



Brief Report

Association of Tobacco Use During Pregnancy, Perceived Stress, and Depression Among Alaska Native Women Participants in the Healthy Pregnancies Project

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Abstract

Introduction: In general population samples, higher levels of stress and depression have been associated with increased prevalence of smoking in pregnancy. Little is known about the association of prenatal tobacco use, stress, and depression among American Indian or Alaska Native (AI/AN) women.

Methods: The Healthy Pregnancies Project is a cluster-randomized controlled trial, evaluating a community-level intervention compared with usual care, for reducing tobacco use during pregnancy and postpartum among AN women in 16 villages in western Alaska. This cross-sectional study analyzed baseline data from enrolled pregnant women. Baseline measures included the self-reported, 7-day, point-prevalence current use of any tobacco, Perceived Stress Scale (PSS), and the Center for Epidemiological Studies-Depression (CES-D). Generalized estimating equations (GEE) analyses adjusted for village, participant age, and gestational age.

Results: Participants ($N = 352$) were on average (SD) 25.8 (5.0) years of age and at 26.8 (9.8) weeks gestation. 66.5% were current tobacco users, of which 77% used Iqmik, a homemade form of smokeless tobacco. Compared with nonusers, tobacco users reported lower PSS score ($p = .020$) and less clinical levels of depression ($CES-D \geq 16$) (18.1% vs. 9.3%, $p = .21$). Findings were not accounted for by nicotine dependence severity or self-reported tobacco use before pregnancy.

Conclusions: In this sample of pregnant AN women, tobacco users report less stress and clinical levels of depression than nonusers. A potential challenge with tobacco treatment for pregnant AN women is to provide alternative ways of deescalating stress and affect management instead of using tobacco.

Implications: This study contributes novel information on the association of tobacco use, perceived stress, and depression among Alaska Native women enrolled in a clinical trial to promote healthy pregnancies. Most prior studies addressing this topic were conducted among general

population samples of pregnant women who smoked cigarettes. Little is known about these associations with prenatal smokeless tobacco, or among American Indian or Alaska Native women. The results are contrary to findings reported previously, because current tobacco use was associated with less stress and depression than nonuse. The study findings have implications for cessation treatment for this tobacco-use disparity group.

Introduction

Theories of addiction implicate stress and negative affect as important mechanisms underlying the initiation and maintenance of cigarette smoking.¹ Smoking for stress management was identified as a key barrier to quitting smoking among vulnerable groups, including Indigenous people.² Studies show that higher levels of stress and depressive symptoms are associated with increased smoking prevalence during pregnancy.³ However, little is known about the association of stress, depression, and prenatal tobacco use among American Indian or Alaska Native (AI/AN) women.

Among 832 pregnant AN women from the Yukon-Kuskokwim (Y-K) Delta region of rural western Alaska, 19% reported cigarette smoking only, 37% used smokeless tobacco (ST) only, 23% used both, and 21% reported nonuse.⁴ A common form of prenatal ST is Iqmik (blackbull), a homemade mixture of tobacco leaves and tree fungus ash, perceived by many as safer to use during pregnancy than other tobacco products.⁵ A qualitative study conducted in this region revealed that alleviating stress was perceived as the major reason for tobacco use during pregnancy.⁶ Although other work highlighted the social acceptance of tobacco use, tobacco is not used for ceremonial or religious purposes among AN people.⁵ The Indigenist Stress Coping Model⁷ provides a conceptual basis for understanding how multiple cumulative and co-occurring stressors, e.g., historical trauma, loss of traditions, traumatic life experiences in adulthood, among AI/AN women are linked to both communal and individual contemporary health behaviors including tobacco use.

The Healthy Pregnancies Project is a cluster-randomized controlled trial, evaluating a community-level intervention compared with usual care for reducing tobacco use during pregnancy and postpartum among Y-K Delta AN women.⁸ Both tobacco users and nonusers were enrolled for prevention and cessation of tobacco use.⁴ The study protocol and baseline demographic characteristics were described previously.⁸ New data are reported here on the association of baseline current tobacco use, perceived stress, and depressive symptoms. We hypothesized that tobacco users would report greater stress and depression than would nonusers.

Methods

Study approvals were obtained by the Mayo Clinic and Alaska Area Institutional Review Boards, and the Yukon-Kuskokwim Delta Health Corporation Human Studies Committee and Board of Directors. The trial, registered with the Clinical Trials Registry (NCT02083081), was guided by a study-specific community advisory board. Enrollment and baseline data collection occurred from January, 2016 to April, 2018.

Study Setting

The Y-K Delta region comprises 58 federally recognized tribes from 47 village locations. The Y-K Delta regional hospital, located in

Bethel (hub of the village locations), provides health care for regional residents.

Study Design

Cross-sectional analysis of baseline data collected from participants in the Healthy Pregnancies Project.⁸ Sixteen village locations were stratified on population size (e.g., ≤ 600 , >600) and randomly assigned to receive the intervention (8 villages) or the usual care control condition (8 villages).⁸ Baseline measures were completed by enrolled pregnant women in-person or by phone, for which participants received a US\$25 gift card. Follow-up assessments are underway through 6 months postpartum.

Participants

The sample size targeted was 352 AN pregnant women (22 per study village). Recruitment was done by distributing flyers and posters in community clinics, referrals from providers, and in-person by the research coordinator at prenatal visits in Bethel.⁸ Eligibility criteria were: (1) aged ≥ 18 years, (2) ≤ 36 weeks at gestation, (3) had access to a working phone, and (4) provided written informed consent.

Measures

Demographics

Characteristics assessed were participant age, employed/working, education, marital status, gestational age, and parity.⁸

Tobacco use

At baseline, participants were asked to retrospectively report on tobacco used before pregnancy, “*Did you use tobacco before you learned you were pregnant?*” (yes/no response option). Current tobacco use was also assessed, “*Do you use any tobacco now? In the past 7 days, have you used any tobacco, even a chew of Iqmik/blackbull?*”⁹ Those responding “Yes” were asked, “*What kind of tobacco do you mainly use now?*” and “*What other types of tobacco do you use now?*” with response options: Iqmik (blackbull), Copenhagen/other chew, cigarettes, e-cigarettes, other/none. A baseline saliva specimen sample was collected for cotinine analysis, but for only a partial sample ($n = 299$), due to a procedural error with return of mailed collection kits. Concordance of cotinine results and self-reported nonuse was 96%. Thus, for this baseline analysis, we relied on self-reported current tobacco use status, defined as any tobacco/nicotine product use during the previous 7 days.⁹

The 6-item Fagerström Test for Cigarette Dependence (FTCD)¹⁰ was assessed among participants reporting any cigarette smoking, and/or the 8-item Fagerström Test for Nicotine Dependence-Smokeless Tobacco (FTQ-ST)¹¹ for those reporting any Iqmik/ST use. Both measure amount used (cigarettes per day [CPD]: ≤ 10 , 11–20, 21–30, ≥ 31 ; ST tins/pouches per week: ≤ 2 , >2 but <4 , or ≥ 4), and time to first tobacco use (smoking: ≤ 5 min, chew: ≤ 30 min).

Perceived stress

The validated 4-item Perceived Stress Scale (PSS)¹² was assessed, with items rated in reference to the past month, e.g., “How often have you felt that you could handle your personal problems?” Possible scores can range from 0 to 8, with higher scores indicating greater levels of perceived stress.

Depressive symptoms

The 20-item Center for Epidemiological Studies Depression Scale (CES-D)¹³ was administered, with items rated in reference to the past week, e.g., “I felt depressed” and “I was bothered by things that usually do not bother me.” The CES-D has acceptable reliability and validity¹³ including among AN people.^{14,15} Total scores range from 0 to 60; a cutoff score of ≥ 16 identifies individuals at risk for clinical depression. Participants meeting this depression cut-point were offered referral information.

Statistical Methods

Tobacco use characteristics, PSS score, and CES-D score for the overall sample were summarized using descriptive statistics. The relationship between current tobacco use and tobacco used before pregnancy was assessed using the chi-square test. The association of current tobacco use, PSS score, and CES-D score (both continuous and binary ≥ 16 variables) was analyzed using generalized estimating equations (GEE) to account for the cluster-randomized study design (village). GEE was also used to assess the association of nicotine dependence (FTCD and FTQ-ST) with PSS and CES-D scores. Analyses adjusted for (1) participant age, due to prior associations with tobacco use among Y-K Delta pregnant women,⁴ and with depressive symptoms among AN adults (along with sex),^{16,17} and (2) gestational age, due to the wide range in the current sample. *p*-values of ≤ 0.05 denoted statistical significance.

Results

Participants

Described previously,⁸ participants ($N = 352$) were on average \pm SD 25.8 \pm 5.0 years of age (range 18–46), and at 26.8 \pm 9.8 weeks gestation (range 6–40); 83% were married/partnered, 16% reported post-high school education, 44% were employed/working, and 22% reported this pregnancy as their first.

Tobacco Use Characteristics

Most women (85%, $n = 299$) reported using tobacco before pregnancy. Current tobacco use was reported by 66.5% ($n = 234$). Compared with

nonusers, current tobacco users were more likely to report using tobacco before pregnancy (55.8% vs. 98.3%, $p < .001$). Among current tobacco users, 94% reported exclusive product use (primarily Iqmik), and 6% reported dual/multiple use (Supplementary Table S1).

Mean FTCD score among participants reporting any smoking ($n = 46$) was 1.1 \pm 1.4 (range 0–5); 95.7% smoked ≤ 10 CPD and only 2 (4.3%) reported their first cigarette was ≤ 5 min after waking. Among participants reporting any Iqmik/ST use ($n = 191$), FTQ-ST score was 1.8 \pm 1.6 (range 0–8); 24.5% reported their first chew was ≤ 30 min. Tins/pouches chewed/week was ≤ 2 (56.6%), > 2 but < 4 (19%), and ≥ 4 (24.3%).

Association of Tobacco Use, Perceived Stress, and Depression

Average PSS score was 3.80 \pm 1.00 (range 1–6) and CES-D score was 8.10 \pm 6.6 (range 0–35); 12.2% met the clinical depression cut-point.

Table 1 presents associations between PSS and CES-D scores with current tobacco use status. Tobacco users reported less stress (3.7 \pm 1.06 vs. 3.98 \pm 0.90; $p = .020$) and were less likely to meet the CES-D clinical depression cut-off (dichotomous) (9.3% vs. 18.1%; $p = .021$) than nontobacco users. The two groups did not differ significantly (7.74 \pm 6.23 vs. 8.83 \pm 7.26; $p > 0.05$) on the CES-D (continuous) score. Interestingly, among tobacco users, the proportion meeting the clinical depression cut-off was lower for Iqmik users than smokers (6.9% vs. 19.5%) (Table 1).

These findings prompted two exploratory analyses. First, because using tobacco before pregnancy might influence current experiences of stress and depression, analyses were stratified based on tobacco use before pregnancy (Table 2). Only four participants began using tobacco during pregnancy. The pattern of results indicates that those who used tobacco at both time points reported the lowest levels of perceived stress (3.70 \pm 1.07 vs. tobacco use before but not current: 3.83 \pm 0.96 or tobacco use neither time point: 4.11 \pm 0.82; $p = .006$) and clinical levels of depression (9.5%, 24.1%, and 13.3%, respectively; $p = .007$).

Second, analyses examined if the findings could be attributed to relatively low nicotine dependence severity among tobacco users. Among smokers, no association was detected of FTCD score and PSS score (parameter estimate = 0.17, $p = .23$), CES-D score (parameter estimate = 0.24, $p = .79$), or the proportion meeting the clinical depression cut-off (parameter estimate = -0.16 , $p = .60$). For ST users, no association was observed of FTQ-ST score and PSS score (parameter estimate = -0.04 , $p = .30$), CES-D score (0.40, $p = .058$), or the proportion meeting the clinical depression cut-off (parameter estimate = 0.05, $p = .78$). Thus, nicotine dependence severity did not appear to account for the observed effects.

Table 1. Association of baseline current tobacco use status, perceived stress, and depression among Alaska Native Women Participants in the Healthy Pregnancies Project ($N = 352$)

Baseline current tobacco use status [†]	PSS score mean \pm SD	<i>p</i> *	CES-D total score mean \pm SD	<i>p</i> *	CES-D score ≥ 16 %	<i>p</i> *
Tobacco user	3.70 \pm 1.06	.020	7.74 \pm 6.23	.260	9.3%	.021
Nonusers	3.98 \pm 0.90		8.83 \pm 7.26		18.1%	
Within tobacco users only, main type of tobacco used						
Iqmik	3.7 \pm 1.0	.049	7.3 \pm 5.6	.020	6.9%	<.001
Cigarettes	3.7 \pm 1.2		10.3 \pm 8.1		19.5%	
Copenhagen	4.4 \pm 1.2		5.7 \pm 5.8		10.0%	

*Analyses were adjusted for participant age, gestational age, and village.

[†]Current tobacco use was defined as self-reported use of any tobacco/nicotine product during the previous 7 days.

PSS = Perceived Stress Scale; CES-D = Center for Epidemiological Studies Depression Scale.

Table 2. Association of tobacco use before pregnancy and current tobacco use status, perceived stress, and depression among Alaska Native Women Participants in the Healthy Pregnancies Project (N = 334)

Tobacco use status before pregnancy [†]	Current tobacco use status [‡]	N	PSS score mean ± SD	p*	CES-D total score mean ± SD	p*	CES-D score ≥16 %	p*
No	No	46	4.11 ± 0.82	0.006	9.67 ± 6.69	0.29	13.3%	0.007
No	Yes	4	3.75 ± 0.96		5.5 ± 2.38		0%	
Yes	No	58	3.83 ± 0.96		8.78 ± 8.11		24.1%	
Yes	Yes	226	3.70 ± 1.07		7.79 ± 6.30		9.5%	

Tobacco use status before pregnancy was missing for 18 participants.

[†]At baseline, women were asked “Did you use any tobacco before you learned you were pregnant?”

[‡]At baseline, women were asked “Do you use any tobacco now...In the past 7 days, have you used any tobacco, even a chew of Iqmik/blackbull?”

*The 4 women who “initiated” tobacco use after pregnancy are excluded from this analysis.

Discussion

This study contributes novel information on the association of tobacco use, perceived stress, and depression among AN women enrolled in a clinical trial to promote healthy pregnancies. Prior qualitative work suggested that AN women use tobacco during pregnancy to reduce stress and manage negative affect.⁶ However, contrary to our study hypothesis, women who used tobacco were less likely to report clinical levels of depression compared with nonusers (18% vs. 9%) and reported lower stress. Exploratory findings suggest that women who used tobacco both before and during pregnancy reported less stress and depression than women who stopped using or did not use at either time point.

Prior studies among general population samples indicate that smokers report greater levels of negative affect than nonsmokers,¹ and depressed individuals are vulnerable to smoking.¹⁸ One difference in our study is that most women (77%) who used tobacco reported Iqmik use. Anecdotal reports from local community members provided cultural perspectives on the findings. First, Iqmik use is linked to social connections which may help us to alleviate stress and negative affect. With implementation of smoke-free policies, cigarette smokers may have started chewing tobacco, possibly creating more Iqmik users, and increasing its social acceptability. Moreover, there is a finite source of Iqmik, so knowing other users and where to obtain it may create important social bonds among users. Second, Iqmik is very potent compared with other tobacco products; people report a “high,” “buzz,” feeling carefree, forgetting everything, calm/satisfied, and/or less stressed when using it.

We explored if results could also be attributed to the relatively low levels of nicotine dependence severity among tobacco users. Research indicates that higher levels of nicotine dependence are predictive of increased stress and depression.¹⁹ In between cigarettes, most smokers experience subtle abstinence symptoms, which can increase everyday stress.¹ Perceived stress has been linked to increased self-reported withdrawal symptoms among smokers, especially women.²⁰ However, exploratory analyses did not reveal significant relationships between nicotine dependence severity, stress, or depression, except a trend for increased CES-D score with increased FTQ-ST score among Iqmik/ST users.

Findings are limited by the cross-sectional nature of this work and therefore do not imply causal associations, and the observed effects are modest. We did not measure substance use, and the PSS lacks validation among AN people. We relied on self-reported tobacco use, but prevalence was similar to prior reports,⁴ and the project was advertised as a “Healthy Pregnancies Study.” Additionally, among nontobacco users who used tobacco before pregnancy, we

did not assess the temporal proximity of quitting to enrollment. Duration of abstinence from tobacco could influence women’s experiences of stress and depression.¹ Finally, analyses examining associations of type of tobacco used, stress, and depression are limited due to the small number of Copenhagen users; therefore, findings are considered exploratory.

In conclusion, in this sample of pregnant AN women, tobacco users report less stress and clinical levels of depression than nonusers. A potential challenge with tobacco treatment for pregnant AN women is to provide alternative ways of deescalating stress and affect management instead of using tobacco. Additional research is needed to inform practice. Based on our conceptual framework,⁷ qualitative research conducted among pregnant women not using tobacco may be useful to understand their ways of resilience and coping for managing stress and depression. In addition, anecdotal reports suggest that exploring ways for social connections and bonding without tobacco use may inform cessation interventions. Moreover, longitudinal studies assessing potential effects of tobacco cessation on stress and depression are warranted.

Supplementary Material

Supplementary data are available at Nicotine and Tobacco Research online.

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Declaration of Interests

None declared.

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