

Title:

Randomized Controlled Trial in Heart Failure: Effects of Moderate Exercise on Mood and Cognitive Function

Laura S. Redwine, PhD

College of Nursing, University of South Florida, Tampa, FL, USA

Session Title:

Innovative Cardiovascular Secondary Prevention Interventions

Keywords:

Exercise, Heart Failure and Symptoms

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Abstract Summary:

In a randomized controlled trial of patients with heart failure, two moderate exercises, Tai Chi and resistance band were more effective in improving depressive symptoms and cognitive function than usual care. Whereas, Tai Chi and resistance band exercises did not differ in these outcomes.

Content Outline:

I. Introduction

1. Despite advances in treatments for heart failure, patients continue to experience debilitating symptomatology, which reduces quality of life.
2. Almost a third of patients with heart failure have clinical levels of depressive symptoms and over half have symptoms of cognitive impairment.
3. The goal of exercise interventions for HF is primarily to improve symptoms and the quality of life

II. Body

1. Studies have examined mostly vigorous exercise interventions, which lower depression symptoms in patients with heart failure

1. Many exercise intervention studies consist of participants that are younger than the typical HF patient, with little co-morbidity (HF-ACTION median age = 59 years and excluded patients with devices that limit achieving target heart rate).
2. Over 80% of patients with HF are over the age of 65 and many have limited capacity for vigorous exercise due to co-morbidities including sarcopenia, anemia, obesity, diabetes, COPD, peripheral artery disease, and older age.
2. In non-heart failure groups, moderate exercise is shown to reduce risk of cognitive impairment.
 1. Few studies have examined the effects of moderate exercise interventions on cognitive impairment in patients with heart failure.
 3. Moderate exercises include Tai Chi and resistance band training.
 1. Tai Chi is composed of low-impact, mindfully meditative movements with integrated breathing techniques, often studied specifically in elderly and frail cohorts and are well tolerated across fitness levels
 2. Resistance band exercise is effective for increasing muscle strength, endurance, and physical function
- III. Conclusion
 1. Tai Chi and resistance band exercises were superior to usual care for reducing depressive symptoms and increasing cognitive function. The study extends prior research by suggesting various moderate exercises are effective for reducing symptoms of depression and improving cognitive function in patients with heart failure.

Topic Selection:

Innovative Cardiovascular Secondary Prevention Interventions (25531)

Abstract Text:

Purpose:

Heart failure (HF) is a global health problem associated with considerable morbidity, mortality and diminished quality of life (Yancy et al., 2017). Although medications can improve some symptoms, individuals with HF continue to experience debilitating symptomatology. The prevalence of depressive symptoms (30%) and mild cognitive impairment (MCI) (over 50%) are high in HF and are related to substantial reductions in quality of life (Cameron et al., 2016; Jiang et al., 2007), as well as adequate self-care (Davis, Himmelfarb, Szanton, Hayat, & Allen, 2015) and cardiovascular event risk (Gelow, Mudd, Chien, & Lee, 2015; Sherwood et al., 2007). Meanwhile, the efficacy of antidepressant therapy in patients with HF is limited (Thombs et al., 2008) and there are no pharmaceutical treatments with neuroprotective effects on dementia.

The goal of exercise interventions for HF is primarily to improve symptoms and the quality of life (Bloom et al., 2017). Research suggests vigorous exercise can lower depressive symptoms in patients with HF (Blumenthal et al., 2012; Tu et al., 2014). However, many exercise intervention studies consisted of younger than typical patients with HF, with little co-morbidity. The HF-ACTION study's median age was 59 years (range = 51-67), and excluded patients with exercise limitations and/or devices that limited the ability to achieve target heart rates (O'Connor et al., 2009). Meanwhile, over

80% of patients with HF are over the age of 65 (Redfield et al., 2003) and many have limited capacity for vigorous exercise due to co-morbidities including sarcopenia (Bekfani et al., 2016), anemia, (Ebner et al., 2016) obesity, diabetes, COPD, peripheral artery disease, and older age (Stahrenberg et al., 2015).

Physical activity (PA) of at least moderate intensity, e.g. aerobic exercise, resistance training, multicomponent training, and Tai Chi (TC) reduces risk of cognitive impairment (Northey, Cherbuin, Pumpa, Smee, & Rattray, 2018). TC is composed of low-impact, mindfully meditative movements with integrated breathing techniques, often studied specifically in elderly and frail cohorts and are well tolerated across fitness levels (Huang, Feng, Li, & Lv, 2017). Practicing TC is effective for reducing depressive symptoms in a broad range of patients with HF (Yeh et al., 2013; Redwine et al., 2012). Meanwhile, resistance band (RB) exercise is effective for increasing muscle strength, endurance, and physical function (Mandic, Myers, Selig, & Levinger, 2012). However, few studies have investigated whether TC compares with other moderate exercises such as RB for improving depression symptoms and cognitive function.

In light of previous research we compared TC, RB exercise, and treatment as usual (TAU) for changes in depressive symptoms and cognitive function. It was hypothesized that moderate exercise including TC and RB would be more effective in reducing depressive symptoms and improving cognitive function than TAU.

Methods:

The study protocol was approved by our Institutional Review Board. Informed consent was obtained from all participants. Recruitment, and assessment personnel were naïve to participant group assignment. Participants were outpatients diagnosed with AHA/ACC Classification Stage C symptomatic HF (N=70, mean age=66.0, SD=10.5) and included both preserved and reduced ejection fraction subtypes. Assessments at baseline and immediately after the interventions included the Beck Depression Inventory-1a (BDI), Montreal Cognitive Assessment (MoCA), and the 6-minute-walk test to assess physical functional capacity (Lipkin, 1986). Echocardiography was performed by blinded assessors and were quantitatively analyzed by a physician blinded to group allocation. Interventions: participants were randomized to TC (Yang-style Tai Chi Chuan-Short Form), RB training (Center for Disease Control's "Move" program), or treatment as usual (TAU). TC and RB groups met twice per week for 60 minutes per session for 16-weeks. Both groups were asked to exercise at a perceived exertion rating of "moderate difficulty", according to the Borg scale (Borg, 1982). TAU participants did not receive an active intervention. Statistical Analyses were performed using SPSS version 24 (IBM Corp, Armonk, NY). Mixed-effects models were used to analyze the efficacy of TC compared with RB exercises and TAU (Gueorguieva & Krystal, 2004). Post hoc analyses made specific group comparisons using repeated measures ANCOVA.

Results:

Of 135 individuals screened for eligibility 70 patients were enrolled. Groups included TC (n = 25), RB training (n = 22) or TAU (n = 23). BDI scores averaged 10.0 (SD = 7.3), at the cut-off for clinically elevated depressive symptoms (> 10) (Beck, Steer, Ball, & Ranieri, 1996). MoCA scores averaged 24.23 (SD = 3.2), while 62% met the cut-off for MCI (≤ 23). Treatment fidelity and adherence: 18% dropped out and 59 subjects completed the study (n = 21, 19 and 19 respectively). There were no group differences

in drop-out rates ($p = .81$). There were no serious adverse events associated with the study. Depressive symptoms: There were fixed effect group differences over time for BDI scores (group x time interaction, $F = 9.2$, $p < 0.01$), with both TC and RB groups decreasing in scores to a greater extent than TAU. Post hoc analyses revealed both TC ($\eta^2 = .096$, $p = .039$) and RB ($\eta^2 = .11$, $p = .034$) groups differed from TAU over time, and no differences between TC and RB ($\eta^2 = .014$, $p = .45$). Cognitive function: There were fixed effect group differences over time for MoCA scores (group x time interaction, $F = 4.7$, $p = 0.014$), with both TC and RB groups increasing and TAU decreasing in scores. Post hoc analyses revealed TC ($\eta^2 = .14$, $p = .028$) and RB ($\eta^2 = .23$, $p < 0.01$) groups differed from TAU, and no differences between TC and RB ($\eta^2 < .01$, $p = .66$).

Conclusion:

TC and RB were superior to TAU for reducing depressive symptoms and increasing cognitive function. The study extends prior research by including RB as a conventional exercise condition and suggests various moderate exercises can reduce symptoms of depression and improve cognitive function in patients with HF. More study is needed to determine the influence of exercising in groups on depressive symptoms and cognitive function, since both interventions were group-based. A main limitation of the study includes a modest sample size, resulting in limited statistical power, and inability to adequately address differences between preserved and reserved subtypes of HF. However, both groups experience reduced physical function (Dhakal et al., 2015), depression and cognitive reductions (Hamo et al., 2015). Thus, the findings relating to physical function and depression are likely relevant to both groups.