Research Report

Community-Based Exercise and Wellness Program for People Diagnosed With Parkinson Disease: Experiences From a 10-Month Trial

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ABSTRACT

Objective: This study considered whether a therapy community could create an infrastructure for developing and maintaining a service delivery model grounded in a clinic-based physiotherapy model. A longitudinal clinical study was conducted to assess the abilities of participants with Parkinson disease in a 10-month community exercise program.

Methods: Fifteen individuals averaging stage 3 on the Hoehn and Yahr scale, 6 years since Parkinson disease diagnosis, and 72 years old, participated.

Results: Graphical analysis of ambulation endurance demonstrated the strongest improvement over time (11%). Walking speeds, balance, and mobility showed a maintenance effect over the 10 months. The total Unified Parkinson Disease Rating Scale, Activities of Daily Living subscale, and Motor subscale remained statistically unchanged in the study. Scores on the Unified Parkinson Disease Rating Scale Mentation, Behavior, and Mood subscale improved by 38%. None of the scores met or exceeded the minimal detectable change, MDC_{95} but two scores demonstrated more than 10% change.

Conclusion: This clinical study implemented previous short-term research findings into an ongoing community wellness program for individuals with Parkinson disease. No community-based studies have demonstrated an ability to maintain a group for an extended time frame. Group exercise including forward and backward treadmill training, designed and monitored by a physical therapist, may improve or maintain functional outcomes.

Key Words: balance, community programming, exercise, older adults, Parkinson disease, treadmill training

(*J Geriatr Phys Ther* 2012;35:1-00.)

INTRODUCTION

People with Parkinson disease (PD) have movement impairments that can negatively impact their quality of life and physical function, leading to immobility, falls, and fractures.[1,2] Exercise is known to improve functional mobility and quality of life for people with many neurologic conditions.[3-6] It has also been shown to improve motor function both in animal models of PD[7,8] and in humans with PD.[9,10] Goodwin et al[11] conducted a systematic review of the literature related to exercise interventions and functional improvements in people with PD. Of the 14 studies reviewed, 5 could demonstrate exercise-related improvements in balance, 4 showed exercise-related improvements in strength, and 4 showed a higher quality of life related to exercise. Multiple walking improvements related to exercise interventions were demonstrated in 4 studies. However, none of the studies reviewed demonstrated positive effects of exercise on the number of falls reported or on indicators of depression. Significantly, the exercise interventions described in Goodwin et al[11] were all of relatively short duration, ranging from 2 weeks in length to a maximum of 8 weeks. In addition, it is unclear what specific types of exercise are most effective in the short term. Allen et al[12] conducted a meta-analysis of the effects of exercise and motor training on balance and falls in people with PD. In 13 of the 16 studies reviewed, there were 20 or fewer hours of intervention. Although balance improved, there was no significant decrease in the proportion of participants with a history of falls.

A 2010 Cochrane review[13] of the effectiveness of treadmill training in people with PD found that treadmill walking increased walking speed, stride length, and walking distance but had no effect on cadence. Miyai et al[14] used body weight-supported treadmill training for 1 month in people with PD and showed that this protocol improved both ambulation speed and stride length. However, there was regression in functional skills once the exercise program ended.

Filippin et al[15] evaluated the effects of treadmill training and typical physical therapy for people with PD. During the treadmill training phases of their study, participants exercised for 50 minutes at a time and took part in 54 sessions over a 6-week time frame. Participants demonstrated improvements in both motor and nonmotor functions following the treadmill training but not with conventional physical therapy treatment.

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DOI: 10.1519/JPT.0b013e31824a1c9d

These studies present evidence supporting the efficacy of short-term exercise intervention in improving some, but not all, aspects of motor function in people with PD. Most of the data measure function in people specifically recruited for a short-term intervention and demonstrate a reduction in outcome effect on follow-up after the short-term program ends.[13,14,16-18] A few studies have begun to examine the effects of longer-term exercise programs for people with PD.

Gobbi et al[19] analyzed motor function in 34 people with PD who exercised for 60 minutes, 3 times per week for 6 months; their analysis included only clients who attended at least 50 sessions. Participants took part in either a multimodal exercise program or an adaptive exercise program. All participants demonstrated improvements in Berg Balance Scale (BBS) scores and on the Timed Up and Go (TUG) test times. Because the authors did not provide specific minimal detectable change (MDC) data, it cannot be determined whether the participants improved more than the MDCs reported by Steffen and Seney.[20]

Reuter et al[21] examined the effects of exercise including walking, Nordic walking, and flexibility/relaxation protocols on people with PD over a 6-month period. Participants exercised 3 times per week for 70-minute sessions. All participants reported improvements in balance, pain, and quality of life. Both the walking and Nordic walking activities improved gait variability, stride length, waking speed, and exercise capacity.

The present study was designed to answer the following related questions:

1. Could a community-based, accessible exercise program for people with PD that would foster long-term participation be created?
2. Would participation in a long-term exercise program improve functional movement in this population?

To address the first question, a community-based exercise program was created at a local YMCA that was designed to be physically and financially accessible to participants. The goal was to minimize some of the barriers to exercise commonly cited by people with PD including disease-specific impairment, individual safety, and location and to encourage long-term exercise participation.[22] Fifteen individuals with PD participated, indicating that at least a subset of people with PD will participate in regular group exercise when it is accessible and affordable to them. To address the second question concerning functional performance in people with PD who exercise, a number of functional and quality-of-life measures, including ambulation, balance, mobility skills, as well as mentation, behavior, and mood, and activities of daily living (ADL) were evaluated in the study population. The study was approved by institutional review board at Concordia University Wisconsin.

METHODS

Exercise Protocol

Three assumptions guided the development of the community-based exercise program:

1. Individual programming was based on a master protocol, which was customized and further adapted by a physical therapist for each client's individual needs (treadmill settings were based on the client's ability).
2. All sessions were executed with supervision of the licensed therapist and assisting staff (either YMCA staff members or physical therapy student volunteers).
3. The program collected a common minimum data set (at a university setting) every 2 months to track individual performance.

The master exercise protocol is presented in the Appendix. A physical therapist was present at all sessions. Assisting staff members received training by the physical therapist in maintaining safety, treadmill use, and the specific exercise protocol. The exercise protocol was designed on the basis of literature available in 2002 and included 3 components:

1. Forward treadmill walking, to facilitate ambulation endurance, speed, and stride length;
2. backward treadmill walking, based on the researchers' observation that people with PD often fall backward; and
3. mat activities emphasizing hip and spinal mobility and spine and hip extension strengthening.

Although treadmill training is often used in cardiac rehabilitation to improve cardiac conditioning, our goal was to improve balance, ambulation endurance, and mobility. The treadmill training used in this program occurred at 0% grade between 2.7 and 4.8 km/h (1.7-3.0 mph), creating an approximate energy requirement of 2.3 to 3.3 metabolic equivalents.[23] As balance activity on the treadmill was a focus, participants were progressed to ambulation without arm assist before speed was increased on the treadmill. Motor challenges including the deletion of the use of hand support and the addition of speed were added by the physical therapist. At the time this study was conducted, there were no published articles describing best practices for exercise for people with PD. For this reason, exercise protocols were designed by the physical therapist for each individual participant. Each protocol was based on:

1. The participant's level of conditioning upon entering the program;
2. the participant's ability to walk forward and backward; and

3. the physical therapist's extensive prior clinical experience, which indicated that people with PD often fall backward and frequently display a stooped, flexed posture.

Exercise Setting

Clients were recruited by the university faculty with the assistance of the Wisconsin Parkinson Association. Recruitment occurred through personal contact with agency nurses and other staff. There were no specific exclusion criteria, except that participants had to be able to stand without assistance and to walk forward for a few minutes. The program was housed at a local community YMCA and used equipment available at most community exercise facilities including treadmills and floor mats. Parking was located close to the building and was free. Participants were charged the YMCA fees for group exercise programs; $39 per month for nonmembers in 2004 with a sliding scale for people with financial challenges. Sessions were held twice a week for 1 hour, and participants were encouraged to attend all sessions. The program was designed to follow clients who participated twice a week for up to 10 months. There was typically a participant to staff ratio of 7:1.

Because the program was designed to encourage long-term exercise participation, we were able to collect data on functional mobility (ambulation endurance, walking speed, balance, and TUG), ADL, and mood and behavior over a longer time frame than previous studies. The project did not control for medications (participants took medications as prescribed by their physicians), and the study was necessarily limited to those with sufficient mobility, financial resources, overall health and social support to attend the regular exercise class. The data presented here indicate that people with PD participate in regular long-term exercise programs.

Participants

Fifteen participants (3 women and 12 men) with a diagnosis of PD joined the exercise program. Diagnosis of PD was made by a neurologist experienced in treating PD. The average age was 72 years, and time since diagnosis averaged 6 years. Participants at all levels of function with the ability to walk forward for a few minutes were accepted. All subjects in the study gave consent to participate and have their performance tracked. Participants were offered the opportunity to join in the outcome monitoring at the time they enrolled in the group; not all participants joined the exercise program at the same time. Table 1 (part A) reports the demographic variables of the group at the point of enrolling in the study. Data on program adherence are presented in Table 2.

Table 1. Initial and 10-Month Means (SD), Confidence Intervals, and Change Scores of Demographic and Outcome Variables in Participants With Parkinson Disease

	Pretest, Mean (SD) (n = 15)	95% Confidence Interval	Final, Mean (SD) (n = 10)	Change for People Who Completed the Study (n = 10)		Wilcoxon z (*P*)
Part A: Demographic data						
Age, y	72 (8) Range: 68-77					
Years since diagnosis of Parkinson disease	6 (5) Range: 4-9					
UPDRS Mentation, Behavior, and Mood subscale (0-16)	3.2 (2.4)	1.9-4.5	1.6 (1.7)	−1.2 (1.5)	38%	2.06 (.04)
UPDRS ADL subscale (0-52)[a]	14 (7)	10-18	12 (6)	0.80	1%	0.12 (.91)
UPDRS Motor subscale (0-56)[a]	13 (5)	10-16	12 (3)	−0.14	0%	0.78 (.44)
UPDRS total score (0-126)[a]	30 (13)	23-37	26 (9)	−0.06	0%	0.05 (.96)
Hoehn and Yahr scale score[a]	3 (1)	2-3	3 (1)	0.28	0%	1.13 (.26)
Part B: Outcome variables						
Six-Minute Walk Test, m	309 (123)	241-377	370 (114)	+35 (51)	11%	1.99 (.05)
Comfortable walking speed, m/s	0.98 (.27)	0.83-1.14	1.03 (0.27)	0.02	2%	0.26 (.80)
Fast walking speed, m/s	1.25 (.35)	1.06-1.44	1.34 (0.31)	0.00	0%	0.56 (.58)
Berg Balance Scale score (0-56)	48 (6)	44-51	49 (6)	−0.01	0%	0.89 (.37)
Timed Up and Go, s	16 (8)	11-20	14 (4)	−0.01	0%	−0.15 (.88)

Abbreviation: UPDRS, Unified Parkinson Disease Rating Scale.
[a]Improvement in scores is reflected in a smaller value.

Table 2. Attendance and Six-Minute Walk Test Results of Participants With Parkinson Disease

Participant	Six-Minute Walk Test,[a] m						
	Average Sessions per Month Attended	Initial Evaluation	2 mo	4 mo	6 mo	8 mo	10 mo
1	3.4	212	225	333	297		213
2	7.2	238	226	270	249	270	286
3	5.4	515	516	584	536	589	590
4	3.3	184	215	278	244	284	303
5	5.3	291	242	217	160	270	303
6	5.5	279	231	270	270		
7	2.7	383	270	360	476		404
8	7.3	356	405	399		450	426
9	6.2	357	334	182	248	242	285
10	4.9	362	405	390	364	420	396
11	6.9	450	428	450	435	495	495
12	4.1	101	276	278		203	
13	4.0	480	460	420			
14	3.8	296	348	354	372	308	
15	8.3	129	199	209			

[a]Measurements reflect rolling admission of participants into the exercise program and some absences from attending a measurement session.

Outcome Measures

Measures of functional performance were collected every 2 months after initial entry into the program. Data collection began in 2003 and continued through 2004. Data were collected by a team of 3 physical therapists experienced in administering the tests. The same therapist collected the same outcome measures every 2 months. One therapist who collected the Unified Parkinson Disease Rating Scale (UPDRS), medication, and fall data was also involved in supervising the exercise group at the YMCA. Testing order was counterbalanced between sessions among the 3 testers. Data were always collected in a standardized time window to minimize the impact of medication fluctuations that could influence testing results. Demographic data for each participant were collected at the beginning of their first measurement session (date of birth, medications, medical history, and medical diagnoses). Therapists testing the client did not have previous data available to them at the time of data collection. Clients missed some data collection dates because of weather or their own vacation schedule, so data were not collected for all clients on all dates (see Table 2).

Data were collected in 3 general categories: functional movement, ADL, and mentation and mood. To do this, functional performance assessments were administered in the areas of ambulation endurance, walking speed, balance, functional mobility, the UPDRS, and the Hoehn and Yahr (H&Y) scale. The UPDRS and the H&Y scale are ordinal scales that measure the progression of symptoms in PD.[24] Data collection typically took about 1 hour.

This project assessed participants' ambulation endurance, walking speed, balance, and functional mobility using 5 performance measures commonly used in the physical therapy clinic and supported by research evidence. Walking (ambulation) endurance was evaluated using the Six-Minute Walk Test (6MWT) in which the participant walks continuously for 6 minutes and total distance is measured. Test-retest reliability for the 6MWT in a group of people with PD was $ICC_{(2,1)} = 0.95$, with an MDC_{95} of 86 m.[20] Self-selected walking speed and fast walking speed was measured over 6-m course, with an additional 2 m for start-up and 2 m for cooldown. Test-retest reliability for self-selected walking speed in people with PD is $ICC_{(2,1)} = 0.96$, with an MDC_{95} of 0.18 m/s. Test-retest reliability for fast walking speed in people with PD is $ICC_{(2,1)} = 0.97$, with an MDC_{95} of 0.25 m/s.[20] Balance was measured using the BBS. Test-retest reliability for the BBS in people with PD was $ICC_{(2,1)} = 0.94$ with an MDC_{95} of 5.[20] Finally, functional mobility was tested using the TUG, which records the number of seconds it takes for a participant to rise from a seated position, walk forward a distance of 3 m, turn, walk back to the chair, and return to sitting position. Test-retest for the TUG in people with PD has been demonstrated as $ICC_{(2,1)} = 0.85$, with an MDC_{95} of 11 seconds.[20]

These outcome measures were chosen because they were commonly used in the clinic by physical therapists when

the study was conducted. Participants were allowed to use assistive devices as needed for ambulation tests. Two trials of self-selected walking speed, fast walking speed, and TUG tests were averaged for use in data analysis.[20]

In addition to the functional movement assessments, we used 2 overall measures of PD: the UPDRS and the H&Y scale.[24] These assessments were administered at each measurement session to measure any potential changes in the disease process; all testers were previously trained in administration of the tests. The original UPDRS has 3 subscales:

1. Mentation, Behavior, and Mood (including 4 questions on intellectual impairment, thought disorder, depression, and motivation/initiative);
2. activities of Daily Living, including 13 questions regarding speech, salivation, swallowing, cutting food, handwriting, turning in bed, tremor, walking, and freezing when walking; and
3. motor Skills: 14 questions regarding speech, facial expression, rigidity, finger taps, hand movements, transition movements, tremor, bradykinesia, posture, and walking.

In the original UPDRS, all subscales can be summed for a total score. The H&Y scale[24] measures movement in people with PD and is often used as a measure of disease progression.

Data Analysis

This project assessed participants' ambulation endurance, walking speed, balance, and functional mobility using 5 performance measures. Data were also collected on age, years since diagnosis, daily levodopa (L-DOPA) dose, falls, overall disease progression as measured by the H&Y scale and total UPDRS scores, as well as specific measures of mentation, behavior, and mood, ADL, and motor performance garnered from the UPDRS. The UPDRS and the BBS are ordinal measures; all other measures are ratio measures. All variables had normal distribution except the TUG test that demonstrated variability. SPSS (version 17.0) and Excel (2007) were used to analyze and graph the data. Wilcoxon tests were used to compare significant differences on 10 clients, with complete data sets between the initial data collection and the 10-month follow-up. Wilcoxon tests were used because the sample size was small and because the UPDRS and the BBS provided ordinal data. Table 1 reports the percentage of change for the measures of the people who completed 10 months of the program. Longitudinal data for the exercise group were graphed (simple linear regression lines) to incorporate lines of best fit for differential scores over time (Figure). Time is the independent variable (x-axis) and outcome measures are the predictors (y-axis). Table 2 shows participant attendance throughout the program. All 15 participants were tested at the first 3 data collection time points. Ten of the 15 participants were available for testing at month 10. This occurred because some of the clients began the program later, and data collection had concluded.

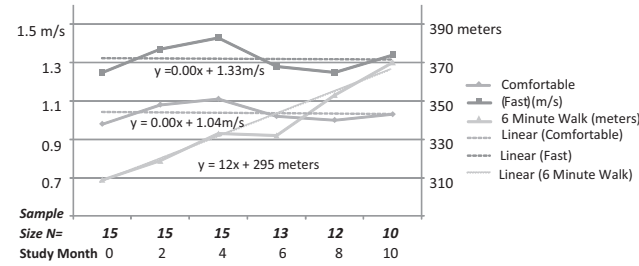

Figure. Progression of gait speeds and Six-Minute Walk Test on participants with Parkinson disease.

RESULTS

Aggregate data are presented in Table 1 (part A). Levodopa was tracked on 6 participants. During this time, 3 people decreased L-DOPA use by a total of 750 mg per day whereas 3 people increased its use by a total of 400 mg daily. This total change was not significant. Table 1 compares the initial evaluation and the final (10-month) evaluation. Participants as a group demonstrated improvements in ambulation endurance that averaged 35 m (11%). Although this is significant, it does not equal the MDC_{95} for the 6MWT (86 m). Mentation, behavior, and mood as measured by the UPDRS also improved, with a mean change of −1.2 (38%). The MDC_{95} for this test would be −2, or a 62% change.[20] Group scores for all other measures showed neither improvement nor decline, indicating that walking speed, balance, and mobility were maintained throughout the 10-month period. However, we do not know whether the change between the group participants who exercised and the control group participants who did not exercise equaled the MDC_{95} for a test such as the 6MWT.

The mean number of falls in the 6 months before the beginning of the study averaged 1.67 falls per participant. While participants were involved in the study, they were asked how many falls had occurred in the past 2 months. After 8 months of participation, there was 1 fall among the 11 people, and after 10 months, 4 falls were reported. These data showed no significant change over time.

Data on individual participant attendance are presented in Table 2. As shown, not all participants were involved for the entire 10-month period and not all participants attended each measurement session. The number of months attended ranged from 4 to 10 months, whereas the average number of sessions attended per month was 5, with a range of 3 to 8 sessions. Table 2 presents data allowing for correlations of individual attendance (number of months attended and average number of sessions attended per month) with

scores on the 6MWT. There was no correlational improvement in the 6MWT associated with increased attendance. Most participants (10/15) showed improvement in ambulation endurance, and some either showed no change (3/15) or demonstrated a decline in endurance (2/15). Although there was a small practice effect for people with PD for the 6MWT, no other tests have demonstrated a practice effect in this population.[20] The ability to improve ambulation endurance while maintaining initial walking speed would mean that the person can endure that walking speed over longer distances. This implies that community ambulation should have improved; however, community ambulation was not specifically assessed.

DISCUSSION

Participants demonstrated improvements in ambulation endurance over the 10-month course of this study. All other measures of motor function remained stable including falls. Larger studies may help determine whether an exercise program can reduce falls in people with PD. Because PD is progressive, a decline in these values over a 10-month period without exercise might be expected.[25] However, Carne et al[26] followed a group of clients with PD who received a multidisciplinary treatment approach including support groups and a home exercise program. Their results showed that a majority of participants maintained or improved motor function over the 1-year course of the study. These authors did not quantify adherence to the home exercise program. Dibble et al[27] have begun a longitudinal cohort study to characterize the trajectory of disablement in a large cohort of people with PD that will include data on exercise habits and physical activity.

The program produced improvements in ambulation endurance, and walking speed was maintained despite the progressive nature of PD. The authors suspect that the mechanism for these improvements was the treadmill-walking component of the program. It is not clear whether adding the backward walking component to the protocol helped produce any positive effect on speed or endurance independent of forward walking. Hackney and Earhart[28] investigated backward walking in people with mild to moderate PD who have impaired forward and backward walking. Differences between those with and without PD were more pronounced in backward walking. The authors concluded that backward walking impairments might be related to the propensity for backward falls. They state that backward walking could be a rehabilitative component.[28] In addition, any positive effect of the strengthening and stretching exercises may have enhanced the outcome of treadmill walking both forward and backward. Further studies aimed at distinguishing among the effects of each component of the exercise program need to be conducted.

Recently, a wider variety of exercise options, including balance programs,[29] treadmill training,[13] tango dancing,[30] Nordic walking,[21] and an axial mobility program,[31] have been explored for people with PD. Some participants in the present study expressed interest in weight/strength training activities. Such exercises might include strengthening of spinal and upper and lower extremity extensors as a possible means of countering the flexed posture often seen in people with PD. A published review demonstrated that strength training protocols reported in the literature are of relatively short duration (16-36 training bouts) and frequency (2-3 d/wk).[32] Well-controlled trials of high-intensity resistance training in people with PD with emphasis on musculoskeletal and neural adaptations are needed.

Many of the exercises described in the Appendix cannot be done by clients on their own. For example, hip extension in the prone position with the arm in full flexion is difficult for many people with PD, and some people cannot safely do the upright balance activities alone. From our perspective, most clients with PD should be supervised for backward ambulation on the treadmill. Safety is always a concern, although we had no adverse outcomes in our program.

The small size of this study limits the ability to generalize results to all people with PD. Further data are needed to evaluate the effects of a long-term group exercise program on a larger population of people with PD. It would be beneficial to assess time frames longer than 10 months: financial constraints prohibited longer data collection in this project. In addition, there may be barriers to exercise for some people with PD that could have prevented them from participating in the program, including working, financial resources, and transportation issues. Ene et al[33] reported barriers to exercise in people with PD that included transportation, time conflicts, and comorbidities. Further exploration of these and other possible barriers is needed.

It could not be determined whether the program's benefits were solely due to exercise or the group format, or resulted from the combination of exercise and social support. The group format may serve as a source of social and emotional support for people with PD.[21,34] Further research is needed to determine whether the physical or social aspects of the group exercise program (or a combination) were most efficacious.

Participants in the study demonstrated improvements in mentation, behavior, and mood (as measured by the UPDRS). This was an unexpected finding and needs to be replicated in future studies using community programming. In addition, it would be valuable to quantify participants' perceptions of the program in future studies.

The program presented here demonstrates that accessible community exercise programs for people with PD can be developed and maintained and that at least some people with PD will participate over the long term. Currently, there are 13 programs in Wisconsin following the basic exercise protocol described in this study. All are designed to be easily accessible by community members

with PD because of low cost and location. Programs are directed and lead by a physical therapist trained to deal with the symptoms of PD who can effectively and safely monitor a number of participants and implement individual program progression. It appears that participation in the group exercise program produced positive physical and mental changes or prevented negative change for the participants. This is an exciting outcome that needs to be studied further.

CONCLUSION

This study initiated a long-term community exercise program for people with PD in the state of Wisconsin. The program has expanded to 13 locations since it was initiated. Program participants improved ambulation endurance and maintained walking speed, balance, and mobility. Access to exercise directed by a therapist may help prevent one complication of PD—*immobility*.

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APPENDIX

Exercise Protocol

The initial exercise routine involved 20 min of stretching/strengthening exercises that required each participant to get up and down to a mat on the floor. Some of the participants required the assistance of an individual and/or a chair.
The following exercises were completed:

1. Lower trunk rotation in supine (2 sets of 10 repetitions)
2. Bridging in supine (hip extension strengthening) (2 sets of 10 repetitions)
3. Two joint hamstring stretch in supine with instructor assistance, statically or using contract/relax (1-2 min)
4. Rectus femoris and iliopsoas stretch in prone (1-2 min)
5. Hip extension in prone (10 repetitions bilaterally)
6. Prone on elbows for back extension mobility (1-2 min)
7. Four-point position with low back extension and flexion (5-10 repetitions)
8. Four-point position with opposite leg and arm lifts (5-10 repetitions)
9. Extension of the hips in kneeling (1-2 min)
10. Rotation of the trunk to right and left in kneeling (1-2 min)
11. Lateral flexion stretch of the trunk in kneeling (1-2 min)
12. Half-kneeling position and hip flexor stretch in kneeling (1-2 min)

This was followed by 10 min of activity in standing including:

13. Gastrocnemius stretch (1-2 min)
14. Active plantar flexion with or without support (2 sets of 10 repetitions)
15. With the back against a wall, a latissimus dorsi stretch was performed bilaterally (1 min)
16. Ambulation backward up to 20 m
17. Tandem walking up to 20 m

Participant then walked down stairs or down a ramp to proceed with 20-30 min of aerobic exercise on the treadmill:

18. Backward treadmill walking 10 min at a comfortable speed (the study's range was 0.8-3.1 km/h); participants use hand support while walking backward
19. Forward treadmill walking 10 min with minimal use of hand support (the study's range of speeds was 0.8-5.6 km/h)

A few participants then used the weight machine equipment.
Three pieces of equipment were encouraged:

1. The back extension machine (erector spinae muscles)
2. Overhead flexion-to-extension (trapezius muscles)
3. The rowing machine (rhomboid muscles)

Participants were free to use any of the machines, as this part of the program was optional. Not all participants were able to complete the entire program each session.