

Long-term Effects of a Program to Increase Physical Activity in Smokers

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BACKGROUND: Programs aimed at increasing physical activity in daily life (PADL) have generated growing interest to prevent the deleterious effects of physical inactivity. Recent literature has shown that a short-term protocol using pedometers increased PADL in smokers with normal lung function. However, the long-term effects of such a protocol were not yet studied. The objective of this study was to evaluate the results of 1-year follow-up after a program aimed at increasing PADL in smokers with normal lung function.

METHODS: Twenty-four smokers were followed (15 men; mean [interquartile range (IQR)], 51 [41-57] years of age; BMI, 26 [22-29] kg/m²; 20 [20-30] cigarettes/d). Subjects were assessed at baseline, immediately after completion of the program, and 1 year later for PADL, lung function, 6-min walking distance (6MWD), smoking habits, quality of life, anxiety, and depression. The 5-month program used pedometers and informative booklets as interventions.

RESULTS: The gains achieved after the program were maintained in the long term: steps/d (postprogram vs 1-year follow-up, mean [IQR]: 10,572 [9,804-12,237] vs 10,438 [9,151-12,862]); 6MWD (625 [530-694] m, 88 [81-97] % predicted vs 609 [539-694] m, 89 [81-96] % predicted), anxiety (34 [26-41] points vs 35 [36-47] points) and depression (6 [2-9] points vs 5 [2-11] points) ($P > .05$ for all). One year after the program, 20% of the subjects had quit smoking.

CONCLUSIONS: In smokers with normal lung function, improvements in daily physical activity, exercise capacity, anxiety, and depression obtained through a 5-month program aimed at increasing physical activity are sustained 1 year after completion of the program. Furthermore, such a program can contribute to smoking cessation in this population.

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ABBREVIATIONS: 6MWD = 6-min walking distance; A1 = assessment moment 1; A2 = assessment moment 2; A3 = assessment moment 3; A4 = assessment moment 4; A5 = assessment moment 5; PADL = physical activity in daily life

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Lifestyle, including physical inactivity in daily life and smoking, has a marked impact on morbidity and mortality rates. Smoking is currently considered a chronic disease caused by nicotine dependence and regarded as a major avoidable cause of death in the world.¹ Furthermore, the concept that regular physical activity may prevent or delay the development of various chronic diseases has solid scientific support.^{2,3} As an example, a prospective study published by Garcia-Aymerich et al⁴ showed that a moderate-to-high level of regular physical activity in smokers is associated with a reduction in the long-term decline in lung function and consequently also with lower risk of developing COPD. Therefore, in addition to interventions aimed at smoking cessation, initiatives to promote regular physical activity in smokers are welcome to prevent the combined deleterious effects of physical inactivity and smoking.

Scientific evidence⁵ revealed that subjects who perform at least 8,000 to 10,000 steps/d generally achieve 30 min/d of moderate physical activity, which is the minimum level of daily physical activity recommended by the American College of Sports Medicine.³ The number of steps/d performed by an individual can be

quantified by using a pedometer, which is a small, light, portable, and low-cost type of motion sensor. The use of pedometers has been highlighted in the literature as one of the strategies to monitor and improve physical activity in daily life (PADL) in several populations.^{2,6-16}

Our research group has studied the benefits of using pedometers to promote physical activity in smokers with normal spirometry.^{10,15} Both in the short term (1 month)¹⁰ and in the medium term (5 months),¹⁵ physically inactive smokers improve their PADL when submitted to a protocol based on the use of pedometers. Moreover, the more inactive the subject was, the larger the increment in his/her daily physical activity. Although these previous results clearly support the use of pedometers to increase PADL in this population, one important question is still unanswered: Are the gains obtained through such a program maintained in the long term, without any formal incentive provided to the subject? Thus, the present study is a follow-up of the studies of Kovelis et al¹⁰ and Zabatiero et al¹⁵ and aimed at evaluating the long-term effects (1 year) after completion of a program that used pedometers to promote the increase of daily physical activity in smokers with normal lung function.

Materials and Methods

Recruitment

Participants were recruited through announcements in the media, buses, and health centers. Forty-nine smokers were included because they were interested in taking part in a program to promote improvement of physical activity in daily life. The program took place at the Laboratory of Research in Respiratory Physiotherapy from the State University of Londrina, Brazil. Inclusion and exclusion criteria for this follow-up study were the same as in the article by Kovelis et al,¹⁰ with the only difference being that only the participants who completed all the phases of the physical activity program were analyzed in the present article (see Study Design).

The program had as its primary aim to increase PADL and not smoking cessation; therefore, no professional counseling or pharmacological support for smoking cessation was offered to the participants, since this could introduce bias to the specific effects of the physical activity program itself. The study was approved by the institution's Ethics Committee in Research (number 007/07) and data were collected from June 2008 to September 2012. All subjects signed an informed consent before taking part in the study.

Study Design and Assessment Methods

The design of this longitudinal prospective study is described in Figure 1.¹⁵ The randomization and allocation process, as well as a detailed explanation about the study design, assessment methods, and the physical activity program can be found in the study by Zabatiero et al.¹⁵ Smokers who fulfilled the inclusion criteria were submitted to an initial assessment (A1) that included lung function test (spirometry), functional exercise capacity test, smoking habits, nicotine dependence, health-related quality of life, levels of anxiety and depression, and quantification of PADL with a pedometer (steps/d).

After A1, subjects were randomized into one of two groups: group booklet + pedometer (GB + P), who initially received a booklet with information about the benefits of walking regularly and were stimulated to walk as much as possible in daily life during 1 month, although they did not receive pedometers and had no written control of their physical activity; and group pedometer + booklet (GP + B), who initially received a pedometer and were instructed and stimulated to perform at least 10,000 steps/d during 1 month. This group was also provided with a logbook where they could record the number of steps in each day during this period of 1 month. After this initial 1-month period, a reassessment (A2) was performed with the same procedures as A1, and the interventions were then crossed over for another 1-month period. Then, another reassessment period (A3) similar to the previous ones was performed, and immediately after that both groups wore pedometers every day during 3 months, aiming to reach the 10,000 steps/d goal. After this 3-month intervention, a

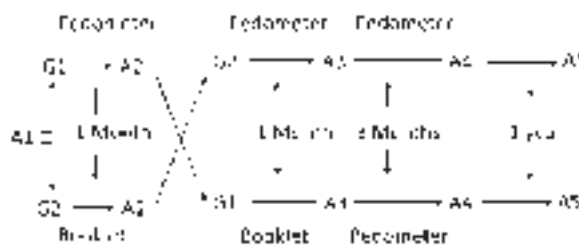


Figure 1 – Study design. A1 = assessment moment 1; A2 = assessment moment 2; A3 = assessment moment 3; A4 = assessment moment 4; A5 = assessment moment 5; G1 = pedometer + booklet group (GP + B); G2 = booklet + pedometer group (GB + P). For a more detailed description of the protocol, see Reference 15.

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