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Short communication

Physical activity and physical activity adherence in the elderly based on smoking status

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Abstract

This study assessed the impact of current smoking status and lifetime smoking status on physical fitness and physical activity regimen adherence as part of a larger study on walking for exercise in elderly primary care patients at a Veterans Affairs Medical Center. At baseline, 218 participants self-reported smoking status which was verified by carbon monoxide expiration. Former and current smokers responded to questions about length of time quit, average daily cigarette intake, and years a smoker. Smoking measures were re-collected at 6- and 12-month follow-ups if the participants indicated a change in smoking status. Veterans completed multiple measures of physical activity (e.g., 6-min walk, 7-day Physical Activity Recall), and adherence to a physical activity goal was assessed. The Physical Component Summary (PCS) subscale of the Medical Outcomes Study Short Form-36 (MOS SF-36) was used to assess health-related quality of life. Hierarchical regression models indicated smoking status was a predictor of the baseline 6-min walk such that smokers walked significantly shorter distances than nonsmokers. In addition, smoking status was found to be a significant predictor of adherence; however, the overall model that included smoking status as a predictor did not demonstrate a significant effect on adherence. Neither smoking status nor pack years were predictors of baseline self-reported physical activity or changes in physical activity post intervention. Results are consistent with recommendations to use physical exercise as an aid to tobacco cessation, even in aging men with extensive smoking histories.

Keywords: Physical activity; Tobacco use; Elderly

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1. Introduction

Reviews of the health literature typically conclude that smoking is negatively associated with physical activity (e.g., Brown et al., 2003), though in some cases the relationship is surprisingly modest (King et al., 1992). Much of this literature is based on survey data in adults that suggest a negative association between smoking and leisure time physical activity (Wagner et al., 2003) and prevalence of sedentary lifestyle among current smokers (Varo et al., 2003). Other studies have assessed the relationship between smoking and adherence to physical activity regimens. Current smoking is associated with poor adherence and participation in exercise by middle-aged and elderly participants (Martin & Sinden, 2001).

Given that most studies of the relationships between smoking and physical activity and physical function have been limited to self-report data of current smoking, studies utilizing current and lifetime smoking status in elderly participants are warranted to gauge the long-term impact of smoking on physical activity program outcomes and adherence. It was hypothesized that greater tobacco exposure (current smoking and former smoking) would predict decreased fitness at baseline, decreased change in endurance during the program, and decreased adherence to the physical activity regimen.

2. Methods

2.1. Participants

This study, which was conducted at the Department of Veterans Affairs Medical Center (VAMC) in Jackson, Mississippi was part of a study of the effects of nurse counseling on walking for exercise in elderly primary care patients (Dubbert, Cooper, Kirchner, Meydrech, & Bilbrew, 2002). The study protocol was reviewed and approved by the institutional review board of the University of Mississippi Medical Center and the Research and Development Committee of the VAMC. Information on informed consent, inclusion and exclusion criteria, and attrition are thoroughly reviewed by Dubbert et al. (2002). Participants in this study were all male, predominantly white (white=73.3%; black=25.7%; other=1.0%), elderly (mean age=68.8 years; SD=4.6 years), and had a high number of pack years (M=33.7 years; SD=35.6 years). The majority of participants in the study were former smokers (former smokers=66.5%; current smokers=14.2%; never smokers=19.3%) (see Table 1).

2.2. Intervention procedures

The intervention procedures for the clinical trial have been described previously (Dubbert et al., 2002). After completing BL measures, participants were randomized to follow-up interventions with varying amounts of telephone contact (Dubbert et al., 2002). For the purposes of this study, participants were divided into those who received no telephone follow-up contact (N=60) and those who received up to 20 phone calls from the nurse (N=119).

2.3. Measures

2.3.1. Demographics and tobacco use

A demographics questionnaire and simple health history interview supplemented by medical record review were completed at BL. Tobacco use history was obtained by self-report; expired carbon monoxide

Table 1
Participant characteristics by smoking status

Variables	Current (N=31)	Former/never (N=187)
Independent variables		
Pack years	45.23 (29.07)	41.92 (33.13)
PCS	61.96 (25.51)	42.27 (7.85)
Number of hours worked per week	6.19 (14.70)	8.15 (19.80)
Age, years	67.55 (4.75)	68.95 (4.55)
Dependent variables		
Physical activity		
Light moderate exercise, h/week	12.31 (10.62)	10.33 (9.56)
Moderate and hard exercise, h/week	3.27 (5.19)	4.54 (6.06)
6-min walk, ft	1352.8 (206.33)	1437.86 (270.15)
Change in physical activity		
Change in 6-min walk, ft	77.72 (282.72)	75.07 (199.11)
Physical activity adherence		
Number of weeks — walked three days a week	5.83 (8.61)	10.37 (9.99)

levels at BL validated self-report. Quit date, average cigarettes per day, and years of smoking were obtained for former and current smokers to generate pack years.

2.3.2. Physical activity and fitness

Participants were asked by interview to recall the minutes walking for exercise during the seven days preceding the visit. The 7-day Physical Activity Recall (PAR) (Blair et al., 1985) was administered at BL and 6 months to estimate weekly hours spent in moderate physical activity of any type. Activity of 2 to 3 METS was coded as Light Moderate activity (e.g., slow walking, fishing), and activity of 3–7 METS was coded as moderate and hard activity (e.g., race walking, calisthenics exercise) (Dubbert et al., 2002). A standardized 6MW test in a climate-controlled, quiet 100-ft hospital corridor was used as a measure of cardiovascular endurance. The 6MW assesses aerobic or exercise capacity by measuring how far participants can walk in 6 min (Enright, 2003).

2.3.3. Physical activity adherence

Participants recorded episodes of at least 10 min duration walking for exercise in weekly diaries. Average monthly percent adherence was calculated from the number of walking sessions reported divided by the number of sessions prescribed. For diary walking, any missing data were considered nonwalking days. Validation of self-reported walking was performed by contacting the participants' significant others by telephone to inquire about knowledge of the participant's walking and by the use of accelerometers by a subsample of 51 participants at baseline and one of the two follow-ups.

2.3.4. Physical functioning

The Physical Component Summary (PCS) score of the MOS SF-36 (Ware, Snow, Kasinski, & Gandek, 1993) was used to assess participant perceptions of physical health-related quality of life.

Table 2
Physical activity and fitness, change in physical activity, and adherence to physical activity

Dependent variables	Independent variables	B	SE B	β	95% C.I. for B
Physical activity and fitness					
Light moderate exercise					
Block 1^	Age	−.593	.164	−.320	−.917, −.256*
	PCS	−.017	.096	−.016	−.207, .172
	# of hrs worked	.082	.035	.203	.012, .153*
Block 2^	Age	−.563	.168	−.304	−.896, −.230*
	PCS	−.016	.096	−.016	−.207, .174
	# of hours worked	.086	.036	.212	.015, .157*
	Smoking status	2.772	2.058	.114	−1.304, 6.848
	Pack years	.003	.024	.013	−.044, .051
Moderate and hard exercise					
Block 1^	Age	−.768	.196	−.345	−1.157, −.379*
	PCS	.032	.115	.025	−.195, .260
	# of hours worked	.069	.043	.142	−.015, .154
Block 2	Age	−.740	.202	−.332	−1.140, −.339*
	PCS	.034	.116	.027	−.195, .264
	# of hours worked	.073	.043	.150	−.013, .158
	Smoking status	2.735	2.478	.082	−2.532, 7.282
	Pack years	.006	.029	.017	−.051, .062
6-min walk+					
Block 1	Age	−14.05	4.404	−.247	−22.756, −5.342*
	PCS	11.65	2.672	.340	6.367, 16.934*
	# of hours worked	1.169	.987	.091	−.782, 3.120
Block 2	Age	−16.01	4.430	−.281	−24.773, −7.253*
	PCS	11.33	2.637	.331	6.120, 16.548*
	# of hours worked	1.087	.971	.084	−.834, 3.008
	Smoking status	−132.1	51.15	−.186	−233.2, −30.97*
	Pack years	−.452	.619	−.054	−1.677, .772
Change in physical fitness					
Change in 6-min walk					
Block 1^	Adherence	5.297	1.659	.279	2.012, 8.582*
Block 2^	Adherence	5.462	1.704	.287	2.087, 8.837*
	Smoking status	38.57	49.488	.070	−59.417, 136.565
	Pack years	−.196	.557	−.031	−1.299, .906
Adherence to physical activity					
Number of weeks — walked three days a week					
Block 1	Nurse counseling	−2.523	1.933	−.118	−6.350, 1.303
	PCS	.147	.116	.114	−.083, .377
Block 2	Nurse counseling	−2.707	1.916	−.126	−6.501, 1.086
	PCS	.142	.115	.110	−.085, .369
	Smoking status	−5.203	2.592	−.179	−10.335, −.071*
	Pack years	−.040	.030	−.122	−.099, .018

Note: *$p<0.05$; ^The block was significant at the alpha-level of .05; +Between blocks 1 and 2; R^2 change was significant at the alpha-level of .05.

2.4. Data analysis plan

In order to understand the possible effects of current and past smoking behavior on the dependent variables used in this study, a series of hierarchical regression models were performed. In all of the models, two blocks were created. Known correlates of dependent variables were assessed in step 1, while smoking variables of interest were assessed in step 2. For physical activity variables (light moderate activity; moderate/hard activity; 6MW), covariates included age, number of hours worked, and the PCS scale of the SF-36. For change in physical fitness (6MW from baseline to 12-month follow-up), the single predictor used was number of weeks' adherent to the program's walking goal. For physical activity adherence, the two predictors used were phone follow-up nurse counseling and the PCS scale of the SF-36. In the second block, pack years and current smoking status served as independent variables of interest.

3. Results

As seen in Table 2, although some likely covariates were associated with the dependent variables of interest, smoking status was significantly associated with the baseline 6MW such that smoking was related to walking shorter distance, and smoking was associated with adherence to program goals such that nonsmokers were more adherent to goals than smokers. With regard the 6MW between blocks 1 and 2, R^2 change was .038 ($p = .027$); with regard to adherence, the overall model was not significant and should be interpreted with caution.

4. Discussion

Consistent with the varying results found in previous studies examining smoking and physical activity, results of this study were mixed. Smokers were unable to walk as far as former and never smokers on the 6MW and exhibited poorer adherence to the physical activity regimen. Although the overall model testing adherence to the physical activity regimen and smoking status was not significant, current smokers reported statistically fewer weeks during which adherence to the program was achieved. The intensity of physical activity in which those in the study participated and changes in physical fitness were not related to current smoking, and pack years were not found to be related to any physical activity measures.

Differences in adherence and 6MW performance based on smoking status suggest smokers may have particular needs that should be taken into account when encouraging smokers to exercise. An individualized focus on strategies to assist smokers in developing and following physical activity regimens may be useful components of future efforts designed to increase exercise in similar populations.

Although smokers in this study began with lower physical fitness ability, the change in their physical activity throughout the course of the study was commensurate with that of nonsmokers. Smokers may begin programs with lower physical fitness ability than nonsmokers, but their ability to improve their fitness may not be affected by smoking status. These results are encouraging, as physical activity has been shown to significantly increase life expectancy in both nonsmokers and smokers (Ferrucci et al., 1999).

The primary strengths of this study include not relying on self-report measures and assessing both current and lifetime smoking status in a unique, elderly population. Limitations include limited generalizability, as the participants were all male, elderly, and predominantly white.

That smoking status was not related to changes in physical activity suggests that physical activity can be used to both prime behavior change in addition to assisting older smokers in coping with cravings and

post-cessation weight gain. The results also suggest implementation of a multiple risk behavior intervention is feasible for this population.

Results of the study provide a contribution to the understanding of the relationship between physical fitness and smoking status that can inform future smoking cessation efforts and investigations in both clinical and research settings. Future studies should examine factors that contribute to adherence in order to develop strategies that may increase adherence among smokers in future physical activity programs, as well as explore the utility of physical activity as a primer for global health behavior change.

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