Journal of Physical Education and Sport ® (JPES), Vol. 21 (1), Art 21, pp. 152 - 158, January 2021
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Pilates and satisfaction with life in elderly

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Published online: January 30, 2021
(Accepted for publication January 22, 2021)
DOI:10.7752/jpes.2021.01021

Abstract:
Introduction: The Pilates exercise can be an improvement in the quality of life of its practitioners, through an optimized condition of improvements in posture, developing greater mobility, balance, agility and functionality. The satisfaction with life is part of a cognitive dimension in this quality of life and it is present in most measures of well-being. **Problem Statement and Approach:** The main purpose of this study is to analyse and relate the effects of a supervised program of Pilates classes in a group of elderly, comparing the results of balance through the Berg scale and their ability by the Leighton scale, and relate these improvements with the satisfaction with life of these elderly in this activity. **Material and Methods:**The evaluation assessments of the elderly were carried out in the proper room, using a goniometer and the Berg scale for articular measurements, the Leighton scale for the balance domain and the life satisfaction scale. The study had 72 participants, 52 women and 20 men aged between 60 and 83 years (M=66.70±SD=6.84). Participants had 30-minute Pilates sessions each twice a week for a 12-month period, after which the life satisfaction questionnaire was applied. **Results**: Better results were achieved in balance and articular ampleness parameters in these participants, with some significant improvements and magnitudes of *effect size* with quite satisfactory results after the second evaluation. The values obtained for life satisfaction were considered quite satisfactory in women with a final average of 5.24, and in men with an average value of 4.9 on a scale between 1 and 7. **Discussion**: Other studies have showed that welfare levels tend to be higher in the male gender, making them have higher life satisfaction averages than women, not reported in our study, however with a value considered satisfactory. **Conclusions**: The Pilates programme implemented showed very favourable values, with gains in all the assessments analysed, where this elderly group showed a very good life satisfaction allied to the improvements found in functional ability.
Keywords: - Well-being, Balance, Exercise, Berg Scale, Leighton Scale, Ability.

Introduction

Physical activity is proved to be a fundamental support in the aging process, not only by slowing down the process, but for the benefits it brings, capable of appeasing the symptoms of aging in its different dimensions, with particular evidence in the social and biological domain(Colcombe & Kramer, 2003). The practice of physical activity (PA) in adulthood is associated with better quality and quantity of sleep, a healthier pattern of a set of physiological indicators, a lower risk of falls, better cognitive functioning, more favourable values of satisfaction with life and a lower incidence of anxiety and signs of depression(Anderson & Spector, 2000).

Pilates practice gathers a group of physical exercises in which the main aspect is the development of flexibility, resistance with breathing coordination focused on body control, posture, centralization and concentration(Sekendiz, Altuna & Korkusuka, 2007). This practice aims at stretching the muscles such as gluteus, and in the abdominal, paravertebral and pelvic areas, named after Joseph Pilates. The proposal of the Pilates Method is indicated as an improvement in the quality of life of participants, through the development of new and better postures, with better mobility capacity, balance and greater agility (Honório et al., 2019). Pilates exercises are aimed at strengthening and relaxing the muscles associated with flexibility and breathing(Carvalho, Dias & Carneiro-Júnior, 2017).

After a period of 12 weeks of the Pilates exercise intervention, Tsai & Wang (2016) found a significant improvement for their 88 Pilates participants on lower limb muscle strength and abdominal muscle endurance with 1 hour per session, 2 times a week. This study provided an example on how Pilates exercise in the workplace can promote health and prevent chronic diseases.

According to Oliveira et al. (2015), Pilates seems to be an efficient activity and an improvement for posture, balance, and aspects related to quality of life. The literature refers to two major aspects of subjective well-being: an affective component, which is often subdivided into positive and negative affections, and a cognitive componentwhich is defined as satisfaction with life.

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Life satisfaction has a negative propensity with age. It appears that men are more satisfied with their lives than women. At all ages and in both sexes, exercise practitioners are more satisfied with their lives than non-practitioners (Pavot & Diener, 1993).

The concept of life satisfaction has been linked to a broader concept that is life quality. Although satisfaction with life and quality of life often appear as synonyms in scientific theoretical reviews, there is a particularity that distinguishes them, as life satisfaction is understood as a subjective psychological dimension of quality of life which encompasses other objective faculties such as living conditions and social circumstances. Life satisfaction refers to an intrinsic evaluation that each person makes with regards to their own evaluation of quality of life based on a context regarding their circumstances of life, ideals and achievements(Mello et al. 2018). In a study developedby Küçük et al. (2016) with 16 elderly after 27 sessions of Pilates, these individuals were evaluated for quality of life, attention and concentration tests, and time reaction with auditory and visual stimulus. They obtained improvements in all variables with significant values in the attention and concentration tests. A study of Abasıyanık et al. (2020) evaluated 37 elderly, with 2 Pilates sessions per week for 8 consecutive weeks. They found that Pilates with multiple sclerosis therapy can have very satisfactory changes in cognition parameters, quality of life, physical tests balance and of these elderlies. In another studydeveloped by Bullo et al. (2015), 42 elderly were studied for establishing the effects of Pilates on walking, balance, fall risk and respiratory assessments. They had 8 weeks of exercises and the participants were divided in 3 groups. One with Pilates and another one with prescribed home exercise. After this period, the group that practiced Pilates had higher values than the group with a home exercise program.

Also,Ilnytska, Kozina, Kaвatska, Kostiukevych, Oncharenko, Bazilyuk & Rawashdeh (2016) presented a study with an objective to develop methods to the level of students' psychophysiological and functional capabilities. They had a positive effect on their application with a significant decrease in the latent time of simple visual and motor reaction, complex visual and motor reaction, time duration on the test of "level of functional mobility of nervous processes".

Bolotin, Bakayev & Azhenin (2015) have used Pilates exercises for pedagogical experiments having a high level of partial or complete recovery of physical condition and health of students that suffered several structural and functional spine disorders, which indicated high efficiency of the technology with the use of Pilates.

Material & methods

Patients

The study had 72 participants, 52 female and 20 male, with ages between 60 and 83 years (M=66.70±6.84). Each one practiced 30-minute Pilates sessions, twice a week for a 12-month period. The classes took place in a proper room with an air-box wooden floor, air-conditioning and the use of mattresses for the exercises and the participants were treated as a group. The exercise protocol involvedbreathing, stabilization of the lumbar position, little circles with the body weight itself, spinal roll and unroll, abdominal and postural contractions, strengthening exercises, movements of posture using the Swiss ball. In the final 10 minutes, exercises of relaxation and passive stretching were performed. Participants who did not have any physical or physiological limitations were included. This group of participants belongs to a "senior university" project who have begun a physical activity program and were selected for the Pilates program, and had not engaged in any exercise program before.

Ethics approval and consent to participate This investigation did not involve any physical or psychological risks to the participants. All of them allowed their free participation and signed an informed consent, and consequently this study was approved by the Scientific Council of the faculty.

Instruments and Procedures A goniometer was used for measuring the articular ampleness: the extension, flexion, adduction and abduction of the shoulder, and the flexion, adduction and abduction of the thigh/knee (hip joint). The results obtained were presented as described in a specific classification table(Leighton, 1955). The classification of this table its categorized as low, below average, above average and high. The balance variable was measured through a validated scale (Berg & Norman, 1996), in order to analyse the risk of falling, covering a scale of 14 daily tasks that involves static and dynamic balance, such as reaching, rotation, transferring and lifting, however we only evaluated the tasks of "standing".

The Berg scale was used after these measurements to verify the risk of falls and relate these aspects to their mobility capacity. The measurements were obtained in two moments, in the beginning and after the twelve months of Pilates practice. The life satisfaction scale was used(Albuquerque, Sousa e Martins, 2010), having a validation process for the Portuguese version of the SWLS, through the confirmatory factorial analysis, with adequate adjustment.

Statistical analyses Descriptive statistics and Wilcoxon test were applied, to compare values between the two moments, using a significance level of $p \leq 0,05$. In addition, the *d cohen* effect size was calculated to determine whether this exercise program had significant effects on these variables. The magnitude of effects obtained, was interpreted according to the cut-off values proposed by the authors who validated this technique(Cohen, 1988;

Hattie & Timperly, 2007). At the end of the study, the life satisfaction questionnaire was applied toanalysethe elderly's levels of satisfaction, as a model of well-being[17]. This scale gathers 5 items and the participants indicates, through a 7-point Likert scale, to choose between Totally Disagree (1) and Absolutely Agree (7), the level of satisfaction according to each one of those items.

Results

Table 1. Values obtained by the two evaluations performed, the effect size and the level of satisfaction with life of the variables analysed.

Variables	Mean±SD	Sig.*	*d cohen*	*Cohen (1988)*	*Hattie (2007)*
Shoulder Flexion (1st)	168.58±11.14	0.000	0.465*	Intermediate effect	Zone of desirable effects
Shoulder Flexion (2nd)	173.14±8.27				
Shoulder Extension (1st)	61.71±11.40	0.000	0.417*	Intermediate effect	Zone of desirable effects
Shoulder Extension (2nd)	66.64±12.23				
Shoulder Abduction (1st)	155.64±8.87	0.000	0.604*	Intermediate effect	Zone of desirable effects
Shoulder Abduction (2nd)	161.23±9.63				
Shoulder Adduction (1st)	42.86±11.49	0.001	0.247	Low effect	Zone of teacher effects
Shoulder Adduction (2nd)	45.71±11.60				
Thigh Flexion (1st)	106.68±13.29	0.000	0.352	Low effect	Zone of desirable effects
Thigh Flexion (2nd)	111.84±15.92				
Thigh abduction (1st)	57.61±7.09	0.000	1.711***	Very large effect	Zone of desirable effects
Thigh abduction (2nd)	74.11±11.64				
Seating to standing (1st)	3.61±0.49	0.000	1.119***	Very large effect	Zone of desirable effects
Seating to standing (2nd)	4.00±0.00				
Standing for 2 min (1st)	3.32±0.83	0.000	1.153***	Very large effect	Zone of desirable effects
Standing for 2 min (2nd)	4.00±0.00				
Satisfaction with Life	5.24±0.82				

** Wilcoxon p≤0.005, * d cohen - intermediate effect , ** d cohen - large effect , *** d cohen - very large effect*

In table 1, it is possible to observe that all variables have improvements with significance differences between the two moments of evaluation. Also, the effect sizes were considered extremely satisfactory. Only the variables of shoulder adduction and thigh flexion had a lower effect, however within the zone of teacher effects and desirable effects, with mean values improved. In terms of life satisfaction, the value obtained was 5.24, which is a very good indicator, once the scale ranges from 1 to 7.

Table 2. Values obtained, between genders, by the two evaluations performed, the effect size and the level of satisfaction with life of the variables analysed.

Female Gender					
Variables	Mean±SD	Sig.*	*d cohen*	*Cohen (1988)*	*Hattie (2007)*
Shoulder Flexion (1st)	168.21±11,44	0.000	0.467	Intermediate effect	Zone of desirable effects
Shoulder Flexion (2nd)	172.92±8.49				
Shoulder Extension (1st)	61.46±11.71	0.001	0.373	Low effect	Zone of desirable effects
Shoulder Extension (2nd)	65.85±11.83				
Shoulder Abduction (1st)	155.38±9.00	0.000	0.6	Intermediate effect	Zone of desirable effects
Shoulder Abduction (2nd)	161.04±9.83				
Shoulder Adduction (1st)	42.38±11.55	0.001	0.279	Low effect	Zone of teacher effects
Shoulder Adduction (2nd)	45.65±11.91				
Thigh Flexion (1st)	107.13±13.17	0.000	0.327	Low effect	Zone of desirable effects
Thigh Flexion (2nd)	111.98±16.31				
Thigh abduction (1st)	57.27±7.23	0.000	1.685	Very large effect	Zone of desirable effects
Thigh abduction (2nd)	73.71±11.75				
Seating to standing (1st)	3.60±0.49	0.000	1.143	Very large effect	Zone of desirable effects
Seating to standing (2nd)	4.00±0.00				
Standing for 2 min (1st)	3.35±0.81	0.000	1.129	Very large effect	Zone of desirable effects
Standing for 2 min (2nd)	4.00±0.00				
Satisfaction with Life	5.26±0.76				
Male Gender					
Variables	Mean±SD	Sig.*	*d cohen*	*Cohen (1988)*	*Hattie (2007)*
Shoulder Flexion (1st)	172.50±5.26	0.068	0.743	Intermediate effect	Zone of desirable effects
Shoulder Flexion (2nd)	176.00±4.08				
Shoulder Extension (1st)	65.00±5.94	0.068	1.086	Very large effect	Zone of desirable effects
Shoulder Extension (2nd)	77.00±14.44				
Shoulder Abduction (1st)	159.00±6.97	0.109	0.687	Intermediate effect	Zone of desirable effects
Shoulder Abduction (2nd)	163.75±6.85				
Shoulder Adduction (1st)	47.00±7.39	0.715	0.230	Low effect	Zone of teacher effects
Shoulder Adduction (2nd)	49.00±9.83				
Thigh Flexion (1st)	100.75±15.47	0.068	0.689	Intermediate	Zone of desirable

Thigh Flexion (2nd)	110.00±10.98			effect	effects
Thigh abduction (1st)	62.00±2.44	0.068	2.352	Very large effect	Zone of desirable effects
Thigh abduction (2nd)	79.25±10.07				
Seating to standing (1st)	3.75±0.50	0.317	0.707	Intermediate effect	Zone of desirable effects
Seating to standing (2nd)	4.00±0.00				
Standing for 2 min (1st)	3.00±1.15	0.157	1.224	Very large effect	Zone of desirable effects
Standing for 2 min (2nd)	4.00±0.00				
Satisfaction with Life	4.90±1.46				

In table 2, comparing genders separately, the female gender presents significant differences. However, it is possible to observe that all variables obtained improvements, with size effects mostly from "intermediate effects" to "very large effects". The variable with less improvements was, in fact for both genders, the shoulder adduction, however with values that reached the zone of teacher effects. In men, the thigh flexion achieved intermediate effects compared to women.

Discussion

In terms of life satisfaction the female gender (5.26) has a higher value, however it is considered positive in the male gender (4.90) as well.

According to the literature(Costa et al. 2016; Kneip, Oliveira & Contenças, 2013) it can be established that Pilates exercises have improvements in elderly physical capacity and mobility, considering that this practice has positive effects and is recommended as a proper physical activity for this population. Also, this type of exercise increases physical capacity and improves overall quality of life as reported by other studies(Sousa, Martins &Oliveira, 2017). Improvements were observed in these Pilates participants in articular mobility and balance(Veiga, Silva & Posser, 2019; Honório et al. 2016). The literature also shows that the act of sitting straight requires strength in the leg muscles, and postural muscles. The same improvements are observable in flexibility, balance and coordination. Regarding the standing up test, our study registered improvements asreported in other investigations(Kolyniak et al. 2004). In the standing variable, also flexibility and balance showed favourable values. Pilates practice can also improve dynamic balance, posture and coordination in elderly(Johnson et al. 2007). Also, other studiessuch as Mokhtari, Nezakatalhossaini & Esfarjani (2013) have shown that Pilates exercise promotes emotional well-being in the elderly. A 12-week Pilates exercises had minimized depression in their participants. Also, the effect of 12-week Pilates exercise in other older adults, leads to favourablebehaviours showing that Pilates exercises had improved several aspects related to health, quality of life and well-being of the elderly. Other investigations(Emery et al. 2010; Roh, 2016) reported that Pilates exercises are very effective for strength and postural stability improvements. However, our study, once compared to others (Kayaoglu & Ilbige, 2019), concluded that Pilates exercises are very helpful in maintaining the mobility, helping the elderly to to perform daily tasks. We also intended, during this study, to analyse differences in life satisfaction for the practice of supervised PA, comparing genders. The literature refers that it was women who presented the best results, i.e., showing more favourable levels of satisfaction with life. It is a fact that the elderly who have higher levels of education and better economic conditions, would have factors that positively influenced the life quality in elderly and, consequently, contribute to their satisfaction with life.

In our study, the women had higher levels of satisfaction with life in relation to men, as in the studies conducted(Boguszewski, Adamczyk & Ochal, 2012), in which women are happier, more energetic and have higher levels of mental health, since physical activity is an essential factor for the physical and psychological well-being of people. Other studies of Fernandez & Benitez-Jimenez (2013) and Fourie et al. (2012) have showed that welfare levels tend to be higher in the male gender, making them have higher life satisfaction averages than women, not reported in our study, however with a value considered satisfactory.

Conclusions

Pilates exercises, when conducted with a proper and systematic method is a very complete and effective tool for quality of life and health issues. The results showed that this activity practice applied to the elderly group in this study, promoted significant improvements in mobility capacity and life satisfaction. We concluded that a twelve-month Pilates program had improved the functional capacity according to our variables analysed and balance, allied to a very good life satisfaction.

Pilates exercises led to significant improvement in functional performance in the elderly with very good size effects revealed. Therefore, elderly people can and should apply a well-structured Pilates exercise program under the supervision of a Pilates instructor and could be an alternative for improving physical fitness parameters among these. Regarding satisfaction with life, which aimed to relate the influence of Pilates on the satisfaction with life of these participants, we found that the female gender present higher levels, this means that women feel more satisfied with life than men by practicing Pilates.

We can conclude that this perception of life satisfaction is exteriorized as a factor of great importance, by the fact that they appear to be a good indicator so that this population can remain active and feel engaged in

maintaining this lifestyle in their life's. The Pilates method proved to be a complete and very effective tool for quality of life and health purposes. The results show that the practice of this activity applied to the elderly group in this study, promoted significant improvement in their ability and life satisfaction. It can be concluded that a twelve-month Pilates program improved functional mobility and body balance, allied to a very good life satisfaction.Pilates is essential for improving health.It facilitates disease prevention and physical rehabilitation, assists in the development of balance and coordination, especially for the elderly.

Pilates exercises appear to offer an excellent and safe form of exercise for the elderly, in addition to contributing, at least, for the maintenance of their physical capacities. When practicing Pilates the individual feels a relief of pain in the body.In addition, it improves bone density, develops lung function and efficiency with improved circulation.In future studies it is crucial to study if Pilates could also help in the treatment of diseases such as scoliosis, osteoporosis, arthritis and multiple sclerosis.

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