Stopping Smoking During Pregnancy

Are We on the Right Track?

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ABSTRACT

Background: Recent data suggest that although smoking during pregnancy has declined in North America, this has more to do with falling rates of smoking initiation among women of childbearing age than with increased rates of pregnancy-related smoking cessation. One possible explanation is poor exposure to effective stop-smoking strategies. Better information about women who smoke during pregnancy may help target these interventions more effectively.

Methods: The study was a cross-sectional, self-administered survey of a consecutive sample of 916 (40.4% of eligible) women who delivered healthy babies in 1997-98 at a tertiary teaching hospital in Hamilton, Ontario. Our main focus was on health behaviours (smoking, drinking, eating, and exercise habits) before and during pregnancy; but we also included questions about the presence of (other) children and (other) smokers in the household, perceived health status, the subject's age and level of education, and whether or not the present pregnancy was planned. Factors associated with pregnancy-related smoking cessation were identified using multiple logistic regression.

Results: Respondents were better educated and healthier, but smoked at rates similar to women of childbearing age in Hamilton at the time of the survey. Two thirds of prior smokers or 20% of respondents overall continued to smoke during pregnancy. After adjustment for other factors, three factors were associated with ongoing smoking during pregnancy: having other smokers in the household; having other children in the household; and not having post-secondary education.

Conclusions: Many pregnant smokers are not being reached by current stop-smoking strategies. New ways to help these women and their partners are needed.

La traduction du résumé se trouve à la fin de l'article.

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Maternal smoking is one of the few known preventable risk factors for pre-term and low birthweight infants. Women who smoke during pregnancy are about twice as likely as non-smoking women to have a low birthweight baby, increasing the baby's risks for mortality, morbidity, and use of health services.[1] Awareness of such risks gives some pregnant smokers the motivation to quit, but in most cases not; and those smokers who do quit usually relapse within the first year of delivery.[2] Recent data from Canada[3] and the U.S.[4,5] suggest that although smoking during pregnancy has declined, this has more to do with falling rates of smoking initiation among women of childbearing age than with increased rates of pregnancy-related smoking cessation. One possible explanation is poor exposure to effective stop-smoking strategies.[6] Better information about pregnant smokers may help target these interventions more effectively.

Previous studies have reported factors associated with pregnancy-related smoking cessation in Canadian women.[7,8] However, one study surveyed women up to two years post-delivery and was limited to socio-demographic characteristics.[7] The other did not control for confounding.[8] Accordingly, we took advantage of data from an earlier study[9] to further characterize women who, despite becoming pregnant, continue to smoke.

METHODS

As part of a separate study,[9] we did a cross-sectional survey of consecutive post-partum women from November 1997 to March 1998 and June to November 1998 at St. Joseph's Healthcare, Hamilton; a 370-bed tertiary teaching hospital providing approximately 50% of the Regional Municipality's obstetrical care. All women who gave birth during the study and who could read English were eligible to participate, except mothers of infants requiring intensive care (who were excluded to avoid causing them additional anxiety). A 20-item self-administered questionnaire was distributed on admission to the post-partum unit and was collected prior to discharge.[9] It had three main sections. Section one described the purpose of the study, in very general terms, and listed the conditions for participation. Section two included

questions about subjects' smoking, drinking, eating, and exercise habits before and during the pregnancy; perceived health status; and the presence of (other) smokers in the household. Section three asked about subjects' age and level of education, (other) children, and whether or not the present pregnancy was planned.

Multiple logistic regression was used to identify independent risk factors for ongoing smoking during pregnancy. Factors that achieved a significance level of $p<0.1$ in bivariate analyses were entered into the model, and those significant at $p<0.05$ were retained. Data were managed and analyzed using SPSS PC (Chicago, Illinois) version 10.0.

The study protocol was approved by the hospital's Research Ethics Board.

RESULTS

Of the 3,024 women who delivered babies during the study, 2,268 (75.0%) met the inclusion criteria and were approached regarding participation. (Excluded were 423 women (14.0%) with language barriers and 333 women (11.0%) whose babies received intensive care.) Nine-hundred-sixteen questionnaires were returned (40.4%). Respondents' characteristics and health behaviours are summarized in Tables I and II, respectively. Based on data from the 1996 Census (Statistics Canada) and the 1996/97 Ontario Health Survey, our subjects were better educated and healthier, but smoked at rates similar to women of childbearing age in Hamilton at the time of the survey.[10]

Women who smoked during pregnancy (20.0% of respondents, 62.5% of prior smokers) differed from those who stopped smoking (37.5% of prior smokers) in several respects. Ongoing smokers were: relatively less likely to have post-secondary education (54/175 (30.9%) vs. 55/103 (53.4% of quitters), $p<0.001$); more likely to have others in the household who smoke (169/175 (96.6%) vs. 56/103 (54.4% of quitters), $p<0.001$); more likely to have other children in the household (100/175 (57.1%) vs. 39/103 (37.9% of quitters), $p=0.002$); less likely to have a planned pregnancy (86/175 (49.1%) vs. 63/103 (61.2% of quitters), $p=0.052$); and less likely to take a daily multi-vitamin in the month before conception (50/175 (28.6%) vs. 40/103 (38.8% of quitters), $p=0.084$).

TABLE I

Respondents' Characteristics*

Characteristic	n (%)
Age	
What is your age (in years)?	
Response (n = 910):	
< 20	60 (6.6)
20-29	424 (46.6)
30-39	417 (45.8)
> 39	9 (1.0)
Mean (SD): 28.8 (5.4)	
Education	
What is your highest level of formal education (in years)?	
Response (n = 907): At least some post-secondary	551 (60.7)
Mean (SD): 14.2 (3.1)	
Perceived health status	
In general, compared to others your age, would you say your current state of health is excellent, very good, good, fair, or poor?	
Response (n = 909): Excellent/Very Good	690 (75.9)
Pregnancy planned/unplanned	
Was this pregnancy planned or intended (i.e., Did you stop using birth control or other precautions with the specific aim of getting pregnant)?	
Response (n = 903): Yes	624 (69.1)
Children in the household	
Are there other children in your household?	
Response (n = 910): Yes	502 (55.2)
Cigarette smoking in the household	
Does anyone in your household smoke cigarettes, other than you?	
Response (n = 915): Yes	357 (39.0)

* The number and order of questions are not exactly as presented to subjects.

TABLE II

Respondents' Health Behaviours*

Health Behaviour	n (%)
Exercise	
In general, outside of your daily activities or work, are you involved in physical activities on a regular basis?	
Response (n = 896): Yes	339 (37.8)
Diet	
In general, do you eat a variety of foods, such as those described in Canada's Food Guide, most days?	
Response (n = 911): Yes	856 (94.0)
Multi-vitamin consumption	
Did you take a multi-vitamin supplement on a daily basis in the month before you became pregnant with this baby?	
Response (n = 908): Yes	340 (37.4)
Did you take a multi-vitamin supplement on a daily basis after you learned you were pregnant with this baby?	
Response (n = 908): Yes	715 (78.7)
Alcohol consumption	
Did you regularly drink more than 3 usual-sized alcoholic beverages per week in the month before you became pregnant with this baby?	
Response (n = 914): Yes	30 (3.3)
Did you regularly drink more than 3 usual-sized alcoholic beverages per week after you learned you were pregnant with this baby?	
Response (n = 914): Yes	6 (0.7)
Cigarette smoking	
Did you smoke cigarettes in the month before you became pregnant with this baby?	
Response (n = 889): Yes	285 (32.1)
Did you smoke cigarettes during this pregnancy?	
Response (n = 889): Yes	178 (20.0)

* The number and order of questions are not exactly as presented to subjects.

On multiple logistic regression, three factors remained associated with smoking during pregnancy: having other smokers in the household (estimated odds ratio (exp(B)): 21.35 (95% confidence interval (CI): 8.49, 53.64), $p<0.001$); having other children in the household (exp(B): 2.02 (95% CI: 1.10, 3.71), $p=0.023$); and not having post-secondary education (exp(B): 0.51 (95% CI: 0.28, 0.93), $p=0.028$).

DISCUSSION

In this sample of relatively well-educated, English-speaking women, most of whom had planned pregnancies, about two thirds of prior smokers or 20% of women overall continued to smoke during pregnancy; a

prevalence similar to that found in a recent Canada-wide survey.[7] Given the social desirability of non-smoking status, which is even greater during pregnancy, the true prevalence may be higher. Like studies done outside Canada,[11] we also found that ongoing smokers were less well educated and were more likely to have other children and other smokers in the household. While better information is needed about Canadian physicians' prenatal counselling practices, we hope this study helps encourage providers and policy-makers to revisit and address barriers to routine stop-smoking intervention in prenatal care.[12]

A brief counselling session of 5-15 minutes, when coupled with pregnancy-specific self-help materials, can double usual pregnancy-related quit rates, even among high-risk groups.[13] Further, for every dollar invested in these interventions, about $6 is saved.[2] Our results reinforce the need to target less well-educated smokers, but also to seek new ways to reach their partners who smoke and to dispel apparent misconceptions that having previously unaffected children while smoking means that future pregnancies are safe.

Though modest improvements are probable through targeted counselling, more important progress is likely with medication. Recently, the Ontario Medical Association called for revised labeling requirements and easier access to nicotine replacement therapies and bupropion hydrochloride among pregnant smokers unable to quit using non-pharmacologic means.[14] Such changes are doubtful, however, without studies to determine whether and how such products can be used safely during pregnancy. More controlled trials are needed;[15] but well-designed, independently monitored registries of women exposed to stop-smoking medications during pregnancy also can provide useful safety data and should be encouraged.[16,17]

Despite some limitations, such as the study's single site and biased sample, the message is important. Many pregnant smokers are not being reached by current stop-smoking strategies. New ways to help these women and their partners need to be explored.

REFERENCES

1. Tough SC, Svenson LW, Johnston DW, Schopflocher D. Characteristics of preterm delivery and low birthweight among 113,994 infants in Alberta: 1994-1996. *Can J Public Health* 2001;92:276-80.
2. Orleans CT, Johnson RW, Barker DC, Kaufman NJ, Marx JF. Helping pregnant smokers quit: Meeting the challenge in the next decade. *Western J Med* 2001;174:276-81.
3. Stewart PJ, Potter J, Dulberg C, Niday P, Nimrod C, Tawagi G. Change in smoking prevalence among pregnant women 1982-93. *Can J Public Health* 1995;86:37-41.
4. Ebrahim S, Floyd RL, Merrit RK, Decoufle P, Holtzman D. Trends in pregnancy-related smoking rates in the United States, 1987-1996. *JAMA* 2000;283:361-66.
5. Husten CG, Chrismon JH, Reddy MN. Trends and effects of cigarette smoking among girls and women in the United States, 1965-1993. *J Am Med Women's Association* 1996;51:11-18.
6. US Department of Health and Human Services. Healthy People 2000 Review. Washington, DC: Office of Disease Prevention and Health Promotion; 1998-1999. DHHS publication (PHS) 99-1256.
7. Connor SK, McIntyre L. The sociodemographic predictors of smoking cessation among pregnant women in Canada. *Can J Public Health* 1999;90:352-55.
8. Dodds L. Prevalence of smoking among pregnant women in Nova Scotia from 1988 to 1992. *CMAJ* 1995;152:185-90.
9. Neimanis IM, Paterson JM, Bain E. Preventing neural tube defects. Survey of preconceptional use of folic acid. *Can Fam Phys* 1999;45:1717-22.
10. Personal communication: Cloutier Fisher D, Central West Health Planning Information Network, November 1999.
11. Cnattingius S, Lindmark G, Meirik O. Who continues to smoke while pregnant? *J Epidemiol Community Health* 1992;46:218-21.
12. Naylor P-J, Adams JS, McNeil D. Facilitating changes in perinatal smoking: The impact of a stage-based workshop for care-providers in British Columbia. *Can J Public Health* 2002;93:285-90.
13. Melvin CL, Dolan-Mullen P, Windsor PA, Whiteside HP, Goldenberg RL. Recommended cessation counselling for pregnant women who smoke: A review of the evidence. *Tobacco Control* 2000;9(Suppl 3):III80-4.
14. Ontario Medical Association. Rethinking stop-smoking medication: Myths and facts. Toronto, ON: Ontario Medical Association, June 1999. Accessed July 2001 at: www.oma.org/phealth/stopsmoke.htm.
15. Wisborg K, Henriksen TB, Jespersen LB, Secher NJ. Nicotine patches for pregnant smokers: A randomised controlled study. *Obstetrics and Gynecology* 2000;96:967-71.
16. Dempsey DA, Benowitz NL. Risks and benefits of nicotine to aid smoking cessation in pregnancy. *Drug Safety* 2001;24:277-322.
17. GlaxoSmithKline. The Bupropion Pregnancy Registry: Interim Report (1 September 1997 through 28 February 2001). Wilmington, NC: GlaxoSmithKline, June 2001. Accessed October 2001 at: 1-800-336-2176.

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RÉSUMÉ

Contexte : Selon des données récentes, si le tabagisme durant la grossesse est en baisse en Amérique du Nord, c'est plutôt parce que moins de femmes en âge de procréer se mettent à fumer qu'en raison d'une augmentation des taux de renoncement au tabac durant la grossesse. Une explication possible serait la piètre exposition à des stratégies antitabac efficaces. Une meilleure information sur les femmes qui fument durant la grossesse pourrait contribuer à mieux cibler de telles mesures.

Méthode : Dans cette étude transversale, un échantillon consécutif de 916 femmes (40,4 % de la population admissible) ayant donné naissance à des bébés en santé en 1997-1998 dans un hôpital d'enseignement de soins tertiaires à Hamilton (Ontario) a rempli un questionnaire d'auto-évaluation portant principalement sur les comportements liés à la santé (tabagisme, consommation d'alcool, alimentation et exercice) avant et durant la grossesse, mais comportant aussi des questions sur la présence d'(autres) enfants et d'(autres) fumeurs dans le ménage, sur l'état de santé subjectif, sur l'âge et le niveau d'instruction du sujet et sur le fait que la grossesse en cours ait été planifiée ou non. Les facteurs associés au renoncement au tabac durant la grossesse ont été cernés par régression logistique multiple.

Résultats : Les répondantes étaient mieux instruites et en meilleure santé que l'ensemble des femmes en âge de procréer vivant à Hamilton au moment de l'enquête, mais leurs taux de tabagisme étaient semblables. Les deux tiers des anciennes fumeuses (20 % de l'ensemble des répondantes) ont continué à fumer durant leur grossesse. Après rajustement selon d'autres facteurs, nous avons relevé trois facteurs associés au maintien du tabagisme durant la grossesse : la présence d'autres fumeurs dans le ménage; la présence d'autres enfants dans le ménage; et l'arrêt des études après le secondaire.

Conclusion : De nombreuses fumeuses enceintes ne sont pas touchées par les stratégies antitabac actuelles. Il faudrait trouver de nouvelles façons d'aider ces femmes et leurs partenaires.