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The Effect of Chair-Based Exercises on Exercise Perception and Risk of Falling in Inactive Older Adults Who Live at Nursing Home

A Single-Blind, Controlled Clinical Trial

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The purpose of this study was to investigate the effect of chair-based exercises on exercise perception, fall risk, and health-related quality of life in inactive older adults. The study was carried out on nursing home residents older than 65 years with an inactive lifestyle. The Exercise Benefits/Barriers Scale, Tinetti Assessment Battery, and Nottingham Health Profile were used in the assessments. The Exercise Benefits/Barriers Scale score and Tinetti Balance and Gait Test scores of the participants in the exercise group were higher than those of the control group. The study concluded that chair-based exercises are beneficial for sedentary older adults in respect of the perception of exercise and risk of falling.

Key words: chair-based training, healthy active life expectancy, healthy aging, healthy lifestyle behaviors, prevention of inactivity

INTRODUCTION

Background

Physical activity is essential for healthy aging.[1] However, research has shown that 60% to 72.9% of older adults are inactive.[2,3] Falls are one of the most important clinical problems caused by immobility in older adults. With various exercise programs, the risk of falls and injury after falls decrease.[4] However, an exercise program that is not applied will certainly not work. According to the findings of a systematic review, 60% of older adults spend more than 4 hours per day sitting and watching television.[5]

Chair-based exercise (CBE) groups have been developed as an alternative exercise model especially for the elderly who cannot participate in exercise programs due to their physical disability.[6] Chair-based exercise is defined as "a primarily seated, structured, and progressive exercise programme that is part of a continuum of exercise for older people, which uses a chair to provide stability, and is delivered by instructors who are suitably skilled and trained to work with frail older people."[7] This exercise model has recently been used in different settings such as care homes and day centres.[8] Chair-based exercise has been reported to have positive effects on physical and cognitive function and to improve well-being in the elderly.[9-14] Chair-based exercise provides improvements in physical functions such as daily life activities,[9] lower extremity strength,[10] upper extremity strength,[9] hand grip strength,[11] hip extension,[11] respiratory muscle strength,[12] arm muscle endurance,[9,11] joint flexibility,[13] and functional reach.[10] Chair-based exercise protocols that combine memory and mental exercises with motor exercises have been shown to improve cognitive functions.[14] In addition, CBE also contributes to an improvement in quality of life.[15] However, as yet there is no guide for clinical application[6] because there is insufficient evidence on what the exercise determinants, such as frequency, intensity, and duration, should be for CBE.[6,16] Therefore, further research on this topic is necessary.

There are many intrinsic and extrinsic barriers to the participation of elderly people in physical activity. The main

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barriers are health status (chronic diseases and pain),[17] environmental factors (transportation[18] problems and neighborhood safety[19]), psychological issues (self-confidence),[20] demographic factors (age,[21] education level[20]), and negative perception of exercise outcome.[22] A negative perception of exercise outcome can be changed with some strategies, one of which is the planning of physical activities as group activities.[23] However, there is no study that has investigated the effect of CBE groups on the exercise perception of the elderly. Chair-based exercise groups can encourage participation in exercise by reducing exercise barriers and will increase belief in the benefits of exercise. It is believed that the current study will contribute to the literature on the effect of CBE on exercise perception of the elderly.

Objectives

The aim of this study was to examine the effect of CBEs on exercise perception, fall risk, and health-related quality of life (HRQL) in inactive older adults living in nursing homes.

MATERIALS AND METHODS

Trial design

This study was designed as a single-blind, controlled clinical trial in parallel groups to compare an exercise group receiving CBE training with a control group that continued with life as usual. The research was conducted on residents of a nursing home in Turkey between August and December 2018. Inactive residents of this nursing home formed the research universe of the study, which was applied in the Dr İsmail Işık Older Adults Care and Rehabilitation Center. Participation in the study was on a voluntary basis. The same assessment methods were applied to all participants before and after the study. Informed consent was requested from the participants or their relatives or caregivers before starting the study. Approval for the study was granted by the Pamukkale University Clinical Research Ethics Committee on March 8, 2017 (number: 60116787-020/49865).

Baseline measurements

The sociodemographic data of the participants were recorded on a preprepared form. The sociodemographic data and questionnaires with patient reports were completed by the participants in face-to-face interviews. All evaluations were made by the same researcher who was blinded to the study groups. The Standardized Mini-Mental State Test (SMMST) was used to evaluate cognitive functions.[24] Physical activity level was evaluated with the short form of the International Physical Activity Questionnaire (IPAQ).[25]

Outcomes

Exercise perception of the participants was evaluated using the Exercise Benefits/Barriers Scale (EBBS). The EBBS is a Likert-type research scale, which has been extensively used to investigate the perceived benefits and barriers of exercise in a range of settings, populations, and conditions.[26-28] The EBBS is known to be valid and reliable in determining the benefits and barriers of exercise in the elderly.[29,30] The total score that can be obtained from the scale ranges from 43 to 172, with higher scores indicating a more positive perception of exercise. The scale consists of 2 subheadings, benefits and barriers. These subheadings can also be used separately. When the Benefit Scale is used alone, the score range is from 29 to 116, with higher scores indicating higher benefit perception. When the Barrier Scale is used alone, the score range is from 14 to 56, with higher scores indicating a lower perception of barriers.[26]

The Tinetti Assessment Battery (TAB) is a widely used clinical tool that allows the evaluation of gait and balance and predicts the probability of falling risk in the elderly population.[31] The TAB has been proven to have high interrater reliability, excellent test-retest reliability, and sensitivity.[32,33] The TAB is also known to be a valid and reliable scale in the Turkish elderly population.[34] A total of 16 items in the TAB include the movements performed during daily living activities. The first 9 items are about balance and the next 7 items are about walking. The total score of the first 9 items gives the balance score, and the total score for the next 7 items gives the gait score. The total score is obtained by adding these 2 subscores. Higher scores represent a lower level of fall risk.[32-34]

The HRQL of the study participants was assessed using the Nottingham Health Profile (NHP). The NHP is a measure of general health status that measures the perceived distress of individuals in physical, emotional, and social areas.[35] It consists of 38 items: physical mobility (8 items), pain (8 items), sleep (5 items), emotional reactions (9 items), social isolation (5 items), and energy level (3 items). Higher scores represent a lower level of HRQL.[36] There is evidence showing that the reliability and the validity of NHP are good in the elderly population.[36] The Turkish version of the NHP has been shown to be successful in the evaluation of HRQL.[35]

Participants

Before the study, the nursing home residents were informed about the content and purpose of the study (n = 121), and 72 were included for evaluation. The participants who wanted to participate in the exercise program (n = 23) were included in the exercise group, and those who allowed only evaluation (n = 48) were included in the control group. All participants were capable of independent ambulation with no requirement for any assistive device for standing or walking.

TABLE 1 Exercise Protocol

Exercise Period	Exercise	Progression of Exercise Program
Warm-up	Abdominal breathing Neck flexion Neck extension Neck rotation Shoulder circumscription Arm circumscription Ankle dorsiflexion Ankle plantar flexion	1-8 wk: 1 set 8 repetitions
Main program	Bilateral shoulder flexion (with RB) Bilateral shoulder abduction (with RB) Bilateral shoulder external rotation (with RB) Rowing (with RB) Trunk flexion (with RB) Trunk rotation(with RB) Trunk lateral flexion (with RB) Double knee pulling to abdomen Single knee pulling to abdomen (with SB) Unilateral knee extension (with SB) Unilateral sitting hip abduction(with RB) Sit to stand Standing bilateral toe rise Standing unilateral hip abduction (with RB)	1 wk: 1 set 8 repetitions 2 wk: 1 set 9 repetitions 3 wk: 1 set 10 repetitions 4 wk: 1 set 11 repetitions 5 wk: 1 set 12 repetitions 6 wk: 1 set 13 repetitions 7 wk: 1 set 14 repetitions 8 wk: 1 set 15 repetitions Rest between sets: none Instrument: Yellow or red resistance band; 0.5 kg or 1 kg sandbag (the intensity of exercise was selected on an individual basis as the resistance that could be achieved without getting overtired).
Cooldown exercises	Pectoral stretching Hamstring stretching Gastrosoleus stretching	1-8 wk: 1 set 5 repetitions

Abbreviations: RB, resistance band; SB, sandbag.

Inclusion criteria

Those included in the study were 65 years of age and older, had no cognitive impairment (SMMDT score of ≥24), reported an inactive lifestyle (IPAQ short form <600 MET-min/wk), and were capable of independent ambulation.

Exclusion criteria

All the participants were examined by the institution physician and those with any health problems that prevented exercise were excluded from the study. Older adults with difficulties in communication (sensory impairment and language barriers) were also excluded.

Exercise program

The CBE program was planned to be applied 3 days a week for 6 weeks. Each exercise started with 8 repetitions and was increased by 1 repetition per week to reach 15 repetitions. The CBE program lasted about 30 minutes in the first week and increased with the increase in the number of repetitions to reach 50 minutes in the last week. Every training session included 5 to 10 minutes of warm-up, including breathing and posture exercises, and a 5- to 10-minute cooldown period that included stretching exercises. The main program consisted of resistance exercises involving large muscle groups in the lower extremity, upper extremity, and trunk. In some exercises, body weight was used, and in others, elastic bands or free weights were used as resistance. The intensity level of exercise was determined on an individual basis according to what the subject could perform without becoming overtired. As one of the aims of the study was to positively change the exercise perception of older adults, low resistance was preferred. Yellow or red elastic resistance bands and 0.5 kg or 1 kg sandbags were used depending on the physical condition of the participant. Details of the exercises are given in Table 1. The exercise program was applied under the supervision of a physiotherapist. Exercise sessions were held with the music preferred by the participants to maintain the continuity of participation. The days and hours of the exercise program were posted 1 week in advance in writing in the common areas of the residential

home. The subjects were reminded 15 minutes before each exercise session by a visit to their rooms. Despite all these efforts to increase participation, some of the subjects did not attend regularly throughout the 6-week period, so the exercise program was continued for 8 weeks. During this period, the second evaluations of the participants who participated in the program for 18 sessions in total were made. Those who participated in fewer than 18 sessions of the exercise program during this period were excluded from the study. Second evaluations in the control group were made 6 to 8 weeks after the first evaluations.

Statistical analysis

The change within each group was determined by comparing the baseline and follow-up measurement outcomes of the participants. Analysis of differences was done to examine the effectiveness of CBE between groups. The baseline scores were subtracted from the follow-up scores of each participant. The differences found were used in the statistical analysis between groups. Continuous variables were expressed as mean ± standard deviation, median (minimum and maximum) values, and categorical variables as number (n) and percentage (%). Shapiro-Wilk test was used to examine conformity of the data to normal distribution. Since the data set did not meet parametric test assumptions, the Mann-Whitney *U* test, one of the nonparametric tests, was used for the analysis of the initial data between the groups, and the Wilcoxon signed rank test was used to compare the pre- and postexercise data in the same group. A value of *P* less than .05 was accepted as the criterion of statistical significance. Data analysis was performed with IBM SPSS 21.0 (IBM Corp. Armonk, New York).

RESULTS

Dropouts

Of the older adults living in the nursing home part of the institution, 8 did not wish to participate in the study, and 22 could not be evaluated because they were absent from the nursing home. A further 19 were excluded: 2 participants did not speak Turkish, 8 had hearing impairment that interfered with communication, 7 had cognitive impairment, and 2 were not evaluated as suitable for the program by the physician of the institution. A total of 72 older adults were included in the study. In the exercise group, 5 subjects participated in less than 18 sessions, and 1 had an ankle sprain, and in the control group, 1 subject left the institution during the study period, 1 refused the second evaluation at the end of the study, 2 were not in the institution during working hours on the relevant dates, and 1 developed acute severe back pain. Following these exclusions, the data of a total of 61 participants were analyzed (Figure).

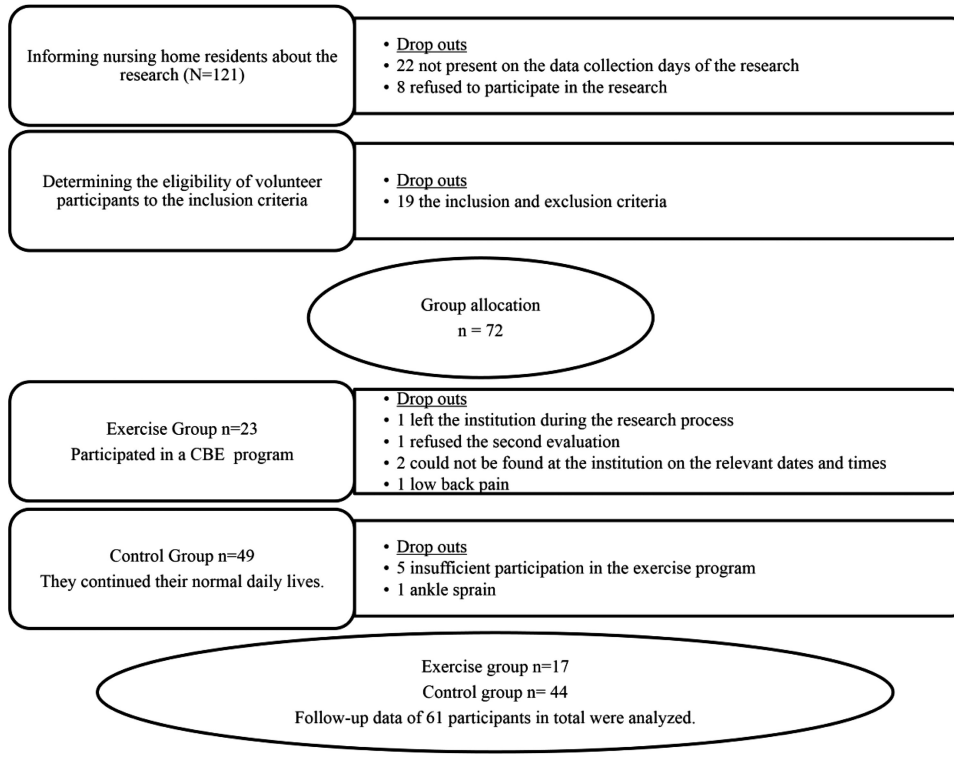

Figure. Participant flow through the trial. CBE indicates chair-based exercise.

TABLE 2 Demographic Characteristics of the Participants

Variables	Exercise Group (n = 17)		Control Group (n = 44)		P[a] (z)
	Median	Minimum-Maximum	Median	Minimum-Maximum	
Age, y	75.00	65.00-92.00	72.50	65.00-95.00	.362 (−0.91)
BMI, kg/m^2	27.06	21.17-42.97	27.33	2.94-44.44	.803 (−0.25)
Education, y	5.00	1.00-16.00	2.00	1.00-16.00	.378 (−0.88)
IPAQ score (MET-min/wk)	226.30	0.00-577.50	0.00	0.00-594.00	.303 (−1.03)
SMMDT score	26.00	24.00-30.00	26.00	24.00-30.00	.731 (−0.34)

Abbreviations: BM, body mass index; IPAQ, International Physical Activity Questionnaire; MET, Metabolic Equivalent; SMMDT, Standardized Mini-Mental State Test.
[a]*Mann-Whitney U test.*

Baseline data

The exercise group (n = 17) comprised 10 females and 7 males with a mean age of 75.82 ± 8.15 years. The control group (n = 44) comprised 17 females and 27 males with a mean age of 74.12 ± 7.69 years. In the exercise group, mean body mass index, education status, IPAQ score, and SMMDT score were 28.39 ± 6.59, 4.12 ± 3.48, 253.14 ± 242.32, and 26.71 ± 7.90, respectively. In the control group, mean body mass index, education status, IPAQ score, and SMMDT score were 27.18 ± 7.09, 3.70 ± 3.38, 186.12 ± 231.53, and 26.49 ± 1.53, respectively. No significant difference was determined between the groups in respect of age, body mass index, average years of education, SMMDT score and IPAQ score ($P > .05$, Table 2). In both the exercise group and the control group, 1 subject was still actively working. One participant in the exercise group and 8 participants in the control group were married. The gender, marital status, and employment status of the groups were similar ($P > .05$).The baseline scores of EBBS, TAB, and NHP were similar in both groups ($P > .05$), (Table 3).

TABLE 3 Baseline Data of the Participants

Variables	Exercise Group (n = 17)		Control Group (n = 44)		P[a] (z)
	Median	Minimum-Maximum	Median	Minimum-Maximum	
EBBS					
Benefit	88.00	50.00-109.00	86.50	62.00-111.00	.509 (−0.660)
Barrier	43.00	28.00-53.00	39.00	31.00-53.00	.181 (−1.338)
Total	131.00	87.00-161.00	124.50	96.00-164.00	.182 (−1.336)
TAB					
Balance	15.00	11.00-17.00	15.00	5.00-16.00	.525 (−0.636)
Gait	10.00	4.00-12.00	9.50	0.00-12.00	.231 (−1.198)
Total	22.00	16.00-29.00	24.50	5.00-28.00	.414 (0.817)
NHP					
Physical mobility	42.66	0.00-87.31	43.35	0.00-100.00	.565 (−0.575)
Pain	0.00	0.00-100.00	5.25	0.00-100.00	.428 (−0.793)
Sleep	27.26	0.00-83.90	30.57	0.00-100.00	.367 (−0.902)
Emotional reaction	20.23	0.00-100.00	34.43	0.00-100.00	.584 (−0.548)
Social isolation	22.01	0.00-100.00	43.34	0.00-100.00	.679 (−0.414)
Energy	0.00	0.00-100.00	62.00	0.00-100.00	.187 (−1.321)
Total	38.35	0.00-93.20	37.73	0.00-94.47	.334 (−0.965)

Abbreviations: EBBS, Exercise Benefit/Barriers Scale; NHP, Nottingham Health Profile; TAB, Tinetti Assessment Battery.
[a]*Mann-Whitney U test.*

Outcomes

According to the intragroup analysis, the EBBS and TAB scores increased, and NHP scores did not change in the exercise group, and in the control group, exercise perception did not change, NHP scores increased, and TAB scores decreased (Table 4). According to the follow-up analysis between the groups, the EBBS and TAB scores of the participants in the exercise group increased, but the NHP scores did not change (Table 5).

DISCUSSION

The results of this study showed that the 18 sessions of CBE had a beneficial effect on exercise perceptions and balance or fall risk but had no impact on HRQL. The exercises were performed safely, with no accidents recorded during training.

It has been previously shown that older adults with a high positive perception of exercise have a higher level of physical activity and greater participation in exercise programs.[37,38] However, fear of the occurrence of new diseases or injuries, worrying about the exacerbation of existing diseases or pain, the belief that physical abilities that worsen with age will prevent participation in physical activity, exercise-induced fatigue, and questions about the expected benefits of exercise can result in a negative perception of physical activity by the elderly.[18,19,21,39,40] This negative perception can develop because of the fact that the majority of the exercises planned for the elderly consist of standing activities without aid and difficulties are experienced by the elderly while trying to perform these exercises.[41] Chair-based exercise can contribute to the positive change in negative exercise perception in the elderly. However, to the best of our knowledge, there is no study on this subject in literature. The most striking result of the current study, as the first such research in the literature, was the effect of CBE on exercise perception. The CBE program applied to this inactive elderly population increased the perception of exercise benefit and decreased the perception of exercise barriers in those who participated in the program compared with those who did not. The perceptions of exercise of the participants in the CBE group changed to a belief that the exercise is beneficial and doable. Lack of knowledge is one of the most important exercise barriers in the elderly.[42,43] Informing the subjects about the benefits of exercise before applying the program may have played an important role in changing negative exercise perceptions. The application of CBE as a group activity may also have contributed to this positive change in exercise perception, as it is known that participation of the elderly in an exercise program with their peers increases adherence to the exercise program and encourages exercise.[44] In other words, the current study results support the idea that group exercises encourage participation in exercise and can be used as a motivational tool.[28,45] Low- and medium-intensity exercises make it easier for the elderly to participate in exercise.[46] Another reason for the change in the negative exercise perception of the participants may be that the exercises selected were low-intensity exercises. By increasing the perception of exercise benefit and decreasing the perception of exercise barrier, CBEs can be an important guide for efficient sitting time, as prolonged periods of inactive sitting is a serious problem in older adults. However, although the EBBS scores of the study group differed from those of the control group ($P = .001$), the exercise group baseline (median: 131.00 [interquartile range: 87.00-161.00]) and follow-up EBBS (median: 132 [interquartile range: 102-162]) results varied widely. The perception of exercise is influenced by many factors such as religious belief,[47] culture,[45] self-motivation,[43] self-consciousness,[48] and level of knowledge.[49] Individual differences in the factors that affect exercise perception may have caused the EBBS score to be in a wide range.

It is known that different exercise programs reduce the risk of falling.[50] In general, multimodal exercise programs with strength and balance components or exercise programs with multiple effects such as tai chi are recommended.[4] The number of studies in which CBEs are applied is limited. Chair-based exercises have been applied in 3 ways: aerobic, joint mobility, and muscular resistance. It has been shown that both the strength-only CBE and the multicomponent CBE increase balance[15,51] and walking functions.[9,15,51,52] Only one of these studies had an additional walking program.[51] In a study that examined the effects of different CBEs, it was shown that of these alternative exercise programs, the chair-strength exercises and the chair-aerobic exercises were able to increase the balance of the participants.[53] Most studies have included participants older than 75 years, and in the current study, those aged 65 to 75 years were also included. The results of this study, similar to the literature, demonstrated that balance and gait performance were increased and thus the risk of falling was reduced. The results are not surprising as the CBE program includes exercises for strength, balance, and mobility. It is also valuable in respect of showing that inactive older people who spend a long time each day sitting can make this time productive with less effort, safely, and without the need for any equipment or assistance.

In the current study, the improvements in the TAB scores of the exercise group can be attributed to the increase in muscle strength and mobility and the functional improvement that developed in parallel with these. CBEs provide physical gains, especially mobility and muscle strength, in the elderly.[15] These gains can improve functional abilities and prevent functional decline.[54] The baseline TAB and follow-up TAB scores of both the control (median: 24.5 [minimum-maximum: 5-28]) and exercise (median:

TABLE 4 Comparisons of the Baseline and Follow-up Data of the Groups

	Exercise Group (n = 17)					Control Group (n = 44)				
	Baseline		Follow-up			Baseline		Follow-up		
	Median	Minimum-Maximum	Median	Minimum-Maximum	P^a (z)	Median	Minimum-Maximum	Median	Minimum-Maximum	P^a (z)
EBBS										
Benefit	88.00	50.00-109.00	88.00	53.00-109.00	**.019[b] (−2.340)**	86.50	62.00-111.00	86.00	62.00-111.00	.498 (−0.677)
Barrier	43.00	28.00-53.00	45.00	34.00-54.00	**.003[c] (−3.020)**	39.00	31.00-53.00	39.00	3.00-53.00	.877 (−0.155)
Total	131.00	87.00-161.00	132.00	102.00-162.00	**.002[c] (−3.054)**	124.50	96.00-164.00	124.50	96.00-164.00	.471 (−0.720)
TAB										
Balance	15.00	11.00-17.00	16.00	12.00-17.00	**.010[c] (−2.565)**	15.00	5.00-16.00	14.00	5.00-16.00	**.002[c] (−3.035)**
Gait	10.00	4.00-12.00	11.00	6.00-28.00	**.015[b] (−2.439)**	9.50	0.00-12.00	9.00	0.00-12.00	**.002[c] (−3.165)**
Total	22.00	16.00-29.00	26.00	20.00-29.00	**.003[c] (−2.923)**	24.50	5.00-28.00	23.50	5.00-28.00	**.001[c] (−3.750)**
NHP										
Physical mobility	42.66	0.00-87.31	22.33	0.00-87.31	.144 (−1.461)	43.35	0.00-100.00	43.35	0.00-100.00	1.000 (0.000)
Pain	0.00	0.00-100.00	0.00	0.00-100.00	.398 (−0.845)	5.25	0.00-100.00	21.88	0.00-100.00	**.046[b](−1.993)**
Sleep	27.26	0.00-83.90	22.37	0.00-83.90	.141 (−1.472)	30.57	0.00-100.00	50.00	0.00-100.00	**.044[b] (−2.010)**
Emotional reaction	20.23	0.00-100.00	20.23	0.00-100.00	.680 (−0.412)	34.43	0.00-100.00	36.10	0.00-100.00	**.027[b] (−2.207)**
Social isolation	22.01	0.00-100.00	22.01	0.00-100.00	.596 (−0.530)	43.34	0.00-100.00	43.34	0.00-100.00	.713 (−0.368)
Energy	0.00	0.00-100.00	0.00	0.00-100.00	.854 (−0.184)	62.00	0.00-100.00	69.60	0.00-100.00	.136 (−1.490)
Total	38.35	0.00-93.20	23.78	0.00-93.20	.972 (−0.035)	37.73	0.00-94.47	46.31	0.00-97.89	**.010[b] (−2.591)**

Abbreviations: EBBS, Exercise Benefit/Barriers Scale; NHP, Nottingham Health Profile; TAB, Tinetti Assessment Battery.

[a]*Wilcoxon signed rank test.*

[b]$P < .05$.

[c]$P < .01$.

TABLE 5 Comparisons of the Differences Between the Baseline and Follow-up Values of the Groups

Variables	Exercise Group (n = 17)		Control Group (n = 44)		
	Median	Minimum-Maximum	Median	Minimum-Maximum	*P*[a] (*z*)
EBBS					
Benefit	1.00	−2.00 to 6.00	0.00	−3.00 to 6.00	**.001**[b] **(−4.160)**
Barrier	2.00	−1.00 to 12.00	0.00	−35.00 to 4.00	**.001**[b] **(−4.307)**
Total	3.00	−1.00 to 15.00	0.00	−5.00 to 3.00	**.001**[b] **(−4.447)**
TAB					
Balance	0.00	0.00 to 3.00	0.00	−3.00 to 2.00	**.001**[b] **(−4.214)**
Gait	0.00	−1.00 to 16.00	0.00	−4.00 to 0.00	**.001**[b] **(−3.995)**
Total	2.00	−1.00 to 6.00	0.00	−4.00 to 2.00	**.001**[b] **(−4.716)**
NHP					
Physical mobility	0.00	−42.73 to 10.57	0.00	−11.54 to 21.91	.419 (−0.809)
Pain	0.00	−37.18 to 53.86	0.00	−20.86 to 100.00	.876 (−0.156)
Sleep	0.00	−27.26 to 21.70	0.00	−27.26 to 100.00	**.049**[c] **(−1.966)**
Emotional reaction	0.00	−9.76 to 36.44	0.00	0.00 to 30.79	.137 (−1.488)
Social isolation	0.00	−22.53 to 38.50	0.00	−22.53 to 22.01	.182 (−1.335)
Energy	0.00	−100.00 to 100.00	0.00	−60.80 to 100.00	.540 (−0.613)
Total	0	−27.61 to 15.75	0.00	−8.47 to 34.51	.185 (−1.326)

Abbreviations: EBBS, Exercise Benefit/Barriers Scale; NHP, Nottingham Health Profile; TAB, Tinetti Assessment Battery.

[a]*Mann-Whitney U test.*

[b]*P < .01.*

[c]*P < .05.*

22 [minimum-maximum: 16-29]) groups were in a wide range. This can be explained by the inability to standardize the differentials affecting TAB scores such as age, gender, body composition, articular pain, and anxiety.[55] In the exercise group, although the follow-up scores had decreased from baseline, they were still in a wide range. Since the exercise protocol was not prepared as a result of an individual assessment, it may not have revealed a similar level of physical gain in all participants. Moreover, differences in the health profiles of the participants may have caused the expected benefits from exercise to differ. Errors that were overlooked by the supervisor during the implementation of the exercises are another factor that may explain this situation.

Chair-based exercise interventions have a positive effect on psychosocial well-being.[14] However the number of studies examining the effect of CBEs on HRQL is limited. There are conflicting results regarding the effect of a CBE program on HRQL in older adults.[10,15] The results of the current study are insufficient to reach a definitive conclusion about the effect of CBE on HRQL.

Limitations

This study had a number of limitations. The older adults who agreed to participate in the exercise group did not all regularly participate, so not every participant participated in the exercise program 3 days a week as originally planned, and second evaluations were taken of those who participated in the exercise program for 18 sessions. There was no long-term follow-up of the participants. Therefore, it could not be determined whether the differences in the measured parameters were reflected in clinical results such as fall and functional disability. The fact that the study was conducted in a single center caused a limitation in revealing the geographical and cultural differences. Finally, as those who did not want to participate in the exercise program were in the control group, this may have caused bias in the results.

CONCLUSION

These results need to be supported by new randomized controlled clinical studies with a larger sample, including a standardized CBE program, and examining both the short- and long-term effects on fall incidence, exercise behavior, and fear of falling.

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