The Impact of a Long-Term Community-Based Group Exercise Programme on Functional Health in Older Adults

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Abstract:

Introduction: Functional health is a key determinant of independence and quality of life in older adults. Community-based structured exercise programs may help preserve physical function and support healthy ageing, particularly among older adults with cardiovascular disease. The aim of this study was to evaluate the effects of a community-based group exercise program on functional health outcomes in older adults.

Materials and Methods: This pre-post intervention study included 239 community-dwelling older adults aged 60 years and over with diagnosed cardiovascular disease. Participants attended a structured group exercise program twice weekly for eight months. The program consisted of warm-up exercises, strength and balance training, functional exercises, and stretching. Measurements were performed at baseline and after the intervention and included body mass index (BMI), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), blood pressure, handgrip strength, Romberg test, and Timed Up and Go (TUG) test. Statistical analyses were performed using paired-samples tests, with significance set at $p < 0.05$.

Results: Following the intervention, significant improvements were observed in handgrip strength, balance performance assessed by the Romberg test, mobility assessed by the TUG test, systolic blood pressure, and WHtR (all $p < 0.05$). The proportion of participants achieving a normal Romberg test result increased after the intervention. No significant changes were observed in BMI, WHR, diastolic blood pressure, or heart rate.

Conclusions: An 8-month community-based group exercise program was associated with significant improvements in several indicators of functional health among older adults with cardiovascular disease. These findings support the implementation of community-based exercise programs as an accessible strategy for promoting functional independence and healthy ageing.

Keywords: Aged, Exercise; Physical Function

Sažetak:

Utjecaj dugoročnog grupnog programa vježbanja u zajednici na funkcionalno zdravlje osoba starije životne dobi

Uvod: Funkcionalno zdravlje ključna je odrednica neovisnosti i kvalitete života osoba starije životne dobi. Strukturirani programi vježbanja u zajednici mogu pomoći u očuvanju tjelesne funkcije i

podržati zdravo starenje, osobito među starijim osobama s kardiovaskularnim bolestima. Cilj ovog istraživanja bio je procijeniti učinke programa grupnog vježbanja u zajednici na ishode funkcionalnog zdravlja kod osoba starije životne dobi.
Materijali i metode: Ovo pre-post intervencijsko istraživanje uključilo je 239 starijih osoba u dobi od 60 godina i više koje žive samostalno i imaju dijagnosticiranu kardiovaskularnu bolest. Sudionici su tijekom osam mjeseci pohađali strukturirani program grupnog vježbanja dva puta tjedno. Program se sastojao od vježbi zagrijavanja, treninga snage i ravnoteže, funkcionalnih vježbi te istezanja. Mjerenja su provedena na početku i nakon završetka intervencije te su uključivala indeks tjelesne mase (BMI), omjer opsega struka i bokova (WHR), omjer opsega struka i tjelesne visine (WHtR), krvni tlak, snagu stiska šake, Rombergov test i TUG test (*Time Up and Go*). Statističke analize provedene su primjenom testova za zavisne uzorke, uz razinu statističke značajnosti postavljenu na $p < 0,05$.
Rezultati: Nakon provedene intervencije utvrđena su značajna poboljšanja snage stiska šake, ravnoteže procijenjene Rombergovim testom, mobilnosti procijenjene TUG testom, sistoličkog krvnog tlaka te WHtR-a (sve $p < 0,05$). Udio sudionika koji su postigli uredan rezultat na Rombergovu testu povećao se nakon intervencije. Nisu utvrđene značajne promjene u BMI-u, WHR-u, dijastoličkom krvnom tlaku ni srčanoj frekvenciji.
Zaključci: Osmomjesečni program grupnog vježbanja u zajednici bio je povezan sa značajnim poboljšanjima nekoliko pokazatelja funkcionalnog zdravlja kod starijih osoba s kardiovaskularnim bolestima. Ovi rezultati podupiru provedbu programa vježbanja u zajednici kao dostupne strategije za promicanje funkcionalne neovisnosti i zdravog starenja.

Ključne riječi: starije osobe; tjelesna aktivnost; tjelesna funkcija.

Introduction

With population ageing, integrated care has become increasingly important for maintaining the physical and mental capacities of older adults, and the World Health Organization's Integrated Care for Older People (ICOPE) framework emphasizes person-centered, coordinated interventions aimed at preventing, delaying, or reversing functional decline (1). Since functional ability is strongly linked to independence and social engagement in community-dwelling older adults, interventions aimed at preserving functional health have become a cornerstone of healthy ageing strategies (2). Older people with cardiovascular disease are particularly vulnerable to mobility limitations, reduced physical function, and loss of independence, highlighting the need for effective and accessible interventions to maintain functional health. Physical activity is recognized as one of the most effective strategies for preserving functional capacity, preventing mobility decline, and supporting healthy ageing among older adults. Regular physical activity is associated with reduced cardiovascular risk, improved physical function, and maintenance of independence in older age (3). Community-based physical activity interventions are particularly valuable because they provide accessible opportunities for regular exercise while fostering social participation and engagement within local settings. Evidence from a systematic review suggests that community-based interventions incorporating low- to moderate-intensity exercise can improve physical activity levels, physical functioning, and psychological well-being in older adults (4). Furthermore, the Retirement in Action (REACT) trial demonstrated that a structured, community-based group exercise program helped prevent decline in physical functioning among older adults at risk of mobility limitations over a 24-month period (5). Although multimorbidity is often considered a barrier to physical activity participation, recent evidence indicates that older adults with multiple chronic conditions can achieve comparable improvements in physical activity and physical capacity through structured multicomponent exercise programs (6). Furthermore, targeted strength and balance exercises can enhance physical function and reduce the risk of functional decline, while multicomponent training may help maintain independence and quality of life among older adults with chronic conditions (7). Despite growing evidence supporting community-based exercise interventions, data on their effectiveness in maintaining functional health among community-dwelling older adults with cardiovascular disease remain limited. The aim of this study was to evaluate the effects of a community-based structured group exercise program on functional health outcomes in independently living older adults with cardiovascular disease.

Materials and Methods

Subjects

This pre-post interventional study included 239 community-dwelling adults aged 60 years and older living in the city of Rijeka. Participants were recruited from community centers and assessed at baseline and after an 8-month intervention period (from October 2024 to June 2025). Inclusion criteria were age ≥60 years, independent living, ability to ambulate, absence of dementia or disability, and diagnosed cardiovascular disease (ICD-10 I00–I99). Exclusion criteria were age <60 years, terminal malignant disease, dementia, paralysis or amputation, acute illness or recovery from surgery, and lack of written informed consent. Subjects participated in community group exercise led by professionals (physiotherapists) twice a week for one hour. Subjects who attended less than 80% of physical activity sessions were excluded from analyses. In total 239 women formed the final group sample. This study was performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Faculty of Medicine, University of Rijeka, RN 380-59-10106-17-100/207. Written informed consent was obtained from all participants prior to enrolment.

Methods

Structured physical activity

Participants underwent a structured group-based physical activity program lasting 8 months. The intervention consisted of supervised exercise sessions twice weekly, each lasting 60 minutes. Sessions were led by trained physiotherapy students under professional supervision and were adapted to participants' age and health status. Each session included a warm-up, a main exercise component focused on mobility, strength, balance, coordination and proprioception, and a cool-down phase with stretching and relaxation exercises.

Measurements

Assessments were conducted at baseline and after 8 months participated in structured group exercise, using standardized protocols. Anthropometric measurements included body height, body weight, waist and hip circumference. Body mass index (BMI) was calculated as weight (kg)/height (m^2). Waist-to-hip ratio (WHR) and waist-to-height ratio (WHtR) were calculated as indicators of central obesity and cardiometabolic risk. Blood pressure and heart rate were measured using an oscillometric device (Omron M7, Omron Healthcare, Kyoto, Japan) after 5 minutes of seated rest. Handgrip strength was assessed using a hydraulic dynamometer (Yamar), with two measurements recorded and the mean value used for analysis. Romberg test measured (8) balance according standardize protocol as well as Time up and go test (TUG) (9).

Statistical analysis

The normality of data distribution was assessed using the Kolmogorov–Smirnov test. Continuous variables are presented as mean ± standard deviation (SD) or median and interquartile range (IQR), depending on data distribution, while categorical variables are presented as frequencies and percentages. Differences between baseline and post-intervention measurements were assessed using the paired-samples t-test for normally distributed variables and the Wilcoxon signed-rank test for non-normally distributed variables. Changes in the proportion of participants achieving a normal Romberg test result (≥10 s) were evaluated using the McNemar test. All statistical tests were two-tailed, and statistical significance was set at $P < 0.05$. Statistical analyses were performed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 239 community-dwelling older women with cardiovascular disease participated in the study and completed the 8-month community-based structured exercise program. The mean age of subjects was 69 ± 5.9 years, and all were women. The baseline characteristics of participants are presented in Table 1.

Table 1. Baseline characteristics of subjects

Variable	Mean ± SD
Age (years)	69 ± 5.9
Body weight (kg)	72.3±10.2
BMI (kg/m²)	27.24±3.66
Waist circumference (cm)	94.9±9.19
Hip circumference (cm)	104.3±7.8
WHR	0.88±0.05
WHtR	0.56±0.11
Systolic BP (mm Hg)	136.4±17.9
Diastolic BP (mm Hg)	79.35±9.31
Dominant handgrip strength (kg)	23.27±5.82
Non-dominant handgrip strength (kg)	21.87±5.66
Romberg test (s)	7.76±2.97
TUG test (s)	8.36±2.005

Results of after 8 months of participation in group exercise program are shown in Table 2. Modest reduction in BMI was observed but the change did not reach statistical significance (p=0.076). Waist-to-height (WHtR), the indicator of central obesity, significantly decreased after intervention, indicating the improvement in cardiometabolic risk profile (p=0.013). A small, but not statistically significant change was observed in waist-to-hip (WHR) ratio (p=0.967). Systolic blood pressure decreased from 136.4±17.9 mmHg to 132 ± 16 mmHg (P <0.001), while diastolic blood pressure changed from 79.35±9.31 mmHg to 78.5 ±9.02 mmHg (P = 0.346). Significant improvements were observed across several functional health indicators after the 8-month intervention. Handgrip strength increased significantly in both the dominant and non-dominant hand, indicating improved muscular strength (p>0.001). Similarly, mobility improved as demonstrated by a significant reduction in Timed Up and Go (TUG) test completion time, indicating enhanced functional mobility and a lower risk of falls (p<0.001). Balance performance, assessed using the Romberg test, also improved significantly, with participants maintaining balance for longer periods at follow-up (p<0.001).

Table 2. Changes in anthropometric, functional and cardiovascular parameters after the 8-month intervention

Variable	Baseline Mean ± SD	8 months Mean ± SD	Mean difference	P value
BMI (kg/m²)	27.24± 3.66	26.771± 5.016	0.470	0.076
WHR	0.884±0.056	0.884±0.054	0	0.967
WHtR	0.568±0.108	0.553±0.123	0.015	0.013
Systolic BP (mmHg)	136.484±17.908	132.086±16.085	4.39	0.001
Diastolic BP (mmHg)	79.351±9.315	78.563±9.021	0.788	0.346
Dominant handgrip strength (kg)	23.270±5.824	24.930±5.664	-1.660	<0.001
Non-dominant handgrip strength (kg)	21.871±5.66	23.345±5.97	-1.473	<0.001
Romberg test (s)	7.759±2.977	8.515±2.432	-0.757	<0.001
TUG test (s)	8.360±2.005	7.782±1.913	0.578	<0.001

Balance performance improved significantly following the intervention ($P < 0.001$). The proportion of participants achieving the maximum Romberg test score of 10 seconds increased from 58.4% at baseline to 68.8% after 8 months, while 47 participants improved from an impaired (<10 s) to a normal balance performance (≥10 s), (Table 3).

Table 3. Change in Romberg test performance

Romberg test	N	%
Improved	78	35.3
No change	110	49.8
Decline	33	14.9

Discussion

The study demonstrated that an 8-month community-based structured group exercise program was associated with significant improvements in several indicators of functional health among older women with cardiovascular disease. Participants showed improvements in handgrip strength, balance performance, mobility, systolic blood pressure, and waist-to-height ratio, while changes in BMI, WHR and diastolic blood pressure were not statistically significant.

Handgrip strength is strong indicator of muscle function and an important predictor of chronic diseases incidence, nutritional status, independence in activities of daily living and quality of life (10). Muscle strength plays a crucial role in movement, balance maintenance, postural stability and overall functional performance (11). Importantly, handgrip strength can be improved even in older age and in the presence of chronic diseases, as shown in previous studies (12, 13) and confirmed by the findings of the present study. Regular physical activity, particularly structured group exercise programs, contributes to improvements in muscle strength, which may subsequently support longer independent living, functional autonomy, and better quality of life among older adults. In addition to improving muscle strength, exercise has a positive effect on balance performance. Balance is particularly important in older adults because impaired balance is a major risk factor for falls, which are among the leading causes of injury, disability, and loss of independence in later life. Improving balance is therefore crucial for maintaining functional independence and preventing falls (14). Balance impairments may result from age-related physiological changes, chronic health conditions, or medication use. Exercise programs that focus on strengthening the lower extremities and core musculature, as well as improving postural control and ankle stability, have been shown to reduce fall risk and enhance balance performance (15). In the present study, balance was assessed using the Romberg test, a widely used clinical measure of postural stability and static balance (16). Following the intervention, participants demonstrated significant improvements in Romberg test performance, indicating enhanced balance control.

Mobility was assessed using the Timed Up and Go (TUG) test, a simple and reliable tool frequently used to evaluate functional mobility and fall risk in older adults and individuals with various medical conditions (17). Lower TUG scores indicate better mobility and a lower risk of falls. The significant reduction in TUG completion time observed in this study suggests that participation in the exercise program improved participants' mobility and functional capacity. These findings are consistent with previous studies demonstrating that regular physical activity and structured exercise interventions can enhance mobility and reduce fall risk among older adults.

The present findings further support the growing body of evidence indicating that community-based exercise interventions can improve physical functioning in older populations. Community-based programs provide accessible opportunities for regular physical activity while simultaneously promoting social participation, engagement, and adherence to exercise (18). Such programs may therefore offer benefits that extend beyond physical health, contributing to social well-being and healthy ageing. The observed improvements in functional outcomes in our study are consistent with previous reports demonstrating the effectiveness of community-based exercise interventions in maintaining mobility, physical function, and independence among older adults.

Although no significant changes were observed in BMI or WHR, a significant reduction in waist-to-height ratio was found following the intervention. These findings suggest that the benefits of exercise in older adults may be better reflected through improvements in physical function and central adiposity than through changes in overall body weight. Furthermore, the significant reduction in systolic blood pressure observed in this study is clinically relevant given the elevated cardiovascular risk associated with ageing and cardiovascular disease. This finding is consistent with previous evidence suggesting that longer participation in physical activity programmes is associated with greater reductions in blood pressure. Most reviewed literature data showed that baseline BP levels had a large impact on the effect of exercise training, which is again in line with our results where greater BP reduction was observed in hypertensive than in normotensive women (19).

This study has several limitations. First, the absence of a control group limits the ability to attribute the observed improvements exclusively to the exercise intervention. Second, the study included predominantly older women living independently in the community, which may limit the generalizability of the findings to men, institutionalized older adults, or those with greater functional impairment. Third, physical activity outside the organized exercise sessions was not monitored and may have influenced the observed outcomes. Finally, the study assessed outcomes

immediately after the intervention, and therefore the long-term sustainability of the observed benefits remains unknown. Nevertheless, the study reflects a real-world community-based setting and included a relatively large sample of older adults with cardiovascular disease, supporting the practical applicability of the findings.

Conclusion

The findings of this study support the implementation of community-based exercise programs as an accessible and effective strategy for promoting functional health among older adults with cardiovascular disease. Such programs may contribute to maintaining independence, improving mobility and balance, and supporting healthy ageing within the community.

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