Effects of a Cardiac Rehabilitation Program on Pain Scores and Six Minute Walk Test Scores

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Abstract

Background: Improved cardiorespiratory fitness (CRF) is associated with decreased mortality, nonfatal cardiovascular events, and re-hospitalization in patients with heart failure and other chronic conditions[1]. Participation in cardiac rehabilitation is associated with improved CRF. The 6-minute walk test (6MWT) is commonly utilized to assess improvements in CRF. However, the relationships of pain intensity and improvements in CRF and the 6MWT in cardiac rehabilitation patients is not well understood.

Objectives: Determine whether patients who report pain show improvements in pain and 6MWT distance after participating in cardiac rehabilitation.

Methods: 100 adults admitted to outpatient cardiac rehabilitation completed a questionnaire on pain, sleep, and activity levels at the beginning of the program. A 6MWT was administered at the start and end of the program. Only patients with complete data were included (n=65).

Results: There was a weak negative correlation between pain scores and 6MWT distance at the start of the program. 6MWT distance was significantly increased at the end of the program. In patients reporting pain (n = 13), 6MWT and pain score improved during the program.

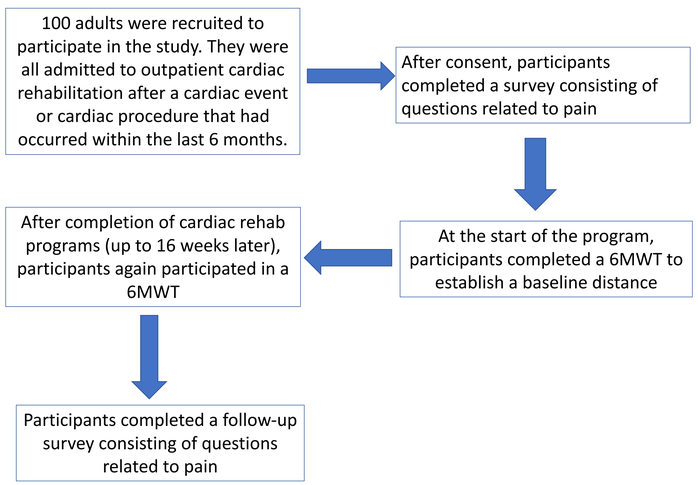
Conclusions: Cardiac rehabilitation was effective in patients experiencing pain. Future work is needed to determine the impact of cardiac rehabilitation programs on pain reduction.

Introduction

Overview: improved cardiorespiratory fitness is associated with a wide variety of improved long-term health outcomes, as well as improvement in quality of life. In particular, cardiac rehab is associated with improved cardiorespiratory fitness.

Research aims: The goal of this study was to determine the association of cardiac rehab with improvements in pain scores and 6MWT distance. This research can be used to help determine the practical values of cardiac rehab, particularly in terms of improved quality of life.

Methods



Results

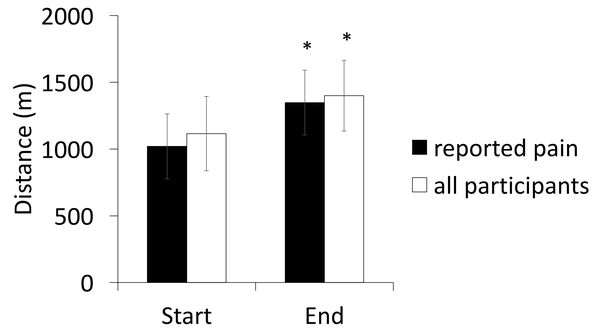


Figure 1: Results of 6MWT at the start and at the end of the cardiac rehab program, in all participants and with only participants who reported pain. There was a significant difference in distance. * Indicates different from start values, $p < 0.001$.

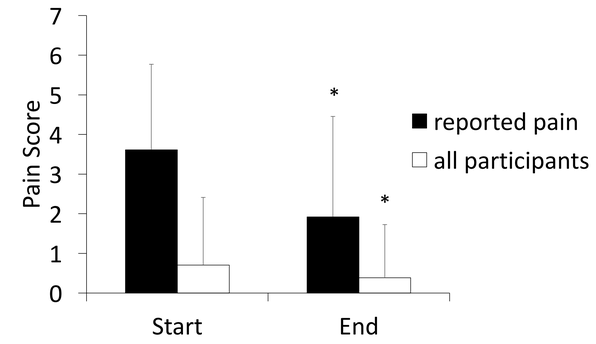


Figure 2: Results of pain scores at the start and at the end of the cardiac rehab program, in all participants and with only participants who reported pain. * Indicates different from start values, $p < 0.05$.

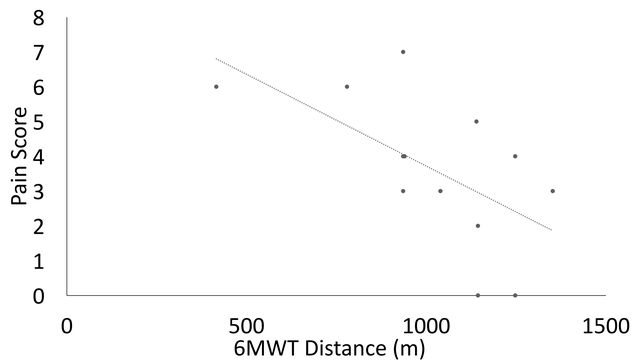


Figure 3: Correlation of 6MWT distance (m) and reported pain scores in participants who reported during the cardiac rehab program. There was a significant negative relationship with a $p < 0.05$.

Discussion

Discussion:
Participation in cardiac rehabilitation is associated with improvements in cardiorespiratory fitness, often measured by the six minute walk test (6MWT). Improved 6MWT has been shown to be predictive of morbidity and mortality in patients with many different lung conditions, including COPD and pulmonary hypertension[2]. The purpose of this investigation was to examine whether pain level influenced improvements in the 6MWT during a cardiac rehabilitation program. A significant improvement was found for the 6MWT in the subset of patients reporting pain and in the entire patient group, indicating a relationship between increased distance in the 6MWT and cardiac rehab programs. A significant decrease in pain scores was found in the whole group studied, as well as in the subset of participants that had reported pain at any point in the program. There was also a weak negative correlation between pain scores and 6MWT distance at the start of the program. These studies are important to evaluate the efficacy of cardiac rehabilitation on improved cardiorespiratory fitness, particularly in patients reporting pain.

Limitations:
A question was not posed that asked patients what their limitations during the 6MWT were. For example, it's unclear if patients were walking slower because of shortness of breath, too much pain, instability, etc. Additionally, a control group is needed to help determine how much of the reduction in pain and increase in 6MWT can be attributed to cardiac rehab. Although commonly utilized, validity of the 6MWT in terms of reliability within and between each tester also needs further investigation.

Future Studies:
Future work is needed to determine the impact of cardiac rehabilitation programs on pain reduction. Many of our participants also reported fairly low pain scores or a pain score of zero at the beginning of the study. Future studies should be conducted on patients with higher pain scores to see if they also benefit from cardiac rehab. Studies on the effects of rehab on 6MWT are also important to investigate the benefits of cardiac rehab on other health comorbidities. Cardiac rehab programs are often underutilized, both because patients are under-referred and because they often do not attend even after referral. Future studies investigating interventions to improve cardiac rehabilitation program utilization are warranted. Additional studies are also needed to further investigate the association of the 6MWT with long-term health outcomes in the general population.

References

1. Giannitsi, Sophia et al. "6-minute walking test: a useful tool in the management of heart failure patients." *Therapeutic advances in cardiovascular disease* vol. 13 (2019): 1753944719870084. doi:10.1177/1753944719870084
2. Agarwala, Priya, and Steve H Salzman. "Six-Minute Walk Test: Clinical Role, Technique, Coding, and Reimbursement." *Chest* vol. 157,3 (2020): 603-611. doi:10.1016/j.chest.2019.10.014

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