

The effect of a group exercise program on functional performance of patients with moderate knee osteoarthritis

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Abstract

Introduction. The aim of this study was to evaluate the effects of a weekly group exercise program on the functional performance of patients with knee osteoarthritis. **Material and methods.** Patients (aged 51-78 years) with knee osteoarthritis Kellgren-Lawrence grade II-III were included in an exercise program. The exercise sessions were held once-a week, for six months, being supervised by a physical therapist. The scope of the program was to increase the mobility, muscular strength and balance. The physical function outcome was assessed using the Short Physical Performance Battery (SPPB) in two moments – before and after participating in the exercise program. **Results.** All patients completed the group exercise program. The SPPB score at the time of inclusion in the study was 8.33 ± 1.9 . After six months of exercising in the weekly group exercise program, the score increased significantly at 9.07 ± 1.73 ($p < 0.0001$). **Conclusions.** In conclusion, participating in a group-based exercise program for six months have been proved to have beneficial outcomes in physical performance in patients with knee osteoarthritis.

Key words: *functional performance, exercises, knee osteoarthritis,*

Introduction

Knee osteoarthritis is a frequent and debilitating disease, and its prevalence increases with aging. The pain and the progressive disability reported by the patients with knee osteoarthritis lead to impairments in daily functional activities, with a negative effect on functional independence. As other chronic diseases, it has a negative impact on functionality and quality of life, affecting the performance of daily living activities (1-3). The functional performance is reported to be affected in inflammatory and degenerative rheumatic diseases, due to pathological lesions not only in joints, but also at muscular and systemic levels (4,5).

In order to maintain the functional performance in patients with knee osteoarthritis and to prevent disability, special attention should be paid to muscle strength, mobility and balance. Physical exercises are recommended not only in the treatment of knee osteoarthritis (6-9), but also in the treatment and prevention of other musculoskeletal diseases either inflammatory or traumatic, cardio-vascular diseases, diabetes or obesity (10,11).

Although the beneficial effects of regular physical activity are very-well known, there are still unanswered questions regarding the adequate frequency, intensity, type, safety and time of

exercising. Regular home exercises are recommended by specialists, and their efficacy has been proved in many studies. But the adherence to this type of exercise program is low (12). McCarthy et al. (13) reported a significant improvement in locomotor function and a significant decrease in walking pain at 12-months follow-up by supplementing the home based exercise program with a class-based exercise program.

Therefore, the aim of this study was to evaluate the effects of a weekly group exercise program on the functional performance of patients with knee osteoarthritis.

Material and method

In order to evaluate the effects of a 6-month weekly group program on physical function of patients with knee osteoarthritis, a number of 45 patients were invited to participate in the study. Only patients with knee osteoarthritis Kellgren-Lawrence grade II-III were included. Exclusion criteria were: 1) inflammatory musculoskeletal diseases with or without cardiovascular involvement (14), 2) known symptomatic meniscal injuries, 3) hip or knee endoprotheses, 4) cardiovascular or other comorbidities not allowing participating in an exercise program, 5) neurological diseases.

All patients that fulfill the inclusion criteria were included in the exercise program. The exercise sessions were held once-a week, for six months, being supervised by a physical therapist. The scope of the program was to increase the mobility, muscular strength and balance. Each session contained a 5-minutes warm-up, consisting in mobility and flexibility exercises. The rest of the session contained strengthening and stretching exercises, as well as standing balance training.

The physical function outcome was assessed using the Short Physical Performance Battery (SPPB) in two moments – before and after participating in the exercise program. SPPB is an objective measure tool for balance, lower limb strength and functional capacity in older adults (15). This set of tests has been used to evaluate lower extremity function in older adults, to evaluate the physical activity level as part of diagnostic criteria for sarcopenia and also as a predictor of disability and mortality (15–19). SPPB comprise three tests that assess gait speed, balance and strength. Each test is scored from 0 to 4 points (4 – best performance). The final score represents the sum of the three scores, with a range from 0 to 12. A cut-off of 8 points has been reported to identify poor physical function (20,21). The standing balance is evaluated in three different positions – side-by-side (standing with the feet parallel and touching), semi-tandem (standing with the feet parallel, the heel of one foot touching the base of the big toe of the other foot) and tandem (standing with one foot in front of the other, with the heel of the foot in front touching the toes of the foot in back) (15). The patients had to maintain the balance for 10 seconds in each condition. For side-by-side and semi-tandem stand, the maximal score is 1 and for tandem stance, the maximal score is 2. The total balance score is the sum of point for the three conditions. For gait speed test, the patients had to walk on a 4-meter course, at a comfortable speed. The time needed to complete the course is recorded and scored. If the time is less than 4.82 sec, the score is 4 and for a time greater than 8.7 seconds, the score is 1. For the repeated chair stand, the patients had to stand up from a chair five times, without using their arms. If the time needed to complete the test was 11.19 seconds or less, the score was 4 (maximal), and for a time of 16.7 or more, the score was 1.

Data were analyzed using Prism 8 software. Descriptive statistics was performed. Data were compared using unpaired t-test. Statistical significance was set at 0.05.

Results

Twenty-seven (aged 51-78 years) patients met the inclusion criteria and agreed to participate in the study. The anthropometric characteristics are presented in Table 1.

Table 1. Patients` anthropometric characteristics

Parameter	
Sex	
Male, n(%)	6 (22.22)
Female, n(%)	21 (77.78)
Weight (kg), mean (SD)	75 ± 13.48
Height (cm), mean (SD)	168.5 ± 12.35
BMC (kg/m ²), mean (SD)	26.43 ± 4.39

All patients completed the group exercise program. The SPPB score at the time of inclusion in the study was 8.33 ± 1.9 . After six months of exercising in the weekly group exercise program, the score increased significantly at 9.07 ± 1.73 ($p < 0.0001$) (Fig. 1).

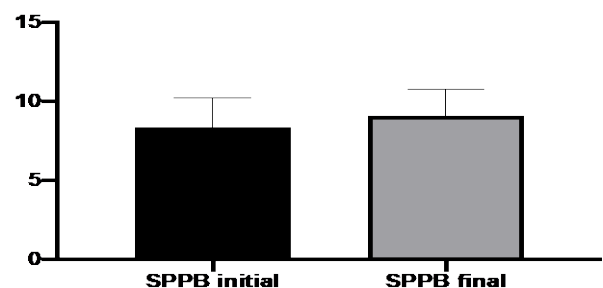


Figure 1. The evolution of SPPB scores

Low physical performance was found in twelve patients (44.44%) who had a SPPB score lower than 8 at the initial evaluation. After completion of the exercise program only eight (29.63%) have had a score lower than the cut-off of 8 at the final evaluation.

Discussions

At the end of the 6-months weekly group exercise program, a significant improvement was recorded in functional performance of patients with knee osteoarthritis. Our results are in accordance with

other studies that have demonstrated the general and also the disease-specific beneficial effects of regular physical activity. Regular participation in an exercise program can improve the impairments associated with knee osteoarthritis and also the cardiovascular fitness (22). We found that 44.44% patients with knee osteoarthritis had low physical performance at the beginning. After participating in the exercise program, the physical performance has been improved and only 29.63% have presented low physical performance after six months of regular exercising. Dell'Isola et al. (23) compared the effectiveness of education plus home exercise and education plus supervised group exercise program and found that, assuming optimal adherence, the supervised group-exercise provided better outcomes than the home-based exercise program in patients with hip and knee osteoarthritis. A group-based exercise program has the advantages of social interaction, that is beneficial for elderly to prevent depression, although it cannot be individualized to every patient's impairment (22). Otherwise, the physical therapist supervision may improve the performance of the exercises and also the outcomes.

Dunlop et al. (24) showed the graded relationship between physical activity level and better performance in adults with knee osteoarthritis, with a better functional performance for a greater levels of physical activity.

In a systematic review, analyzing 13 randomized controlled trial, Roddy et al. (25) observed that both aerobic walking and home based quadriceps strengthening exercises were effective in individuals with knee osteoarthritis.

Conclusions

In conclusion, participating in a group-based exercise program for six months have been proved to have beneficial outcomes in physical performance in patients with knee osteoarthritis. Group-based exercises should be combined with home-based exercise programs in order to increase the physical performance and minimize the detrimental effects of knee osteoarthritis on functionality.

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