Annals of Physical and Rehabilitation Medicine xxx (2017) xxx–xxx

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com

Original article

Long-term exercise adherence after public health training in at-risk adults

Trine Gro Riktrup Hansen Saida [a,b,*], Tina Juul Sørensen [a], Henning Langberg [a]

[a] CopenRehab, Section of Social Medicine, Department of Public Health, University of Copenhagen, Copenhagen, Denmark
[b] Region Zealand, Human Resources–The Education and Competence Centre, Herlufsvaenge 14 B, Naestved, Denmark

ARTICLE INFO

Article history:
Received 22 November 2016
Accepted 21 February 2017

Keywords:
Exercise
Health behavior
Health promotion
Public health practice
Exercise referral scheme

ABSTRACT

Objectives: Sustainment of healthy exercise behavior is essential in preventing cardiovascular disease and diabetes. Few studies have explored long-term exercise adherence after an exercise referral scheme. The objective of this study was to examine 12-month exercise adherence after an exercise intervention program.
Methods: This was a pragmatic follow-up study in at-risk people performed between June 2012 and January 2014. The main outcome measure was self-reported single-item exercise adherence. Secondary outcomes were change in exercise level, quality of life rated on a visual analog scale and self-rated health. Predictors of long-term exercise adherence were assessed by logistic regression, estimating crude odds-ratios (OR) and 95% confidence intervals (95% CIs) and adjusting for age, gender, education, smoking, moderate and vigorous exercise.
Results: In total, 214 adults (mean age 58.8 ± 11.97 years, 71% women) participated in the study and received a 12-week training intervention: 62% had hypertension, 64% dyslipidemia and 15% impaired glucose tolerance. Attrition rate was 84% (n = 179). During the 12-month follow-up, 48% (n = 85) reported long-term exercise adherence. The main predictors of long-term exercise adherence were participation in sport activities at baseline (adjusted odds-ratio [aOR] 4.22, 95% CI 1.72–10.40), self-rated health (aOR 2.60, 1.00–6.75) and quality of life (aOR 2.39, 1.03–5.54). Long-term non-adherence was associated with low education (< 10 years; aOR 3.27, 1.14–9.43) and age < 50 years (aOR 3.53, 1.32–9.43).
Conclusions: In this pragmatic study, long-term exercise adherence was associated with participation in sport activities and self-rated health at baseline.

1. Introduction

Physical inactivity increases all-cause mortality [1] and has been identified as a modifiable risk factor for cardiovascular disease and type 2 diabetes [2]. The proportion of the European population not meeting World Health Organization physical activity recommendations is about 29% to 39% [3,4]. Regular exercise improves several public health outcomes such as decreased risk of cardiovascular disease [5] and delayed onset of type 2 diabetes [6].

An exercise referral scheme (ERS) is a method used to increase exercise in primary prevention of chronic disease in primary healthcare settings [7]. Long-term exercise adherence is critical for sustaining the gained health benefits of an exercise program [8]. Despite the identification of low adherence in patients with type 2 diabetes [9] and cardiovascular disease [10], this area still remains understudied [11]. Factors affecting long-term exercise adherence need to be identified to increase the number of adherent individuals and to enhance the effectiveness of public interventions in free-living adults in everyday life to prevent and manage chronic diseases.

Factors of exercise adherence to prescribed individualized exercise regimens in primary health care have been identified. Leijon et al. found that increased age, home-based activities and high activity level at baseline increased 12-month exercise adherence [12]. Furthermore, a Swedish study examining 6-month exercise adherence found high activity level at baseline in an adherent group [13]. Leijon et al. found no difference in non-adherence factors after 12 months, with no significant predictors [14]. In a 24-week follow-up study of a randomized 12-week resistance training intervention in older adults [15], perceived lack of time, being more interested in other physical activities and

* Corresponding author at: CopenRehab, Section of Social Medicine, Department of Public Health, University of Copenhagen, Copenhagen, Denmark.
E-mail address: trinegro@hotmail.com (T.G.R.H. Saida).

http://dx.doi.org/10.1016/j.rehab.2017.02.006
1877-0657/

seasonal reasons were identified as non-adherence factors. However, few studies have examined the long-term effects of ERS and the adherence to exercise as a primary outcome in a pragmatic setting [11,16].

We aimed to examine long-term self-reported adherence to exercise after ERS and identify factors associated with long-term exercise adherence.

2. Materials and methods

2.1. Study design

The study was a pragmatic follow-up design evaluating routine clinical practice. All participants provided oral informed consent before participation. Data were collected and stored according to the guidelines of The Danish Data Protection Agency, and approval was obtained (ID No. 2013-41-2028). Ethical approval was not required because of the non-biologic scope of the study.

Inclusion criteria were residents of Copenhagen who were at least 18 years old and had a diagnosis of hypertension (defined as systolic blood pressure $>$ 140 mmHg and/or diastolic blood pressure $>$ 90 mmHg), dyslipidemia (defined as total cholesterol level $>$ 5 mmol/L and/or low-density lipoprotein-cholesterol level $>$ 3 mmol/L and/or high-density lipoprotein-cholesterol level $<$ 2 mmol/L and/or triglycerides level $>$ 2 mmol/L) and/or impaired glucose tolerance (defined as fasting glucose 6.1–6.9 mmol/L). Further inclusion criteria were motivation for changes in exercise, ability to participate in exercise sessions with moderate intensity and awareness of physical limitations. The exclusion criterion was a chronic disease such as cardiovascular disease or diabetes.

The Municipality of Copenhagen was responsible for recruitment. General practitioners assessed risk factors and referred eligible individuals. Before assignment to exercise, participants were interviewed about baseline characteristics. Participants at risk of a chronic disease were able to choose the exercise guidance and training intervention. Only participants allocated to the training intervention were included.

Baseline data were collected between June 2012 and January 2013. At follow-up, between June 2013 and January 2014, data were collected by multiple methods. All participants received a mailed questionnaire with exercise-related items including single-item exercise adherence. Non-responders to the mailed questionnaire were telephone-interviewed once; the telephone interview included the same items as in the mailed questionnaire.

2.2. Training intervention

The training intervention was funded by the Municipality of Copenhagen and was free of charge. The physiotherapist-guided training program was delivered at one of the 5 public prevention centers in the Municipality of Copenhagen. Participants were allowed to combine the training intervention with up to 4 visits to a local sports club accompanied by an exercise guide from the prevention center.

The 12-week training program consisted of physiotherapist-guided training for 90 min twice weekly at the prevention center. A maximum of 15 participants were included in each training session, with ongoing intake of participants. The training consisted of a recognizable program with a warm-up, training on exercise bikes and strength training combined with a varied training session including an exercise maintenance session every fourth week led by trained exercise guides. During the training, participants were introduced to the "Borg scale of exertion" [17]. Participants were instructed to cycle for 15 min at Borg 14–15 with brief intervals of half a minute at Borg 15–17. Strength training was performed on machines (leg press, chest press, leg stretcher and arm pull-down) with 2 sets of 12–15 repetitions and loads not exceeding 60% to 70% of maximum load. Training intensity was increased progressively throughout the 12 weeks. Emphasis was placed on maintaining an active lifestyle after finishing the training program.

2.3. Measurements

The primary outcome was long-term exercise adherence at 12 months. Secondary outcomes were change in exercise level, quality of life (QoL) rated on a visual analog scale (VAS) and self-rated health. We measured long-term exercise adherence at 12-month follow-up with a self-reported non-validated single item: "Have you adhered to the recommendation of increased exercise, which you received at the prevention center?" Answers were classified into 4 response categories: "Yes, I have increased my activity level" (defined as "adherence"); "Yes, I have taken up a new kind of physical activity" (defined as "adherence-new"); "No, I increased my activity level in the beginning of the intervention, but I am no longer active" (defined as "partial adherence"). "No, I have not increased my activity level" (defined as "non-adherence"). The 4 categories were grouped into a binary variable: "long-term adherence" (response categories 1 and 2) and "long-term non-adherence" (response categories 3 and 4). The single-item exercise adherence and the 4 answer categories correspond to those in previous pragmatic ERS studies [12,13].

Self-reported moderate and vigorous exercise was measured at baseline and follow-up, with 2 items comparable to the validated brief exercise assessment tool [18] measuring frequency of exercise and distinguishing moderate from vigorous intensity. Moderate exercise was measured with the item "How much do you exercise daily? Moderate exercise increases your heart rate or makes you breathe harder than normal" (coded "$<$ 30 min daily", "30–60 min daily" and "$>$ 60 min daily"). Vigorous exercise was measured with the item "How often do you perform vigorous exercise, which makes you sweat or puff and pant?" (coded as "never", "$<$ 1 weekly session", "1–2 weekly sessions" and "$\geq$ 3 weekly sessions"). Participation in sport activities at baseline (yes/no) and activity location of choice (fitness center/sports associations/at home/other location) were reported as was intention to increase activity level (yes/no/maybe).

Body mass index ($<$ 20, 20–24, 25–29, 30–34, $>$ 35 kg/m^2) was determined by the general practitioner. The following data were collected at baseline: living status (single/cohabitant), education length, occupation status (working/social security benefits/early retirement/retirement/other), diet intake ("How often do you eat a healthy diet" [5–7 days a week/3–4 days a week/1–2 days a week/less often]), smoking ($\geq$ 20 cigarettes daily/10–19 cigarettes daily/$<$ 10 cigarettes daily/occasionally), alcohol use (amount per week). Self-rated health (very poor/poor/satisfactory/good/very good) was identical to the item on the general health scale in the Medical Outcomes Study Short-form 36 [19]. Pain during the last 14 days was assessed and vitality was assessed by the question "During the last 14 days, how much of the time did you have a lot of energy?" Emotional outcomes assessed during the last 14 days were calmness, happiness and sadness ("How much of the time during the last 14 days have you felt calm and peaceful/have you been a happy person/have you felt downhearted and sad?"). Pain, vitality and emotional outcomes were measured on the same scale (most of the time/a good bit of the time/a little of the time/a little or mostly not). Data related to QoL were obtained from baseline interviews and again after 12 months and measured as social support from family/friends (poor, satisfactory, good/very good) and VAS-rated QoL (0–10), comparable to the EuroQoL-VAS [20].

Please cite this article in press as: Saida TGRH, et al. Long-term exercise adherence after public health training in at-risk adults. Ann Phys Rehabil Med (2017), http://dx.doi.org/10.1016/j.rehab.2017.02.006