A bio-psycho-social approach in elderly population: outcome of adapted physical activity in patients with osteoarthritis

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Abstract

Background. The beneficial effect of physical activity on a large spectrum of diseases is well known, with particular importance for elderly people. Among the different types of activity, adapted physical activity (APA) has been applied in a number of disease-related physical deficit.

Objective. The purpose of this study is to determine the outcome of a six months APA program in elder patients with osteoarthritis concerning physical and functional health and as second endpoint to determine the potential effect of APA on reducing the risk of institutionalization.

Method. The clinical indexes used to assess the outcome included the Blaylock Risk Assessment Screening Score (BRASS), the Psychological General Well Being Index (PGWBI), the Cumulative Illness Rating Scale (CIRS), the Short Physical Performance Battery (SPPB), and the visual analogue scale (VAS).

Results. A significant difference (p = 0.047) between the pre-APA and the post-APA value was found for BRASS, and highly significant differences (p <0.0001) were found for SPPB and VAS.

Conclusion. These findings show that a six months APA program in elder patients with osteoarthritis improves physical function, reduces pain intensity and decreases the risk of institutionalization. Moreover, the positive outcome of APA we found in elder patients with osteoarthritis suggests a more frequent use of such rehabilitation approach, also evaluating its economic impact on this disease.

Key words: physical exercise, osteoarthritis, pain intensity, elderly, adapted physical activity

Introduction

Most countries in the world are concerned by population ageing, that is currently at its highest level but is foreseen to further increase in the next decades, possibly reaching a projected number of 2.1 billion of elderly people by 2059.¹ It is known that ageing is associated with a decline in physical activity²,³ which was shown to equally affect men and women, while a significantly higher decrease was found in old elderly (aged 70 to 80 years) compared with young elderly (aged 60 to 69 years), mainly due to the reduction of muscle strength.² Indeed, regular physical activity is known to improve bodily and mental functions but, as reported in the United Kingdom, the large majority of older people do not meet the minimum physical activity levels needed to maintain health, facilitating a premature onset of frailty and diseases.⁴ A study evaluated the rate of decline in physical performance in 4,182 subjects of mean age of 79.4 years by using log-linear models to assess three domains (mobility, upper-extremity function and activities of daily living). A relationship between the decrease of physical performance and the relative risk of disability and death was found.⁵ Decrease of physical performance in elderly people could derive also from illness and polypharmacotherapy.⁶,⁷,⁸ In a holistic perspective, also personal resources as resilience could intervene in improving outcomes in musculoskeletal disorders.⁹,¹⁰ The concept of adapted physical activity (APA) was introduced in the 1970s, with changing definitions in the following years. Nowadays, the definition of APA as “adaptation that could facilitate physical activity across a wide range of individual difference” is usually agreed.¹¹ Osteoarthritis is known to significantly impair physical capacity¹² and to produce considerable costs as assessed by consumption of a significant amount of healthcare resources.¹³ The purpose of this study was to evaluate the outcome of an APA program, as assessed by a series of clinical indexes, in elder patients with osteoarthritis, concerning physical and functional health, and as second endpoint the study was aimed to determine the potential effect of APA on reducing the risk of institutionalization.
Materials and methods

Design of the study

This was an open retrospective observational study.

Sample

One hundred and eighteen patients (20 men and 98 women, mean age, 72 ± 4.14 years) with a primary diagnosis of osteoarthritis undergoing rehabilitation in the Department of Rehabilitation and Functional Recovery of Gaetano Pini Orthopedic Institute (Milan, Italy) were evaluated in the study. The inclusion criterion was the ability to walk up and down without walking aids or assistance. Exclusion criteria were the presence of other orthopedic diseases, neurological disorders impairing physical capacity or cognitive status, and participation to other particularly designed physical activities outside the study. Patients were involved in an APA program consisting of a group exercise including walking, strength, and balance training for 1 hour, twice a week, in local gyms, supervised by gym instructors. Patients were tested twice: before starting the study and after 6 months of training in the APA program. Fifty subjects suffering from osteoarthritis, 25 men and 25 women with a mean age of 73.6 ± 6.23 years, served as control group. In this group all clinical indexes were measured at the same time of the study group without performing the APA program.

Data collection was integrated into the normal diagnostic assessment procedure and quality check processes. However, all patients signed an informed consent form, according to the hospital’s rules. Since the study is a retrospective observational investigation, data were analyzed anonymously and all information contained in the database used for this study were previously de-identified according to the Italian legislation (D.L. 196/2003, art. 110, 24 July 2008 art. 13). The study was carried out in accordance with the Declaration of Helsinki (with amendments) and Good Clinical Practice. Furthermore, we consulted the Ethical Board of our hospital (Ethics Committee of Azienda Socio Sanitaria Territoriale Gaetano Pini-CTO, Milano, Italy) prior to the beginning of the study. The Ethical board confirmed that, as it was a retrospective observational study, the authorization from the Board was not necessary.

Measure assessment

Patients were evaluated by the Blaylock Risk Assessment Screening Score (BRASS), the Psychological General Well Being Index (PGWBI), the Cumulative Illness Rating Scale (CIRS) and the Short Physical Performance Battery (SPPB). The BRASS is a screening tool used to identify patients who may require a more comprehensive discharge plan. The BRASS is based on an evaluation of 10 items including patient’s demographic characteristics and health and social condition. Total score (0 to 40) allows to divide patients into three risk classes: low risk (score from 0 to 10) concerns patients with very limited disability; medium risk (score 11 to 19) concerns patients with problems related to complex clinical situations that require discharge planning; high risk (score greater than or equal to 20) concerns patients who report problems and require a continuity of care, probably, in rehabilitation facilities or institutions. The PGWBI was developed for the evaluation of perceived well-being and distress. It is composed of 22 items including six dimensions: Anxiety, Depressed Mood, Positive Well-Being, Self-Control, General Health, and Vitality. The CIRS evaluates the chronic medical illness (morbidity) burden while taking into consideration the severity of chronic diseases in 14 items corresponding individual body system. The SPPB, which has been extensively used in community dwelling older adults to assess physical and functional health, is composed of 3 objective tests of lower body function: a timed walk, repeated chair stands, and standing balance. The visual analogue scale (VAS) was used to measure pain intensity. All indexes were measured before starting (T0) and after completing (T1) the APA program. The program was conducted for 6 months with two training sessions per week (1 hour each session). The sessions were performed in local gyms in groups up to 20 participants, and the activities were set up and concerted by the research team, based on weekly meetings. Each session was supervised by trained physical educators and physical therapists. Exercises proposed in the APA program consisted of stretching of the major muscle groups (such as pectoral, cervical paravertebral, anterior and posterior thigh muscles); aerobic exercise (fast walking); adapted strength and endurance training (tailored on participants and according to the supervisors); exercises of coordination, agility, and flexibility, and respiratory exercises.

Statistical analysis

Statistical analysis was performed with Stata 15 (StataCorp, 2017). Since almost all the scales used had non-Gaussian distributions, before-after intervention comparisons were performed with the non-parametric Wilcoxon signed-rank tests, stating as significant a p value <0.05.

Results

Of the 118 patients with a primary diagnosis of osteoarthritis enrolled in the study, 106 completed the APA program. Twelve (patients number 2, 3, 14, 17, 26, 27, 33, 41, 43, 67, 86, 92) patients dropped out from the study. In basal condition, the mean of the BRASS was 8.61 (SD 3.98), the mean of the PGWBI score was 57.72 (SD 4.72), the mean of the CIRS was 2.57 (SD 1.95), the mean of SPPB was 9.20 (SD 2.06) and the mean of the VAS was 4.57 (SD 2.96). After completing the APA program, the mean of the BRASS was 9.11 (SD 4.53), the mean of the PGWBI score was 58.19 (SD 4.67), the mean of the CIRS was 2.54 (SD 1.97), the mean of SPPB was 9.92 (SD 1.96) and the mean of the VAS was 3.76 (SD 3.13). A significant difference (p = 0.047) between the pre-APA and the post-APA value was found for BRASS, and highly significant differences (p<0.0001) were found for SPPB and VAS. In the control group no significant difference was detected for any of the indexes.

Table 1 summarizes the data obtained by statistical analysis.
was included in the meta-analyses, and to our knowledge no such study was published thus far in 2018. In 2010, Reid argued the future directions in APA, suggesting a number of ways to enhance it, including “using physical activity as a dependent measure more frequently”, “attending to diverse and changing populations, particularly older persons with disabilities”, “clarifying the impact of clusters and comorbidity in research”.

Our study evaluated for the first time the outcome of an APA program in elder patients with osteoarthritis. We assessed before and after the APA program a number of issues by specific tools. Patient’s health and social condition and the related risk of institutionalization was measured by BRASS, patient’s perception of well-being and distress, anxiety and depressed mood was measured by PGWBI, comorbidity by CIRS, body function by SPPB, and pain intensity by VAS. A significant difference between the pre-APA and the post-APA value was found for BRASS, and highly significant differences were found for SPPB and VAS. The beneficial effect on physical function and pain are in line with the findings from meta-analyses including several types of exercise, and also the lack of significant effect on distress, anxiety and depression mirrors the contrasting observations from the available studies. Indeed, the statistical significance of a reduced risk of institutionalization associated with health and social condition, as assessed by BRASS, though it may appear obvious, can be compared with insufficient literature. In a systematic review on 11 studies addressing interventions for social isolation and loneliness in community-dwelling elderly people, diverse recruitment strategies, intervention objectives, and length of follow-up were noted. The interventions included in-person, group, social, and technology-assisted activities, and concerned different targeted groups including elderly in mental or emotional distress, physical inactivity, support by caregivers, and low-income. Such interventions resulted in reduction of social isolation, although the technology-assisted interventions tended to involve only seniors in mental distress and informal caregivers. Community-based exercise programs were beneficial in inactive community-dwelling elderly. The authors concluded that research into a number of critical areas for sustainability of independent community living for elderly seniors is required, because the potential impact of interventions on the social health and well-being of elderly has been investigated only at preliminary stage. Based on our finding, APA, thus far not used for this issue, warrants to be investigated.
Conclusion

The positive outcome of APA we found in elderly patients with osteoarthritis confirm that APA can improve physical and functional health through the participation of patients, reducing the pain intensity. Moreover, based on the considerable amount of healthcare resources produced by osteoarthritis, the economic impact of APA on this disease deserves be evaluated.

References