delivery must be explored in more detail and larger samples. Additional intervention advice may be an important approach to consider with minority and low-income populations who are less likely to breastfeed for socio-cultural reasons. Our results suggest that there remains an opportunity to improve prenatal and postpartum health education, which could highlight the potential protective effects of breastfeeding on postpartum smoking relapse. To better address these overlapping public health issues, future research is needed to improve our understanding of these associations and to improve the design and implementation of strategies that promote breastfeeding, maternal smoking, and child SHSe.

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Figure 1.
Percentage of women in the entire sample (n=24) reporting relapse at one month postpartum by trimester of prenatal care initiation.

Table 1

Demographics and characteristics of the sample by group assignment

	S+B group (n = 16)		RP-only group (n = 15)		Total sample (n = 31)		²	<i>p</i>
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%		
Mothers age by group 25years	6	33.3	3	20.0	9	27.3	0.73	0.39
Hispanic ethnicity	8	44.4	8	53.3	18	56.3	0.76	0.76
Primiparous	8	44.4	8	53.3	16	48.5	0.24	0.61
Employed	8	44.4	8	53.3	16	48.5	0.26	0.61
Government-supported health care	13	72.2	9	60	22	66.7	0.55	0.46
Education of 12 years	10	58.8	10	66.7	20	62.5	0.21	0.65
Initiated breastfeeding prior to baseline	9	50	7	46.7	16	48.5	0.04	0.85
Intent to return to smoking after discharge	4	22.2	5	33.3	9	27.2	1.91	0.39

Note: S+B, smoking plus breastfeeding; RP-only, relapse prevention only.