



The effect of the Contemporary Pilates method on physical fitness, cognition and promotion of quality of life among the elderly

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Abstract

Objective: to evaluate the effects of the Contemporary Pilates method on the physical fitness, cognition and quality of life of the elderly. *Method:* the Senior Fitness Test battery, the Vienna Test System and the EUROHIS QOL-8 quality of life questionnaire were used. The study group consisted of 16 elderly people and 27 classes of the Solo Contemporary Pilates method, held twice a week. To verify the normality of the data the Shapiro-Wilk test was used while the physical fitness and cognition variables were tested using the t-test for paired samples. Percentage analysis was performed for the quality of life variable and its dimensions. A significance level of 5% was adopted. *Results:* a significant difference ($p < 0.05$) was observed in the variables: lower and upper extremity flexibility test ($p=0.007$), agility ($p=0.001$) and dynamic balance ($p=0.001$), aerobic endurance test ($p=0.001$) and Attention and Concentration test time ($p=0.047$). *Conclusion:* the Contemporary Pilates Method can improve the quality of life, physical fitness and reaction time of the elderly. It can be concluded that the Contemporary Pilates Method improves the health of the elderly, thereby helping to promote quality of life.

Keywords: Aging, Physical Fitness, Pilates Training, Cognition.

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INTRODUCTION

The aging process can be conceptualized as a dynamic and progressive phase in which morphological, functional and biochemical changes progressively limit the elderly. Studies show that in the long term sedentarism intensifies the processes of incapacity and dependence, as well as increasing the risk of the incidence of chronic diseases and cognitive and motor impairments¹⁻³. Thus, the aging process is accompanied by changes in the neuromuscular, somatosensory, vestibular and visual systems and may be associated with a sedentary lifestyle or diseases, resulting in a functional capacity deficit⁴.

In this sense, the practice of regular physical exercise tends to reduce the effects of aging on physical and motor capacity and consequently on quality of life. There are different types of physical exercises that can assist health promotion, such as water aerobics and floor gymnastics⁵⁻⁷. Among the physical exercises that bring benefits is the Pilates Method (PM).

PM includes resistance work based on the principles of breathing, control, concentration, precision, fluidity and centralization, thus integrating body and mind, helping to maintain health and physical abilities⁸. It is an exercise program that aims to minimize and reverse the negative effects of aging, improving levels of physical fitness, cognition and respiratory function, as well as being a physical conditioning method that integrates body and mind, attenuates muscle pain, improves movement range, increases control, strength, muscle balance and body awareness. It works the body as a whole, corrects posture and realigns the muscles, developing the body stability necessary for a healthier and longer life^{9,10}.

Given the above, the importance of maintaining functional capacity, postural stability and cognitive function for the general health of the elderly based on increasing life expectancy and changes in habits, can clearly be seen. The objective of the present study was to assess the effects of PM on physical fitness, cognition and quality of life (QoL) among a group of elderly persons.

METHOD

This study is characterized as a cross-sectional intervention type with pre- and post tests¹¹. The study group was intentionally selected, and individuals were invited to participate in the research through social media, announcements in newspapers and community groups in the city of Santa Maria, Rio Grande do Sul. Elderly persons of both genders were recruited. Selection was based on the following inclusion criteria: being 60 years of age or older, not practicing regular physical exercise, being able to attend PM classes twice a week and having cognitive function preserved, verified through the Mini Mental State Exam (MMSE)¹². The exclusion criteria were neurological, cardiovascular, respiratory and/or orthopedic diseases that impeded the performance of the exercises and a class attendance frequency of below 75%.

Twenty-seven classes using the Solo Contemporary Pilates Method were held. The tests were performed before the first class, characterized as pre-tests, and in the week after the last class, characterized as post-tests. All were performed by the same four previously trained evaluators.

The tests used were the Senior Fitness Test (SFT) which measures the physical fitness of the elderly. This battery is composed of six motor tests that assess the strength of the upper (forearm flexion) and lower (get up from and sit down in the chair) limbs, flexibility of the upper (reach behind the back) and lower (sit down and reach) limbs, agility/dynamic balance (sitting, walking 2.44 m and sitting down again) and aerobic endurance (walking for 6 minutes or standing gait) according to age group, validated for the Brazilian population by Mazo et al.¹³.

In addition, the relationship between attention/concentration and the ability to react quickly to a stimulus was tested. Attention and Concentration Tests and Reaction Time with auditory and visual stimulus were evaluated using the Vienna Test System (VTS)¹⁴ software and with the MMSE¹². Pre and post-practice of PM quality of life was also evaluated. The collection instrument was the EUROHIS QOL-815 questionnaire, validated and translated, which measures QoL in the elderly.

The PM classes, representing the intervention, took place from April to July of 2017 in the Sport and Physical Education Center of the Universidade Federal de Santa Maria. They were taught by three physiotherapists certified in the Pilates method, accompanied by an undergraduate student in Physical Education as a monitor. The activities occurred twice a week (60 minutes) for 15 weeks, and the time of execution of each exercise was based on breathing time. The exercises used in the classes were the Solo Contemporary Pilates method, which consists of exercises performed on the ground, usually on mats and tatamis, requiring body awareness, strength, stretching and balance.

The set of exercises were: *bridge, spine stretch forward, saw, single leg circles, the hundred, the cat stretch, abdominal curls, mermaid, swan, side kicks forwards and back, side kicks up and down, swimming, and the spine twist*. Accessories (ball and elastic) were used and the exercises were based on the use of the individual's own body weight. The application occurred progressively and with the evolution of exercises from the least to the most difficult, for all participants, respecting the levels of physical fitness of each individual.

In addition, during the classes the elderly were dynamically stimulated to participate in the planning of the classes, in a dialogical process of teaching and learning, preserving their autonomy and proactivity. The elderly were stimulated through verbal and visual information to work with the principles of

breathing, control, concentration, precision, fluidity and centralization, thus integrating body and mind. They were also encouraged to become aware of posture, strength, endurance, flexibility and balance, helping to maintain health and physical fitness.

The study was submitted to and approved by the Ethics Research Committee of the Universidade Federal de Santa Maria (CAAE: 45429015400005346) in accordance with Resolution 466/12 and Resolution n° 510/2016 of the National Health Council. All the participants read and signed a Free and Informed Consent Form (FICF).

Data were submitted to descriptive analysis. The normality of the data was verified through the Shapiro Wilk test, which identified that data distribution was normal. The variables of the physical fitness and cognition of the group were compared through the t-test for paired samples. The quality of life variable and its dimensions was assessed through percentage analysis. SPSS version 22.0 was used with a probability of significance value of 5%.

RESULTS

The present study initially consisted of 20 elderly persons, although there were 13 drop-outs (one man and 12 women) during the course of the project. Table 1 below shows the descriptive data of the group.

Table 1. Characterization of Sample. Santa Maria, Rio Grande do Sul, 2017.

Variables	n (%)	Mean (\pm sd)
Age		71.0 (\pm 7.2)
BMI*		29.7(\pm 13.1)
MMSE**		29.5(\pm 2.0)
Marital Status		
Single	2 (15.4)	
Married	5 (38.5)	
Widowed	3 (23.1)	
Divorced	3 (23.1)	
Gender		
Women	12 (92.3)	
Men	1 (7.6)	

* Body mass index; **Mini mental state exam;

A significant difference ($p < 0.05$) was observed for the variables: upper and lower limb flexibility test, agility and dynamic balance, and aerobic endurance test, thus confirming an improvement in physical fitness (Table 2).

There was only a significant difference in the mean time in the Attention and Concentration test. There were no significant differences ($p < 0.05$) in the other cognitive variables (Table 3).

Table 2. Comparison between physical fitness variables (pre- and post-test). Santa Maria, Rio Grande do Sul, 2017.

Variables	Pre (Mean \pm sd)	Post (Mean \pm sd)	P
Elbow Flexion	14.85 (3.21)	17.31 (2.87)	0.081
Sit and Lift	9.15 (1.17)	12.77 (2.86)	0.001
FLX MMII (cm)	-10.952 (12.07)	-0.08 (8.65)	0.007
FLX MMSS (cm)	-20.12 (12.15)	-10.19 (10.93)	0.001
TUG (s)	8.091 (1.12)	6.45 (0.79)	0.001
6MWT (m)	437.36 (41.95)	479.85 (45.85)	0.001

Table 3. Comparative Analysis of Cognitive Variables through VTS (pre- and post-test). Santa Maria, Rio Grande do Sul, 2017.

Variables	Pre [Mean \pm (sd)]	Post [Mean (\pm sd)]	P
Cognition Scores	47.5 (2.33)	47.5 (2.29)	1.01
Mean Cog Time	2.19 (0.6)	1.65 (0.5)	0.047
Auditory Reaction Time	3.3 (4.9)	4.33 (6.6)	0.520
Visual Reaction Time	2.7 (4.4)	25.6 (4.5)	0.094

There was a significant improvement in QoL, with 30.7% of the elderly considered their QoL to be very good before the exercise period and 92.3% after the exercise period. The satisfaction of the elderly with regard to health also increased, from 23.0% to 30.7%. Willingness to perform day-to-day tasks increased from 7.6% to 30.7%. There was also an improvement in the elderly persons' satisfaction with themselves, from 38.4% to 46.1%.

DISCUSSION

Improvements were mainly observed in the parameters of lower and upper limb flexibility, agility and dynamic balance, the aerobic endurance test and quality of life.

The decline of flexibility in the elderly is often due to lack of movement and a sedentary lifestyle¹⁶, which occurs concomitantly with a physiological

reduction in the elastic fibers¹⁷. In addition, flexibility is directly associated with joint mobility and muscle elasticity¹⁸ and may be related to the autonomy of the elderly¹⁹. Fourie et al.²⁰ state that flexibility is directly linked to the independence of the elderly, as it is an extremely important component for movement. Also, adequate levels of flexibility are determinant for the successful execution of activities of daily living²¹. From this perspective, at the end of the intervention with PM, the participants of this study reported an improvement in their activities due to this mobility.

It should be highlighted that maintaining or gaining flexibility and muscle strength is an important goal in the health control of the elderly, directly influencing their QoL, as it can lead to the avoidance of comorbidities associated with aging²².

We also prioritized the work of strengthening the abdominal region to obtain better functionality

of the spine and promote body control and balance. Corroborating the findings of the present study, the systematic review by Granacher, Gollhofer and Hotobágyi²³, concluded that strengthening the center of the body through intervention with PM contributes to efficiency in the extremities of the body by improving balance among the elderly. In addition, a study carried out by Hyun et al.²⁴ compared the effects of Pilates on the balance and stability of the torso of the elderly and found that the oscillation time of the body reduced, improving overall balance. Furthermore, the study by Pata et al.²⁵ aimed to determine if an exercise program based on PM was effective in improving dynamic balance, mobility, and postural stability, and found significant results in the Timed-Up and Go, Turn-180 and Forward Reach Test. Thus, studies suggest that a program based on PM can effectively improve balance, mobility, postural stability and reduce the number of falls.

Regarding cognition, which was also evaluated in the present study, a significant difference was observed only in the Attention and Concentration test response time, although there were also positive effects on the other means. An average Reaction Time of 330m was observed, with Reaction Time values of between 340m and 380m considered satisfactory for those aged over 60 years²¹. In addition, a positive correlation (0.729) was observed between the Reaction Time and the mean number of correct answers in the Attention and Concentration test. However, there was no significant difference in the results after the intervention.

It is observed that a strategy involving PM twice a week alone is not enough to achieve expressive cognitive improvements, but rather daily challenges and maneuvers, using cognitive aspects, knowledge construction, the constant learning of different elements, associations and interpersonal relationships, are required. In this context a study carried out by Middleton and Yaffe²⁶ postulates that physical exercise is one of the most promising strategies in the fight against dementia and that the improvement in physical fitness also brings cognitive benefits as the elderly become more independent and socially active. In addition, it is perceived that a greater frequency of stimuli leads to better results^{27,28}.

Faria et al.²⁹ report that one option for minimizing the loss of muscular strength is the practice of regular physical exercise, which allows the improvement or maintenance of the autonomy of the elderly and their social insertion, and also influences QoL. In the same way, Mazo et al.³⁰ emphasize that an effective exercise program for the elderly population should offer significant improvements in physical ability and fitness, such as cardiovascular endurance, strength, flexibility and balance, which will consequently provide greater personal autonomy and quality of life to these individuals. PM is an exercise program that offers these types of benefits to the elderly population, with the study by Jesus et al.³¹ emphasizing that the method is both a physical exercise and leisure activity, bringing improvements to QoL, corroborating the findings of this study.

In view of these results, it can be seen that Pilates provides improvement in the physical fitness of the elderly and consequently in QoL. However, it is important to highlight some limitations found in the study, such as the low number of participants, most of whom were female, and the absence of a control group. Clinical trials, which assess the effects of PM with greater reliability, are therefore recommended.

CONCLUSION

It was identified that the practice of the Pilates Method promoted improvement in levels of flexibility, agility, dynamic balance and aerobic endurance. In addition, improvement in reaction time and quality of life was also verified.

Although there remain few studies on the Pilates Method in aging, with no consensus among the same, there are indications that the method has positive effects on several aspects, notably the improvement of physical fitness and quality of life.

Thus, the Pilates Method is an effective preventive strategy to maintain and improve health status, demonstrating direct and indirect beneficial effects on several aspects and contributing to the prevention of diseases and other comorbidities associated with changes caused by the aging process.

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