

Cardiorespiratory effects of breathing and relaxation instruction in myocardial infarction patients

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Abstract

The effect of individual instruction in relaxation and breathing, additional to an exercise training program, was investigated in 76 post-myocardial infarction patients after rehabilitation and at 3 months follow-up. Respiration rate (RR), heart rate (HR) and respiratory sinus arrhythmia (RSA) were the outcome variables used to compare experimental (exercise plus relaxation) and control (exercise without relaxation) groups. HR and RR decreased slightly during 20-min sessions of supine measurement. This response did not vary between sessions (pre-rehabilitation, post-rehabilitation and after 3-month follow-up). RSA tended to decrease during the sessions. The within-session reduction in RSA became more apparent in the control group after treatment and less so in the experimental group. RR decreased in the experimental group after rehabilitation, but not in the control group. HR decreased for all patients, but the decrease was larger in the experimental group. This effect was associated with the lower RR. RSA did not change in the control group but increased in the experimental group, during both normal and deep breathing. This effect was also associated with a slower RR and became marginally significant when RR was statistically controlled for. We conclude that the relaxation intervention induced a slower breathing pattern which was associated with beneficial effects on resting HR and RSA. Further study is warranted to clarify the degree to which reduced respiration rate is an indicator of lower sympathetic arousal or merely a concomitant of the learned breathing technique. © 1998 Elsevier Science B.V. All rights reserved.

Keywords: Relaxation; Breathing therapy; Physical exercise; Myocardial infarction; Respiration; Respiratory sinus arrhythmia

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1. Introduction

Autonomic imbalance in cardiac regulation has received increasing attention as a possible mechanism for cardiac complaints and as a prognostic factor in heart disease (Niemelä et al., 1990; Coumel et al., 1991; Cripps et al., 1991; Lombardi et al., 1992; Buchanan et al., 1993; Detollenaere et al., 1993). Conversely, improvement of autonomic imbalance may influence prognosis of and recovery from acute heart disease and may partly explain the benefit of physical exercise, psychosocial stress management and relaxation training (Frasure-Smith and Prince, 1989; Buchanan, 1992; Kiilavuori et al., 1995). Previous reports have indicated that breathing and relaxation instruction added to a program of exercise rehabilitation improved psychological and physical outcome of rehabilitation after myocardial infarction (MI) and reduced the occurrence of cardiac events over a 2-year follow-up period (van Dixhoorn et al., 1987). The mediating physiological processes that account for such effects need further investigation. In this report the effects of breath relaxation on respiration, resting heart rate and respiratory sinus arrhythmia (RSA) are examined in post-MI patients, after rehabilitation and at 3 months follow-up.

2. Methods

2.1. Patients

The study population consisted of 156 myocardial infarction patients, referred for rehabilitation soon after hospital discharge. At intake they were asked to participate in the study and upon consent they were randomly assigned to either the usual exercise rehabilitation program only (control group, CG), or to exercise plus additional sessions for relaxation therapy (experimental group, EG). For this report complete physiological data of 76 patients were available. They were 74 men and two women, 39 in the EG and 37 in the CG.

2.2. Interventions

The exercise training consisted of 5 weeks of daily bicycle-ergometer interval training for 30 min. After each session there was a possibility to change, sit together and talk. Training was done in groups of four supervised by two physical therapists. Each patient exercised up to 70% of the heart rate reserve, established by submaximal exercise testing.

Relaxation training was provided once a week in six individual 1-h sessions by five specially trained persons, three psychologists, one physician and one physiotherapist. Electromyographic (EMG) feedback of *M. frontalis* was used to clarify the concept of muscle relaxation, during exercises which entailed alternate active muscular contraction and passive release of tension. EMG feedback was also employed to monitor excessive motor responses during breathing exercises (van Dixhoorn and Duivenvoorden, 1989).

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