Assessment of the Validity of Self-Report as a Measure of Smoking Status in Patients Post-Myocardial Infarction

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Summary

Self-report is the standard method for assessment of smoking status in the outpatient setting for myocardial infarction (MI) patients. However, the validity of self-report in this patient population has not been previously investigated. Using data from a double-blind, placebo-controlled, randomized trial we examined the validity of self-report for assessment of smoking status in an outpatient setting for MI patients. Smoking was assessed by self-report and biochemical validation by expired carbon monoxide (CO). Abstinence was defined by a self-report of no cigarettes smoked in the past week and a CO level of less than or equal to 10 parts per million (ppm). At 12 months, number of cigarettes smoked was positively correlated with CO level ($r = 0.70$). Results show that biochemical validation by CO does not substantially increase the likelihood of detecting smokers in MI patients. However, it may discourage patients from denying their smoking status and therefore should be considered for routine assessment of smoking status in the outpatient cardiac setting.

Current clinical guidelines for secondary prevention in myocardial infarction (MI) patients recommend routine assessment of smoking status.¹ In clinical trials, biochemical validation in conjunction with self-report is the conventional method for assessment of smoking status.²⁻⁴ In the outpatient cardiac setting, self-report alone is used for routine assessment of smoking status.

Résumé

En consultation externe, l'on évalue habituellement le tabagisme selon les dires du patient, et il en va ainsi pour le patient ayant subi un infarctus du myocarde (IM). La validité de cette méthode (autoévaluation) dans ce groupe de patients n'a pas été étudiée. Nous reprenons les données d'un essai clinique randomisé, comparatif avec placebo et à double insu pour examiner la validité de l'autoévaluation dans la détermination du tabagisme en consultation externe chez des patients ayant subi un IM. Le tabagisme est évalué selon les dires du patient

et par la validation biochimique au moyen d'un test respiratoire mesurant le monoxyde de carbone (CO) expiré. L'abstinence s'entend du fait de ne pas avoir fumé de cigarettes dans la dernière semaine, selon ce qu'en dit le patient, et d'un taux de CO ≤ 10 parties par million (ppm). Au terme de 12 mois, il y a une corrélation positive entre le nombre de cigarettes fumées et le taux de CO ($r = 0,70$). Les résultats démontrent que la validation biochimique par la mesure du CO n'augmente pas vraiment la probabilité de détecter les fumeurs chez les patients ayant subi un IM. Cependant, cela peut décourager le patient de fausser la donne quant à son tabagisme; pour cette raison, l'on devrait envisager d'adopter cette méthode dans l'évaluation usuelle du tabagisme en clinique de soins cardiaques externes.

Methods

Data from a double-blind, placebo-controlled, randomized trial examining the efficacy of bupropion following an acute MI was used to evaluate the validity of self-report for assessment of smoking status. The full details of the study have been described elsewhere.¹⁰ Briefly, patients had to have smoked 10 or more cigarettes per day over the past year, be aged 18 years and over, and be motivated to quit smoking. A total of 392 patients hospitalized for an acute MI were randomized to receive bupropion or placebo for 9 weeks. Patients returned for clinic visits at 4 and 9 weeks and at 6 and 12 months. Both groups received motivational support at baseline and all follow-up visits. Motivational support consisted of a brief (two-minute) session with a physician prior to randomization followed by a session (≥ 5 minutes) with a research nurse or smoking cessation counsellor (if available) at baseline (prior to discharge) and at all follow-up visits.

Smoking status was determined at each clinic visit by self-report and biochemical validation by expired CO. Expired CO levels were measured using a Micro 4 Smokerlyzer monitor (Bedfont Scientific Ltd., USA) and are expressed in parts per million (ppm). In the original study, abstinence was defined by a self-report of no cigarettes smoked in the past week and an expired CO reading fewer than or equal to 10 ppm. Data from patients who returned for clinic visits and provided self-report and CO measures were included in the analyses. A total of 1,046 paired measures were obtained from each of the four follow-up visits (291, 287, 236, and 232, at 4 and 9 weeks and at 6 and 12 months, respectively).

The agreement between self-report and expired CO was calculated using the Cohen's kappa statistic. Pearson's correlations were performed to determine the relationship between number of cigarettes per day and CO levels. Data were analyzed using the PASW statistical software program (Version 18.0) and the OpenEpi Epidemiologic Calculator.

Results

Patients were predominantly male (84%) and the mean age was 54 years (standard deviation [SD] 10). Patients smoked an average of 33 years (SD 12) and 36% reported having another smoker at home. On average, patients reported smoking 23 cigarettes per day (SD 11) and 63% reported low-to-moderate nicotine dependence at baseline.

At 12 months, biochemical validation correlated with self-reported smoking status for 182 of 232 patients (kappa = 0.54; 95% confidence interval, 0.44–0.57). This pattern was consistent across all follow-up visits (data not shown). Of the discordant pairs, two (0.9%) included a self-report of non-smoking but a positive CO reading. These patients had a mean CO level of 24.5 ppm (SD 5.5). The remaining 48 discordant pairs included a self-report of smoking and a negative CO reading (false negatives, $n = 48$). These patients had a mean CO level of 5.9 ppm (SD 2.6) and reported smoking a median of 4 (interquartile range 1.4, 8.5) cigarettes per day. Patients with both a positive CO and self-report had an average CO of 18.7 (SD 7.7) and reported smoking a mean of 11.9 (SD 7.6) cigarettes per day.

At 12 months, the number of cigarettes smoked per day was positively correlated with expired CO levels ($r = 0.70$, Figure 1). The strength of the correlation increased across the 12-month follow-up (data not shown). Among patients who reported smoking more than 14 cigarettes per day, 90% had a CO reading greater than 10 ppm.

Discussion

Our study was designed to examine the validity of self-report for outpatient ascertainment of smoking status in post-MI patients. We found that biochemical validation by CO was only able to increase the likelihood of detecting smokers by less than 1% in patients. However, it may have discouraged patients from denying their smoking status and therefore should be considered for routine assessment of smoking

status in the outpatient cardiac setting.

Self-report remains the conventional method for ascertaining smoking status in the outpatient post-MI setting. However, it has been found to be an inaccurate marker of smoking status.⁹ Moreover, biochemical validation has been shown to reduce the social desirability bias that often occurs in patients who suffer a major health event.⁹ A study investigating the validity of self-report found that patients with acute coronary syndrome (ACS) were more likely to deny their smoking status versus healthy individuals.^{11,12} Our finding that CO was only able to increase the likelihood of detecting smokers by less than 1% does not support these previous findings. However, knowledge of having to undergo biochemical validation may have deterred patients from denying their smoking status.

Our study had several limitations that should be noted. First, individuals who participated in the original study had to be motivated to quit smoking. This may explain the minimal effect of CO above that of self-report. Second, the knowledge of using a CO monitor at each clinic visit might have discouraged patients to deny their smoking status. Finally, we did not collect data on factors that could potentially affect the ability to detect biological levels of expired CO in the body (e.g., levels of physical activity, time since last cigarette, puffing habits). This could potentially explain the inability of CO to detect individuals who reported having returned to smoking.

Conclusion

Our study was designed to examine the validity of self-report for outpatient ascertainment of smoking status in post-MI patients. We found that expired CO does not substantially increase the likelihood of detecting smokers who would otherwise deny smoking. However, it may discourage patients from denying their smoking status and therefore should be considered for routine assessment of smoking status in the outpatient cardiac setting.

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