

Cigarette Smoking and the Intention to Quit Among Pregnant Smokers

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Research has demonstrated that smoking during pregnancy has deleterious effects on the health of the unborn child as well as the mother. The present study examined whether pregnant smokers would have a greater intention to quit smoking, whether the stage of pregnancy would influence the intention to quit, and whether variables which have predicted cessation among pregnant smokers would also predict intention to quit. The results indicated that pregnant women did not have a significantly greater intention to quit smoking compared to nonpregnant smokers, despite the health risks to their child. Women who were further along in their pregnancy and women who smoked more cigarettes on a daily basis demonstrated the least intention to quit. Notably, women in the first trimester showed the greatest intention to quit, suggesting that pregnant women may be most receptive to quitting during their first trimester.

KEY WORDS: pregnancy; smoking cessation; intention.

INTRODUCTION

Numerous studies over the last 30 years have demonstrated an association between smoking and health-related problems. A recent review on the public health implications of tobacco addiction indicates that smoking contributes to one-sixth or more of the annual deaths in Western cultures and as many as 2.5 million deaths worldwide (Shopland and Burns, 1993).

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Furthermore, it is well documented that smoking increases mortality through a variety of diseases, such as cardiovascular disease, pulmonary disorder, gastrointestinal disease, peptic ulcer, and cancer [U.S. Department of Health and Human Services (USDHHS), 1983, 1984, 1988]. Thus, smoking is a major health problem.

In particular, pregnant women who smoke are at high risk for associated health problems. Research has demonstrated that smoking during pregnancy has deleterious health consequences for the unborn child as well as the mother (USDHHS, 1990). These adverse effects include low birth weight, spontaneous abortion, perinatal death, and preterm deliveries (for review see Gritz *et al.*, 1993; Walsh, 1994). Walsh (1994) summarizes considerable evidence that indicates these effects may be due to the chemicals in tobacco. Although the specific mechanisms remain to be clarified, several biological concomitants of smoking likely contribute to the adverse effects. For example, smoking may affect the growth and development of the fetus via nicotine and carbon monoxide. Benowitz (1991) found that the nicotine absorbed from smoking results in a reduction in blood flow to the placenta as well as decreases in heart rate and respiration.

Another biological correlate of smoking is carbon monoxide. The amount of oxygen that is available to the fetus is reduced by carbon monoxide (Benowitz, 1991). Thus, the combination of vasoconstriction due to nicotine and a reduction of oxygen may lead to intrauterine hypoxia. In turn, this relative deprivation of oxygen is likely to interfere with the growth and the development of the central nervous system (Levy and Koren, 1990).

According to a recent review by Leftwich and Collins (1994), not only can there be severe health consequences to the unborn child, but there are also potential deleterious effects on the child after birth. Studies have demonstrated that the children of women who smoked during pregnancy have long-term behavioral problems (USDHHS, 1989). For example, Naeye and Peters (1984) found that the children of mothers who smoked were more likely to be hyperactive, have decreased attention, and score lower on reading tests. Sexton *et al.* (1990) demonstrated that children of pregnant women who smoked scored lower on cognitive and developmental indices than did children of pregnant women who had quit smoking during pregnancy. In addition, maternal smoking appears to increase the probability that children, especially female offspring, will become addicted to nicotine later in life (Kandel *et al.*, 1994). The authors suggest that this prenatally-induced predisposition may be a result of the action of nicotine on the development of dopaminergic systems in the brain. Thus, smoking during pregnancy may have long-term consequences for children, as well as immediate effects.

Despite evidence that smoking during pregnancy may be harmful to one's unborn child, many women continue to smoke throughout their preg-

nancy (for review see Gritz *et al.*, 1993). A recent study found that a majority of women continued to smoke during the early weeks of their pregnancy (Haug *et al.*, 1992), while another study showed that as many as 77% of women who smoked during their pregnancy were still smoking 13 years later (Kandel *et al.*, 1994). Several factors have been reported to be predictive of smoking status. For example, one study reported that education, age, and parity were important predictors of cessation among Caucasian women, while only the intention to formula feed was predictive among African-American women (O'Campo *et al.*, 1992). Wakefield *et al.* (1993) found that having previously quit, having a nonsmoking partner, and having a belief in the adverse health consequences to the child were significantly predictive of long term cessation. Another study showed that parity, heavy smoking, and daily passive smoking were predictive of smoking during pregnancy (Cnattingius *et al.*, 1992). In addition, Tollestrup *et al.* (1992) reported that smoking rates in pregnant women were predicted by age, marital status, and parity.

In the last decade, the transtheoretical model of change has guided research on the processes involved in changing behavior (e.g., Prochaska *et al.*, 1988). This model posits that individuals progress through a series of stages of readiness to change, although not necessarily in a sequential fashion. A smoker who has no foreseeable intention to quit is described as being in the *precontemplation* stage. In the *contemplation* stage, the smoker is planning to quit in the near future, while the *action* stage is marked by a smoker who has recently taken action to quit. Based on this model of behavior change, intention to quit should be an important variable with regard to smoking cessation during pregnancy.

With respect to smoking, intentions or reasons to quit may become more salient for a female smoker during pregnancy, and thus, pregnancy may be an opportune time to capitalize on one's motivation to quit. Ruggiero *et al.* (1992) recently examined smoking attitudes in pregnant women compared to nonpregnant women and found that smoking attitudes may become more polarized in pregnant women. For example, pregnant smokers are either more motivated to quit smoking or more fixed in their intention to maintain their smoking behavior (Ruggiero *et al.*, 1992).

Because pregnancy is a critical time for beginning or maintaining healthy behaviors, it is important to understand the factors which influence a pregnant woman's intention to quit smoking. The present study examined whether pregnant smokers would have a greater intention to quit smoking, whether the stage of pregnancy would influence the intention to quit, and whether variables which have predicted cessation among pregnant smokers would also predict intention to quit.

METHOD

Subjects

Of the 113 women who participated, 35% were pregnant and 88% were smokers. There was no specific number of cigarettes required to be counted as a smoker. Rather, subjects had only to identify themselves as smokers to be counted as smokers. Of the pregnant women ($n = 39$), 66% identified themselves as current smokers, while 23% reported that they had quit earlier in their pregnancy, and 4% reported that they had quit before they were pregnant. In terms of ethnicity, 13% were Native American, 3% were Hispanic, 13% were African-American, and 71% were Caucasian. A majority (51%) was married, while 36% were never married and 13% were divorced or widowed. In terms of education and income, 51% reported completion of high school, 18% reported some college education, and 79% reported a family income of less than \$15,000.

Of the nonpregnant women ($n = 74$), 84% currently smoked, while 16% did not. In terms of ethnicity, 30% were Native American, 2% were Asian, 12% were African American, and 56% were Caucasian. Of these women, 42% were divorced or widowed, while 37% were married and 21% were never married. In terms of education and income, 55% reported completion of high school, 69% reported some college education, and 90% reported a family income of less than \$15,000.

Measures

The subjects completed a smoking questionnaire which was designed to assess demographic information, smoking history, and intention to quit variables. The subjects also completed the "contemplation ladder," which is a 0- to 10-point scale presented in the form of a ladder. This scale has five anchor points, with 0 equivalent to "no thought of quitting," 2 equivalent to "think I need to consider quitting someday," 5 equivalent to "think I should quit but not quite ready," 8 equivalent to "starting to think about how to change my smoking patterns," and 10 equivalent to "taking action to quit" (Biener and Abrams, 1991).

Procedure

Participants were recruited from an ambulatory medical clinic waiting area between 2/1/93 and 3/1/94. Women with a medical appointment were

eligible for the study. Because of the demands on clinic staff, a uniform method of administration could not be implemented. Depending on patient volume in the clinic, the questionnaire packets were either distributed to the patients by clinic staff or the patients were allowed to pick up a packet on their own. Each packet consisted of a description of the study, a consent form to be signed by the subject, and a questionnaire on smoking behavior.

RESULTS

Differences Between Pregnant and Nonpregnant Smokers

Differences on demographic and smoking-related variables between the pregnant and the nonpregnant women were analyzed using *t* tests. Results indicated that pregnant women were significantly younger than nonpregnant women [$t(85) = 4.35, p < .001$] and smoked significantly less than nonpregnant women [$t(87) = 2.60, p < .01$]. However, the average rate of daily cigarette use among pregnant women was still considerable, at 16–20 cigarettes per day. There were no significant differences in terms of education, intention to quit, or confidence that they could quit. Both groups reported marginal confidence in their ability to quit and were similarly matched in their intention to quit. Table I summarizes these results.

Because the absence of a significant difference in the intention to quit scores of the pregnant versus the nonpregnant women may have been related to the significant differences in age and amount smoked, another comparison of intention to quit was made between the pregnant sample and a subsample of the nonpregnant women which were matched on age and amount smoked. The *t* test revealed that pregnant women did not report a greater intention to quit even when controlling for age and amount smoked [$t(45) = 1.57, p > .05$].

Nonparametric analyses between pregnant and nonpregnant smokers were conducted on factors which were expected to influence reasons for quitting. These factors included being concerned about their health, being concerned about the health of their unborn child, being urged to quit by family, and being urged to quit by a physician. Participants were allowed to endorse more than one reason for quitting. Results indicated that among women who were planning to quit, 84% of the nonpregnant women endorsed being concerned about their health as a reason to quit, compared to only 55% of the pregnant women. In contrast, 70% of the pregnant women cited concerns about the health of their unborn child as a specific reason for wanting to quit. Encouragement by friends and family or by

Table I. Mean Demographics and Smoking Habits of Pregnant ($N = 26$) and Nonpregnant Women ($N = 62$)

	Pregnant	<i>n</i>	Nonpregnant	<i>n</i>	<i>t</i>	<i>p</i>
Age ^a	24.8	25	33.4	61	4.35*	0.01
Education (highest grade)	10.7	26	11.0	61	.96	N.S.
Amount smoked ^b	3.2	26	4.0	62	2.60*	0.01
Confidence in ability to quit ^c	3.1	21	3.4	52	0.74	N.S.
Intention to quit ^d	6.1	23	5.4	57	0.97	N.S.

^aThe range of ages for the pregnant and nonpregnant groups were 18-37 and 18-59, respectively.

^bCigarettes smoked per day (0 = none, 1 = less than 10, 2 = 10-15, 3 = 16-20, 4 = 21-25, 5 = more than 25).

^cConfidence (1 = very confident, 2 = somewhat confident, 3 = a little confident, 4 = not confident, 5 = not at all confident).

^dIntention (0-10 scale, with 0 = no thought of quitting and 10 = taking action to quit).

one's physician were not highly endorsed as reasons to quit by either pregnant or nonpregnant smokers. Table II summarizes these statistics.

Variables that Predict Intention to Quit

Several key variables which predicted cessation in pregnant women in earlier studies were analyzed for their ability to predict intention to quit. Regression equations were used to test the significance of these variables. For this analysis, women who had quit during their pregnancy were assumed to have taken "action" to quit smoking and were given a ladder score of 10 at the point in their pregnancy at which they quit smoking. Pregnant women who smoked more on a daily basis had a lower intention to quit [$F(1,30) = 9.83, p < .01$], and pregnant women who had been pregnant longer had a lower intention to quit [$F(1,29) = 11.12, p < .01$]. Variables which predicted smoking status among pregnant women in previous studies, such as age, college education, marital status, income, and previously quitting, did not significantly predict intention to quit in the present study.

Stage of Pregnancy and Intention to Quit

Further analyses were conducted to determine the importance of the stage of pregnancy with regard to the subject's intention to quit. When the pregnant women were divided into groups by trimester, an ANOVA revealed

Table II. Percentage of Pregnant and Nonpregnant Women Who Gave Specific Reasons for Wanting to Quit

Reason for quitting (if planning to quit)	Pregnant (<i>n</i> = 20) ^a	Nonpregnant (<i>n</i> = 43)	χ^2	<i>p</i>
Concerned about health	55%	84%	6.21*	.05
Urged to by friends and family	30%	35%	0.30	N.S.
My doctor wants me to quit	14%	15%	0.01	N.S.

^aThe *n*'s for the pregnant and nonpregnant groups reflect only those women who reported wanting to quit.

significant differences across the three groups [$F(2,28) = 4.41, p < .05$], with women in their first trimester demonstrating the greatest intention to quit, followed by the women in their second trimester and their third trimester. Figure 1 depicts the mean intention to quit for women for each trimester.

DISCUSSION

Considerable data have demonstrated that smoking during pregnancy is associated with numerous health risks to one's unborn child (USDHHS, 1990). Recent studies have also suggested that deleterious effects may occur as a result of maternal smoking during the child's postnatal development (Leftwich and Collins, 1994). Although 70% of the pregnant smokers in our study acknowledged health risks to their unborn child as a reason for quitting, our results indicated that pregnant smokers had no greater intention to quit smoking than did nonpregnant women. Our results also indicated that pregnant smokers who smoked more on a daily basis were less inclined to quit. Interestingly, pregnant women as a group reported smoking fewer cigarettes per day compared to nonpregnant smokers. However, the average rate of daily consumption in the pregnant women was still fairly moderate, at three-fourths to one pack of cigarettes per day, and continues to place mother and child at risk for health complications.

Length of pregnancy was also shown to be predictive of the intention to quit. Notably, women in the first trimester of their pregnancy demonstrated the greatest intention to quit, followed by women in the second and third trimesters. This finding suggests that an optimal time for intervention may be during the first trimester, when women may be most receptive to messages to quit. Indeed, many other behavioral changes, such as dietary changes, are requested of the pregnant women upon news of pregnancy, and therefore, a woman's motivation for change may be more accessible or malleable at this time.

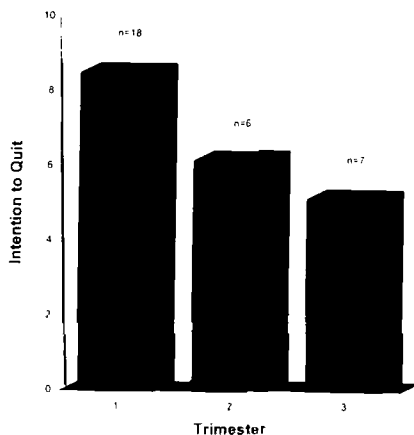


Fig. 1. Intention to quit ratings from the "contemplation ladder" among women in their first, second, or third trimester.

The relationship between length of pregnancy and intention to quit also raises questions as to whether pregnant smokers lose motivation to quit as their pregnancy continues. While our research did not specifically address this question, future research should examine how intention to quit changes across pregnancy. It should be noted that 23% of the pregnant women reported quitting earlier in their pregnancy. Of these women, 80% quit during the first trimester, none quit in the second, and only 20% quit in the third. Future research with larger samples should explore the characteristics of women who quit early in their pregnancy. One previous study examined the characteristics of "spontaneous quitters" and found that these women smoke less and have a greater belief in the adverse effects of maternal smoking (Quinn *et al.*, 1991).

Although other studies have demonstrated that variables such as age, education, and previously quitting are important predictors of smoking cessation during pregnancy (e.g., O'Campo *et al.*, 1992; Cnattingius *et al.*, 1992; Wakefield *et al.*, 1993), these variables did not predict intention to quit in the present study. However, the number of cigarettes smoked daily and the length of the pregnancy were predictive of intention to quit. It should be noted that the present findings were derived from a small sample and it is possible that, with greater power, some of the nonsignificant variables would have been predictive.

Depending on a woman's readiness to change, aggressive intervention may focus on helping a woman to decrease the number of cigarettes consumed on a daily basis, particularly if she is not interested in total cessation. Intervention could also focus on helping these women become more con-

fidant about quitting and more ready to undertake cessation. For this population, it is crucial that smokers quit as soon as possible to reduce health complications for the mother and the unborn child. The best time for these interventions may be during the first visit to the clinic or even before their first visit to the clinic, since pregnant women may delay their prenatal care (Tollestrup *et al.*, 1992).

Another critical time for intervention is the postpartum period. Unfortunately, it appears that the majority of women who successfully quit will relapse after giving birth (e.g., Sexton *et al.*, 1987), and a relapse continues to place mother and child at risk as well as any other children that may be conceived. According to Gritz *et al.* (1993), there are several logical reasons why women may relapse during this time. The desire to lose weight, stress from caring for the child and later from returning to work, and the resumption of alcohol and caffeine use may all contribute to relapse. These women may benefit from interventions designed to help them cope with these factors. In addition, motivational interventions could be used to emphasize the long-term consequences to mother and child after birth.

Because of the low number of pregnant women in this sample, the results of this study must be viewed with caution until they are replicated. Another limitation of the present study is that the self-reported data of the pregnant women may be biased due to the influence of social desirability. However, the relatively high rate of smoking among the pregnant women suggests that this was not the case. Finally, the sample was predominantly caucasian (71%), and caution should be used before generalizing the results of this study to more ethnically diverse populations.

Despite these limitations, the results of the study strongly suggest early intervention for pregnant smokers. Future studies may benefit from including an intention to quit variable as well as examining the influence of the length of pregnancy on a woman's intention to quit. These studies also need to follow pregnant women throughout their pregnancy to examine how intention to quit changes prospectively. In addition, clinical studies should begin to evaluate the efficacy of more aggressive motivational treatments emphasizing the health consequences to mother and child at the beginning of pregnancy as well as after pregnancy.

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