



Weight Change in Patients Attempting to Quit Smoking Post-myocardial Infarction

Sonia M. Grandi, MSc,^{a,b} Kristian B. Filion, PhD,^{b,c} André Gervais, MD,^d Lawrence Joseph, PhD,^{a,e,f}
Jennifer O'Loughlin, PhD,^g Gilles Paradis, MD, MSc,^{a,f} Stéphane Rinfret, MD, MSc,^h Louise Pilote, MD, PhD,^{a,e,g,i}
François R. Grondin, MD,^j Sohrab Lutchmedial, MD,^k Mark J. Eisenberg, MD, MPH^{a,b,c}

^aDepartment of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, Quebec, Canada; ^bDivision of Clinical Epidemiology, Lady Davis Institute for Medical Research of the Jewish General Hospital, Montreal, Quebec, Canada; ^cDepartment of Medicine, McGill University, Montreal, Quebec, Canada; ^dAgence de la santé et des services sociaux, Direction de santé publique, Montreal, Quebec, Canada; ^eDivision of Clinical Epidemiology, McGill University Health Centre, Montreal, Quebec, Canada; ^fResearch Institute, McGill University Health Centre, McGill University, Montreal, Quebec, Canada; ^gCRCHUM and the Department of Social and Preventive Medicine, Université de Montreal, Montreal, Quebec, Canada; ^hMultidisciplinary Cardiology Department, Institut universitaire de cardiologie et de pneumologie de Québec (Québec Heart and Lung Institute), Québec City, Québec, Canada; ⁱDivision of General Internal Medicine, McGill University Health Centre, Montreal, Quebec, Canada; ^jCHA Hôtel-Dieu de Lévis, Lévis, Quebec, Canada; ^kNew Brunswick Heart Centre, Saint John, New Brunswick, Canada.

ABSTRACT

BACKGROUND: Current guidelines recommend smoking cessation and weight management for secondary prevention in patients post-myocardial infarction. However, little is known about the effects of smoking cessation on weight change post-myocardial infarction.

METHODS: We examined patterns of weight change and its effects on blood pressure and glycemic control using data from a randomized trial investigating the effect of bupropion on smoking cessation in patients post-myocardial infarction. Weight change was compared among 3 groups of patients: those who were completely abstinent (n = 92), those who smoked intermittently (n = 49), and those who smoked persistently (n = 38) during the 12-month follow-up. Analyses were restricted to patients who attended all follow-up visits.

RESULTS: The median weight at baseline was 77.1 kg (interquartile range [IQR], 66.0, 87.5), and 64.3% of patients were overweight/obese (body mass index ≥ 25.0 kg/m²). The median weight gain at 12 months was 4.0 kg (IQR, 0-7.0), with more than one third gaining >5 kg. The proportion of patients who were overweight/obese increased by approximately 10%, and 23.2% of patients moved up a body mass index category. Abstainers gained a median of 4.8 kg (IQR, 1.0, 8.6), intermittent smokers gained a median of 2.0 kg (IQR, -2.0, 5.0), and persistent smokers gained a median of 3.0 kg (IQR, -0.8, 6.0). Weight gain was associated with an increase in blood pressure and requirements for hypoglycemic medications at 12 months.

CONCLUSIONS: The majority of patients attempting to quit smoking gain weight 12 months post-myocardial infarction, with abstainers gaining more weight than those who return to smoking. Weight gain was associated with an increased prevalence of hypertension and diabetes.

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KEYWORDS: Myocardial infarction; Randomized controlled trial; Smoking cessation; Weight change

Current treatment guidelines recommend strategies to facilitate smoking cessation and weight loss among overweight smokers who have had a myocardial infarction.¹

Despite established benefits of smoking cessation and weight loss post-myocardial infarction,²⁻⁵ minimal attention has been afforded to the importance of weight gain in

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Requests for reprints should be addressed to Mark J. Eisenberg, MD, MPH, Divisions of Cardiology and Clinical Epidemiology, Jewish General Hospital/McGill University, 3755 Cote Ste-Catherine Road, Suite H421, Montreal, Quebec, Canada H3T 1E2.

E-mail address: mark.eisenberg@mcgill.ca

patients who have had a myocardial infarction and are attempting to quit smoking. Post-cessation weight gain in this patient population presents physicians with competing interests with respect to the risks and benefits of smoking cessation. Although the benefits of smoking cessation post-myocardial infarction are well established,^{3,5} substantial weight gain may offset the cardiovascular benefits of smoking cessation.⁶⁻⁸ Consequently, an examination of the impact of post-cessation weight change in patients post-myocardial infarction and the effect on cardiovascular risk factors is needed to help guide the implementation of optimal secondary prevention strategies post-myocardial infarction. The specific objectives are therefore to compare trends in weight change in patients who return to smoking versus those who remain abstinent post-myocardial infarction and examine the effects of weight change on blood pressure and need for anti-diabetic medications.

METHODS

We used data from a randomized, double-blind, placebo-controlled trial investigating the efficacy of bupropion for smoking cessation in hospitalized patients immediately after a myocardial infarction. The full details of the trial have been reported by Eisenberg et al.⁹ Briefly, 392 patients were randomized in-hospital to receive bupropion or placebo for 9 weeks post-myocardial infarction. Patients returned for clinic visits at 4 and 9 weeks and 6 and 12 months. Both groups received motivational support for cessation from a research nurse at baseline and all follow-up visits. Patients enrolled in the trial had to have smoked ≥ 10 cigarettes per day in the past year, to be ≥ 18 years of age, to have had an enzyme-positive myocardial infarction, and to be motivated to quit smoking.

Analyses for the current study were restricted to patients who attended all follow-up clinic visits ($N = 179$). Weight and height were measured, and smoking status was assessed by a research nurse at each clinic visit. Body mass index (BMI) was calculated using the standard formula ($BMI = \text{weight}/[\text{height}]^2$) and categorized as follows: underweight $< 18.5 \text{ kg/m}^2$, normal weight = $18.5\text{-}24.9 \text{ kg/m}^2$, overweight = $25.0\text{-}29.9 \text{ kg/m}^2$, and obese $\geq 30.0 \text{ kg/m}^2$. Obesity was further classified as class I obesity = $30.0\text{-}34.9 \text{ kg/m}^2$, class II obesity (severely obese) = $35.0\text{-}39.9 \text{ kg/m}^2$, and class III obesity (morbidly obese) $\geq 40 \text{ kg/m}^2$.¹⁰ Self-reported smoking status was validated by expired carbon monoxide. Point prevalence abstinence was defined as zero reported cigarettes smoked in the previous 7 days with an expired carbon monoxide ≤ 10 ppm. Blood pressure was

measured, and data regarding the use of antihypertensive and diabetic medications and the occurrence of clinical events were collected by a research nurse at each clinic visit. Antihypertensive agents were grouped by class and included angiotensin-converting enzyme inhibitor inhibitors, angiotensin II receptor blockers, beta-blockers, and calcium channel blockers. Lipid and hemoglobin A1C levels, and use of diuretics were not collected in the trial and therefore were not available for our current analyses.

Change in weight was defined as the difference in weight from baseline to 12-month follow-up. Weight change was compared among patients who were completely abstinent, smoking intermittently, and smoking persistently during the 12-month follow-up. Patients who reported being abstinent at all follow-up visits were classified as abstainers, and those who reported smoking at all follow-ups were classified as persistent smokers. Patients who reported both abstinence and smoking during the 12-month follow-up were classified as intermittent smokers.

CLINICAL SIGNIFICANCE

- Among patients attempting to quit smoking post-myocardial infarction, the median weight gain at 12 months was 4.0 kg (interquartile range [IQR], 0, 7.0), with more than one third gaining more than 5 kg.
- Abstainers gained a median of 4.8 kg (IQR, 1.0, 8.6), intermittent smokers gained a median of 2.0 kg (IQR, -2.0 , 5.0), and persistent smokers gained a median of 3.0 kg (IQR, -0.8 , 6.0).
- Weight gain was associated with an increase in blood pressure and requirements for hypoglycemic medications at 12 months.

Data Analysis

Baseline demographic, clinical, and smoking characteristics are presented as means, standard deviations (SDs), medians, interquartile ranges (IQRs), and percentages, as applicable. Groups were compared by calculating a between-group difference in weight change (baseline to 12 months) and corresponding 95% confidence interval (CI). Comparisons in change in weight, number of cigarettes smoked per day, and blood pressure among the 3 groups are reported as mean differences and corresponding 95% CIs. The independent association between baseline characteristics and weight change at 12 months was assessed using multivariable linear regression. Initial selection of candidate variables was based on their estimates and 95% CIs and evidence of confounding in comparing the estimated coefficients between models with and without each variable. Statistical analyses were performed using SAS statistical software (Version 9.2, SAS Institute Inc, Cary, NC) and R (<http://cran.r-project.org/>).

RESULTS

Patients' Characteristics

Patients were predominantly male (84.0%), and the mean age was 53.9 years (SD, 10.0) (**Table 1**). The mean weight at baseline was 78.3 kg (SD, 17.7), and the mean BMI was 27.3 kg/m^2 (SD, 5.0). At baseline, 64.3% of patients were overweight or obese. Among obese patients, 6.2% ($n = 11$)

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