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Research Paper

An integrative review of physical activity/exercise intervention effects on function and health-related quality of life in older adults with heart failure

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ABSTRACT

This paper reviews randomized, controlled trials (RCTs) that have used a physical activity/exercise intervention in older adults with heart failure and reported outcomes of physical function and/or health-related quality of life. An integrative review was necessary because a literature search indicated no reviews have been done regarding these outcomes which are deemed very important by the older adult population. Computerized database search strategies by authors between 2002 and 2015 resulted in 163 studies, with 12 meeting inclusion criteria. Interventions were performed in clinic and home-based, group and/or individual settings with durations from three to 12 months. Interventions were varied. Common methodological weaknesses of the studies include lack of theory guiding the intervention, small sample and low minority representation. Strengths included detailed intervention methods. There was a moderate effect of interventions with no reported adverse effects. Further work is essential to identify successful strategies to support older adults with heart failure to increase their physical activity levels.

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Introduction

Aging is associated with a higher prevalence of chronic disease that can negatively affect physical and functional abilities in older persons.¹ An estimated 80 percent of older adults (65+) in the United States (U. S.) currently suffer from one or more chronic conditions.² Heart failure—a major chronic health condition of older age—greatly contributes to decline in the older adult's physical function level, thus affecting self-care abilities. As heart failure progresses older adults often experience frequent exacerbations from which they may not fully recover. This continued decline places the older heart failure population at a high risk for dependence on others and is a catalyst to frequent hospitalization and long-term institutionalization.^{3,4} In spite of modern therapies, half of older adults diagnosed with heart failure will die within five years⁵ and quality of life deteriorates quickly in another one-third of this population.³ The current medical cost of caring for heart failure patients in the U. S. is \$32 billion annually and due to the continued growth of the older population, costs are predicted to be more than \$77 billion by 2030.⁶ Many pharmacologic and medical

treatments are critical elements in managing heart failure in older adults, however one area that receives less attention—but may be as important—is the role of physical activity in promoting cardiovascular health, and improving symptoms, function, and health-related quality of life in this population. In light of the deleterious effects of heart failure on the older adult's functional abilities, coupled with the staggering costs of care for this population, a greater depth of understanding is needed regarding the structure and efficacy of existing physical activity interventions that promote physical function in older adults with heart failure. Thus the purpose of this integrative literature review was to synthesize current tertiary physical activity/exercise interventions promoting improved physical function and quality of life in older adults with heart failure, and to offer recommendations to promote physical activity/exercise in this population to improve outcomes.

Background

It is well known that physical activity such as walking greatly improves health in older adults.^{7,8} Moreover, physical activity can slow physiologic changes associated with aging and assist with the management of chronic disease.⁹ Physical function and the ability to perform self-care are also closely tied to physical fitness level.^{10,11} Unfortunately physical activity levels among older U.S.

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adults are alarmingly low. Less than 20 percent of the older adult population meets the U.S. physical activity guidelines.^{12,13} As older adults age they continue to decrease their level of engagement in physical activity. Additionally, symptoms associated with heart failure often further limit participation in physical activity. Lastly, older adults with heart failure often have multiple comorbid conditions compared to younger adults, thus contributing to further decline in the ability to be active and maintain physical function.⁴ Because of these unique characteristics of older adults with heart failure, proven physical activity interventions in younger patients with heart failure¹⁴ may not translate to this population.

As low physical activity level is among the most important risk factors for cardiovascular disease,¹⁵ primary prevention has been a key area targeted for interventions. However, older adults who have progressed to a diagnosis, and even complications, of heart failure may benefit also from physical activity/exercise interventions. Once a disease such as heart failure is established and has been treated in its acute clinical phase, tertiary prevention aims to reduce the impact of the disease on the individual's function, health, and quality of life through restoring them to the highest level of function and minimizing complications.¹² Tertiary health promotion activities for heart failure extend into rehabilitation of the heart failure condition.

Development of tertiary physical activity interventions for older adults with heart failure supports the *Healthy People 2020* initiative to "improve the health, function, and quality of life of older adults"¹⁶ through two primary objectives:

1. Older Adult Objective 5: Reduce the proportion of older adults who have moderate to severe functional limitations and,
2. Older Adult Objective 6: Increase the proportion of older adults with reduced physical ... function who engage in light, moderate, or vigorous leisure-time activities.¹⁶

In order to support the *Healthy People 2020* objectives, researchers must determine effective interventions for the chronically ill older adult population. There is limited and possibly conflicting evidence related to physical activity/exercise intervention outcomes in older adults with heart failure thus there is not a consensus regarding appropriate physical activity prescription for this special population. Furthermore, many studies report cellular or physiologic outcomes such as arterial diameter changes, and VO_{2max} , or blood pressure improvements related to interventions, but do not translate how these changes may affect functional abilities or quality of life in the older adult. The lack of outcome measures meaningful to the older adult may limit adoption and use by clinicians, caregivers, and patients themselves. Evaluation of interventions that support and measure function and quality of life provides direction for clinicians to develop and/or encourage appropriate physical activity programs for older adults with heart failure.

Methods

Literature search and inclusion criteria

The authors searched PubMed, Web of Science, and CINAHL research databases using the terms *older adult*, *heart failure*, *exercise*, *physical activity*, *physical function*, and *quality of life* for studies published between January 2002 and December 2015. A total of 163 studies were identified for further review. Abstracts were reviewed for the following criteria: 1) randomized controlled trial, 2) participant mean age of 65 years or older, 3) diagnosis of heart failure at time of intervention, 4) intervention included (but may

not be limited to) physical activity or exercise, 5) sample size greater than 10 and, 6) outcome measures included physical function (assessed or self-reported) and/or reported health-related quality of life (HRQoL). Seventeen abstracts were identified for further review. Both authors reviewed the full study reports and independently assessed them for eligibility based on the defined inclusion criteria. On further review, four studies were missing one or more inclusion criteria (e. g. one of the study group's mean age was <65, depression score reported as (HRQoL). If we did not reach the same decision after our independent review, we collectively reviewed the study, applied the criteria, and resolved through discussion. This occurred for one study, in which outcomes were reported in multiple publications, therefore only the original study¹⁷ investigating physical function and HRQoL was included for this review.

Results

Twelve independent studies (total 1149 subjects) met our search criteria. All but one study included the 6 min walk test (6MWT) in reporting of functional outcomes. Wall et al¹⁸ compared their participant's function levels using the self-report Yale Physical Activity Survey (YPAS). Health-related quality of life was assessed using a specific heart failure questionnaire (Minnesota Living with Heart Failure Questionnaire [MLWHFQ] or Chronic Heart Failure Questionnaire [CHFQ]) in all but one study in which Borland et al¹⁹ used the Short Form-36 (SF-36).

Average participant age across studies was very similar at 70.1 years, with the exception of one study in which participant average age was 80.5 years.²⁰ Study sample sizes ranged from 19 to 200 participants. Almost one-half of the studies had a female participation rate of 42 percent or higher, and one study had an all-female sample. Minority participation information was included for less than 50 percent of the studies. Intervention times ranged from three to 12 months. [Table 1](#) shows specific characteristics and outcomes related to physical function and HRQoL. Five studies^{17,19,21–23} reported significant differences in physical function and perceived HRQoL between intervention groups and standard care/control groups. Gary et al²⁴ reported significant improvements in function but not HRQoL, and Yeh et al²⁵ reported significant improvements in HRQoL but not function in their studies. Five studies^{18,20,26–28} showed no statistically significant differences between groups. All of the studies reported no participant adverse effects during the intervention.

There was a mix of intervention implementation methods, with four studies (33.3%) utilizing a group-based exercise/physical activity method, seven (58.3%) performing the exercise/physical activity intervention at an individual level, and one study using both group and individual methods (8.3%). Six studies incorporated both aerobic activity and resistance training,^{19–21,23,27,28} and three studies administered aerobic interventions.^{18,22,24} Participants in Yeh et al²⁵ performed Tai-Chi, which incorporates aerobic and anaerobic activity. Three studies^{21,22,24} included additional components of education or cognitive behavioral therapy with their exercise intervention. Two studies^{18,28} conducted a long-term intervention (12 months duration). All other studies had short intervention periods (between two and four months). Seven studies (58.3%) had short-term follow-up (three to six months), with five studies (41.6%) evaluating outcomes long-term (at 12 months).^{18,22,23,27,28}

Five studies contained a moderate to large sample size thus were able to identify smaller significant effects in the study population.^{20,22,23,27,28}

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