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Smoking Cessation and Weight Gain: A Common Challenge and a Unique Opportunity

BY DANIELLE SIMPSON, BA, BPHE

A female patient once told a physician, “Doc, the cheapest lunch I can buy is a cup of coffee and a cigarette. The coffee helps keep me awake and the cigarette gets rid of my hunger and keeps me slim!” This quotation reflects the widespread belief that smoking helps to control hunger and lose weight. Weight gain after quitting smoking is commonly cited as a primary reason for not attempting to quit and for smoking relapse after cessation.¹ When contemplating quitting smoking, over 65% of women and 25% of men express concern about gaining weight.^{2,3} Not surprisingly, smokers who have concerns about weight gain after cessation are more likely to drop out of treatment and are less likely to quit successfully than those without such weight concerns.¹ In this issue of *Smoking Cessation Rounds*, postcessation weight management, the relationship to gender, and implications for the treatment of adolescents are discussed; as well, some simple, practical strategies to prevent postcessation weight gain are identified.

Postcessation weight gain

For most practitioners, it is no surprise that smoking cessation is often coupled with an increase in weight. Studies published in the 1980s confirmed this association; current research is now focused on the distribution of body fat in smokers and the related health effects.¹ The literature confirms that, although not universal, most people will experience a weight gain of between 4 – 5 kg following cessation;^{1,2} only a small percentage of quitters (13%) experience a weight gain of ≥ 11 kg.^{1,4} Nevertheless, it is the experience of most clinicians that despite reassurance, the onset of significant, or greater than anticipated, weight gain can significantly impair the likelihood of smoking cessation success. As a result, it is important to understand the factors that surround weight gain in association with smoking cessation to apply “anticipatory guidance” and simple counselling in forestalling the development of this common cessation “side effect.”

African Americans, people <55 years of age, and heavy smokers are at increased risk for substantial postcessation weight gain.¹ Studies demonstrate a strong dose-response relationship between the number of cigarettes smoked per day and weight gain following cessation. Investigators note that the higher the number of cigarettes per day smoked by an individual, the greater the increase in body-mass index (BMI) upon quitting (Figure 1).^{3,5} The majority of weight gained after smoking cessation occurs in



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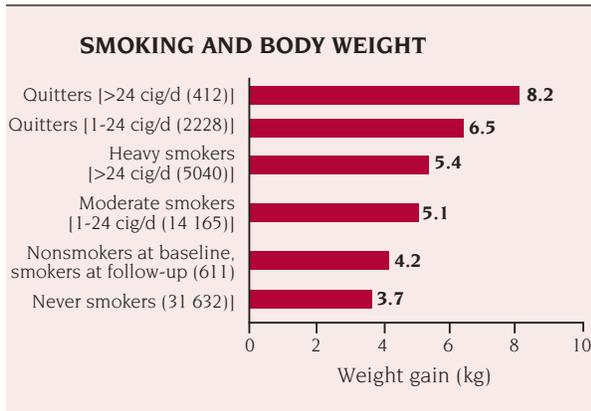
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Figure 1: Weight gain according to smoking status at 8 years of follow-up in the Nurses' Health Study



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the first 2 years after quitting and the majority of that weight gain occurs within the first 1-2 months of cessation.⁵ In the long term, however, the good news is that most people will shed the weight. When comparing cardiovascular (CV) risk factors, a small increase in weight is negligible in contrast to the overwhelming health benefits that accompany quitting smoking. An individual would have to gain between 35–45 kg (75–100 lb.) to equal the amount of stress inflicted on the heart as a result of continued smoking!⁶ Smoking is also associated with greater visceral fat accumulation, insulin resistance, and an increased risk of developing the metabolic syndrome and type 2 diabetes; all are complications that are much more severe than a small amount of weight gain.³

By understanding the mechanisms that cause postcessation weight gain, and identifying the social stereotypes surrounding weight and smoking, it may be possible to provide better care and support for those patients who are attempting to quit smoking.

Smoking to control weight

Hollywood actresses, models, and renowned ballet dancers have all stated that they smoke in order to stay thin; this has helped perpetuate the idea that smoking is an appropriate form of weight control in the eyes of young adoring fans. Science supports this unfortunate but valid association between smoking and weight control. In a World Health Organization investigation conducted over a cross-section of 69,000 men and women drawn from 42 populations, smokers had significantly lower BMIs in 20 populations of men and 30 populations of women out of the 42 populations

studied.⁷ There was no population in which smokers had a higher BMI than nonsmokers. The Inter99 study, a randomized population-based lifestyle intervention study, confirmed this finding and concluded that daily smokers had lower BMIs when compared with those who have never smoked.⁴ Results of the Tromso study, a prospective follow-up study conducted in Norway, demonstrated that BMI was related to the number of cigarettes an individual smoked per day.⁸ Intriguingly, it was noted that those who smoked between 6-10 cigarettes per day had a lower BMI than those who smoked over 20 cigarettes per day. It is not entirely clear what causes this U-shaped relationship between BMI and smoking; however, it has been hypothesized that the clustering of unhealthy lifestyle behaviours in heavy smokers outweighs the anorexic affects of nicotine and leads to weight gain over time.

Smokers have lower BMIs, in part, because nicotine slightly increases energy expenditure. Inhaling nicotine from a cigarette causes blood pressure (BP) to rise and the heart rate to increase. These realities have long been understood and corroborated by much research. Smoking a single cigarette has been shown to produce a 3% increase in energy expenditure.⁹ Subsequent research demonstrated that female smokers have a 16% decrease in resting metabolic rate upon quitting smoking;¹⁰ thus, when smokers quit, their previously “suppressed” metabolic rates return to normal. Patients who have stopped smoking can expect to burn approximately 200 calories less per day that over time will normally result in weight gain. Smoking may also control weight by inducing an “acute” state of anorexia. In fact, for both smokers and nonsmokers, increasing doses of nicotine over a period of 2 hours were found to be positively associated with feelings of satiety and fullness and negatively associated with food consumption and hunger.³

While postcessation weight gain can be a result of a decreased metabolism, it has become clear that the majority of weight gain arises secondary to a distinct increase in caloric intake. Increased appetite is a well-known consequence of smoking cessation (and may reflect normalization of taste and smell with obvious implications for food intake). Similar to the statement by the patient at the beginning of this article, many people smoke in order to avoid feelings of hunger, a perspective that is supported by scientific investigation. There is clear evidence that nicotine reduces hunger and increases feelings of satiety.¹¹ Animal studies have also demonstrated that the administration of nicotine results in a reduction of food intake.¹²

Table 1: Reasons for postcessation weight gain

- Decreased metabolism
- Increased appetite
- Taste and smell return, making food taste better
- Replacing hand-to-mouth action of a cigarette with food
- Lack of physical activity
- Poor diet

It is not generally appreciated that at the time of cessation, many quitters crave high-fat, high-sugar foods further contributing to weight gain.¹³ A study by Caan et al¹⁴ found that women who quit smoking increased their daily caloric intake by 163 kcal at 1 month follow-up, and by 125 kcal at the 6-month follow-up when compared with their baseline values. Their intake of high-calorie, high-fat, and high-sugar foods increased over this time period. The good news, however, was that the increase in caloric intake and the consumption of high-calorie foods returned to baseline levels 1 year after cessation.¹⁴ The obvious clinical implications suggest that advising patients to stick to low-fat snacks or drop 1 snack per day may help patients successfully avoid significant weight gain in the postcessation period.

Research has also investigated the role of leptin in postcessation weight gain. Leptin, a hormone secreted by fat, is a positive regulator of energy expenditure and a negative regulator of food intake. Investigators have postulated that leptin levels may change after quitting smoking; however, results to this point have been mixed.¹

Replacing old habits with new ones

Although the major factors associated with postcessation weight gain are a decrease in metabolism, an increased appetite, and an increased consumption of high-calorie foods, other common side effects of quitting smoking can exacerbate weight gain (Table 1). With cigarettes no longer able to provide the “hand-to-mouth satisfaction” previously experienced with smoking, ex-smokers look for other options and food becomes a common replacement vehicle. The hand-to-mouth action of eating may quite predictably contribute to weight gain during the initial postcessation period. Taste and smell also return to presmoking levels, which makes eating all that more satisfying.

Research reveals that individuals trying to quit smoking often increase the amount they snack, and the amounts consumed during a meal,¹¹ with a resultant increase in their daily caloric intake.¹ Sadly, physical activity does not typically increase during cessation attempts; as a result, the replacement of cigarettes with food accounts for a substantial amount of the weight gained after quitting smoking. There are good reasons for practitioners to provide simple behavioural or dietary counseling to patients attempting to quit smoking. Such counselling should focus on food choices and portion size, the avoidance of snacking, and the significance of subtle changes in daily physical activity.

Does gender play a role?

Postcessation weight gain occurs in both sexes. It is important to recognize those patients who have strong weight concerns, or have experienced significant weight gain during previous quit attempts, and provide simple, effective guidance that may serve to minimize weight gain in the cessation and postcessation periods. Both men and women frequently cite postcessation weight gain as a barrier to quitting smoking and a reason for relapsing.¹⁵ Although the amount of weight gained by men and women is often comparable, the actual concerns surrounding weight gain differ significantly between the sexes. In a randomized trial of different smoking-cessation medications,¹⁶ 50% of the female smokers were concerned about weight, compared with only 20% of men. The authors of the Inter99 study and many other investigators have all reported similar results.⁴

Overall, women are more concerned about weight, in general, and many will not tolerate any large gain in weight. Levine et al¹⁵ conducted an observational study that compared the amount of weight women expected to gain versus the amount they were willing to gain. They reported that women expected to gain >7.3 kg (16 lb.) following cessation, which is 50% more than is typical; they were only willing, however, to tolerate a weight gain of 2.3 kg (5 lb.).¹⁵ Dealing realistically with the question of weight gain is important; assisting patients in knowing what to expect when quitting smoking may help ease the anxiety of many patients and result in more successful quit attempts. A failure to address weight concerns among patients of either sex could result in a reluctance to embark on a quit attempt or significantly lower confidence in quitting.

It is equally important to consider the role of postcessation weight gain in pregnant women. Currently,

it is estimated that 11% to 22% of pregnant women smoke throughout their pregnancy, and reports suggest that pregnant smokers use smoking as a weight management tool during pregnancy.¹⁷ The study by Berg et al¹⁷ found that concerns about postcessation weight gain hindered the efforts of pregnant women to quit smoking. As a result, it is extremely important to address postcessation weight gain concerns in pregnant women; smoking during pregnancy contributes markedly to the development of low birth-weight infants with ominous implications for a host of immediate and long-term consequences.

Adolescents and weight gain

Despite the wealth of knowledge surrounding the negative health effects of smoking, approximately 11% of adolescents in grades 10 to 12 are current smokers according to Health Canada.¹⁸ Many smokers begin to smoke during the formative years of adolescence and they are heavily influenced by the social beliefs, myths, and messages that surround smoking. It is known that adolescents who believe that smoking helps with weight loss are more likely to transition from experimental smoking to current smoking.¹⁹ Such adolescent smokers also believe that if they quit smoking, they will gain weight.¹⁹ Adolescent females have demonstrated a greater likelihood than males to report using smoking as a weight-loss tool and to express fear of gaining weight upon cessation.²⁰

Very little research has been conducted with adolescents regarding postcessation weight gain; however, a prudent clinician would supply adolescent smokers with ample “anticipatory guidance” to help the adolescent who is quitting smoking address the issue of weight management in the postcessation period. Providing physical-activity advice in association with simple dietary counseling may help adolescents deal with weight concerns and prevent postcessation weight gain.

The use of quit-smoking medications

If patients need another reason to use medications to quit smoking successfully and ease withdrawal symptoms, it may help to inform patients that smoking-cessation medications can reduce the amount of postcessation weight gained. Although the research has revealed mixed results, some evidence points to a significant reduction in hunger and postcessation weight gain when cessa-

Table 2: Strategies to prevent weight gain

- Increase physical activity
- Use a smoking-cessation medication
- Eat more fruit and vegetables
- Avoid drinking alcohol
- Drink water or herbal teas

tion has been achieved using pharmacotherapy. Hill et al,²¹ found that participants using nicotine replacement therapy (NRT) gained between 0.1 kg and 3.8 kg compared with a group using placebo, who gained between 2.5 kg and 5.3 kg over a 10-week period. These results were significant for females, but not for males. Similarly, in a study by Hays et al,²² patients receiving bupropion and the nicotine patch gained significantly less weight by the end of treatment than those who received bupropion alone. It has been hypothesized that the nicotine delivered in quit-smoking medications helps to increase the resting metabolic rate of smokers thereby preventing or postponing weight gain.²¹

Strategies to prevent weight gain

Providing patients with information regarding postcessation weight gain may help some patients in their preparations for quitting and ease their anxiety about gaining weight. Educating patients can provide them with the confidence to quit and the willpower to succeed when they are unhappy with the side effects associated with weight gain, though mostly transitory, that may be associated with quitting (Table 2).

It is important to remember that many smokers do not engage in healthy lifestyle behaviours. In fact, smokers tend to exhibit other risk behaviours – including increased alcohol consumption, less fruit and vegetable consumption, and less physical activity – than nonsmokers.²³ The clustering of risk behaviours was found to be more prevalent among men than women, and increased with the amount of cigarettes smoked per day. It follows that adopting new physical-activity behaviours or healthy eating patterns at the time of a cessation attempt may be difficult. Pairing a physical-activity program with smoking cessation, however, may help increase successful quit attempts and minimize postcessation weight gain. A randomized control trial by Prochaska et al²⁴ found that an

increase in moderate-to-vigorous physical activity predicted sustained abstinence from smoking after 24 weeks. Another study by Kawachi et al¹³ demonstrated that moderate-intensity exercise helped decrease the amount of weight gained after quitting smoking among females. Physical activity, in addition to helping patients ward off weight gain, can also be instrumental in alleviating depressed moods, and relieve the stress and cravings associated with quitting smoking.²⁵ Having patients engage in a physical-activity program may encourage them to recommit to living a healthy lifestyle, one that does not include smoking.

Increasing moderate-to-vigorous physical activity can be achieved by walking, an activity to which individuals are more likely to adhere than vigorous physical activity;²⁵ providing pedometers to patients may encourage them to be more active. It may help to remind patients to use walking breaks as a way to get their mind off cravings and to ease withdrawal symptoms; thus, by walking for brief periods at the time of customary smoking breaks during the day, patients may be better able to forestall or minimize weight gain.

Simple dietary counselling, with an emphasis on portion control and food choices, may be helpful in combatting postcessation weight gain. A randomized trial by Danielsson et al²⁶ found that women who are involved in an intervention with dietary and behavioural counselling lost a mean of 2.1 kg compared with the control group, who gained a mean of 1.6 kg upon quitting smoking. Even more importantly, the intervention group had a quit rate of 50% compared with 35% in the control group at 16 weeks of follow-up.

Practitioners can help patients prepare for the sugary food craving after quitting smoking by encouraging them to keep healthy snacks, such as carrot sticks, fruit, or yogourt, on hand. Encourage patients to drink water, as opposed to alcohol or high-calorie sodas. It is always wise to advise patients to reduce their caffeine intake at the time of any quit attempt. Many practitioners are unaware that the metabolism of caffeine changes with the elimination of smoking.²⁷ Constituents of tobacco smoke, particularly the polycyclic aromatic hydrocarbons (PAH) induce enzymes involved in the metabolism of caffeine; thus, smokers metabolize caffeine more rapidly. As a result, caffeine toxicity may accompany smoking cessation because postcessation caffeine levels will

rise despite no increase in caffeine intake.^{28,29} Many mistake the associated “edginess” from increased caffeine in the body as a sign of withdrawal and that symptom can make the cessation process more difficult.³⁰ Coffee consumption is also frequently associated with smoking a cigarette and further depresses appetite.¹¹

Conclusion

Gaining the typical 4–5 kg does not have to be the norm for every smoker who tries to quit. With the right advice, a plan, and the application of simple approaches to increasing activity and moderating food intake, patients trying to quit smoking can reduce or eliminate the likelihood of postcessation weight gain, ease their symptoms of withdrawal, reduce cravings, and most importantly, enhance the likelihood of successful cessation.

At the time of preparation of this article, Ms. Simpson was a Research Assistant, Minto Prevention and Rehabilitation Centre, University of Ottawa Heart Institute, Ottawa.

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Abstract of Interest

Consequences of smoking for body weight, body fat distribution, and insulin resistance.

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Our aim was to critically evaluate the relations among smoking, body weight, body fat distribution, and insulin resistance as reported in the literature. In the short term, nicotine increases energy expenditure and could reduce appetite, which may explain why smokers tend to have lower body weight than do nonsmokers and why smoking cessation is frequently followed by weight gain. In contrast, heavy smokers tend to have greater body weight than do light smokers or nonsmokers, which likely reflects a clustering of risky behaviors (eg, low degree of physical activity, poor diet, and smoking) that is conducive to weight gain. Other factors, such as weight cycling, could also be involved. In addition, smoking increases insulin resistance and is associated with central fat accumulation. As a result, smoking increases the risk of metabolic syndrome and diabetes, and these factors increase risk of cardiovascular disease. In the context of the worldwide obesity epidemic and a high prevalence of smoking, the greater risk of (central) obesity and insulin resistance among smokers is a matter of major concern.

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