

Effects of the Pilates method on water in elderly women: repercussions on physical and emotional aspects

Efeitos do método Pilates na água em idosas: repercussão nos aspectos físicos e emocionais

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ABSTRACT

Objective: To verify the effects of the Pilates in Water method on body image, self-esteem, perception of aging, postural balance and handgrip strength in elderly women. **Method:** Descriptive, experimental study, composed of 33 elderly women residing in a city in the interior of Rio Grande do Sul. The following questionnaires were used: Body Appreciation Scale (BAS) for the assessment of body image, Rosenberg's Self-esteem Scale for assessment for self-esteem, Aging Perceptions Questionnaire (APQ) for perception in relation to aging, Timed Up and Go (TUG) for balance and a portable digital dynamometer to assess handgrip strength. The Pilates in water protocol was performed twice a week for a period of 36 weeks. **Results:** Five elderly women (14.3%) had a higher risk of falls and after the intervention, only two elderly women (5.7%). As for dynamometry (pre 16.20 ± 5.07 KgF and post 16.39 ± 5.30 KgF, $p = 0.951$) and body image assessment (pre 4.9 (4.3-5.0) and post 4.9 (4.7-5.0), $p = 0.66$) showed no significant difference. Self-esteem was satisfactory (100%). The participants' perception of aging provides a better quality of life. **Conclusion:** It is an appropriate resource for the elderly and capable of generating many benefits.

Keywords: Hydrotherapy, Exercise Movement Techniques, Self Concept, Perception, Aged

RESUMO

Objetivo: Verificar os efeitos do método Pilates na Água na imagem corporal, autoestima, percepção acerca do envelhecimento, equilíbrio postural e força de preensão palmar em idosas. **Método:** Estudo descritivo, experimental, composto por 33 idosas residentes de uma cidade do interior do Rio Grande do Sul. Utilizou-se os seguintes questionários: Body Appreciation Scale (BAS) para a apreciação da imagem corporal, Escala de Autoestima de Rosenberg para avaliação da autoestima, Aging Perceptions Questionnaire (APQ) para a percepção em relação ao envelhecimento, Timed Up and Go (TUG) para o equilíbrio e dinamômetro digital portátil para avaliação da força de preensão palmar. O protocolo do Pilates na água foi realizado duas vezes na semana por um período de 36 semanas. **Resultados:** Cinco idosas (14,3%) apresentavam maior risco de quedas e após a intervenção, apenas duas idosas (5,7%). Quanto a dinamometria (pré $16,20 \pm 5,07$ KgF e pós $16,39 \pm 5,30$ KgF, $p = 0,951$) e a apreciação da imagem corporal (pré 4,9 (4,3-5,0) e pós 4,9 (4,7-5,0), $p = 0,66$) não apresentaram diferença significativa. A autoestima foi satisfatória (100%). A percepção das participantes sobre o envelhecimento propicia melhor qualidade de vida. **Conclusão:** É um recurso apropriado para idosos e capaz de gerar muitos benefícios.

Palavras-chaves: Hidroterapia, Técnicas de Exercício e de Movimento, Autoimagem, Percepção, Idoso

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INTRODUCTION

The aging process is dynamic and progressive with morphological, physiological, biochemical, and psychological changes, which generate a loss of the individual's ability to adapt to the environment over time, reflecting on their perception of the aging process. Because of this, aging has been becoming more vulnerable to pathological processes, which directly imply the performance of daily activities and their autonomy and quality of life.¹

Some factors are related to the transformations that occur during senescence and that concomitantly help construct the vision of this process, such as physical and emotional aspects, the reduction of peripheral muscle strength, balance, body image, and self-esteem, respectively. Regarding these aspects, the self-satisfaction of the elderly during aging is related to the adoption of lifestyles with activities that integrate body and mind, capable of generating countless benefits to their health.²

Given the above, it is necessary to highlight some anatomical and pathophysiological alterations that occur in advanced age and lead individuals to present dysfunctions that influence functionality and compromise aging. These conditions reduce the intensity of some movements that require strength and coordination, including the palmar grip and body balance.³

Still in this context, it is highlighted that aging encompasses other aspects capable of interfering with the perception of the elderly about this process, including the emotional ones. Hence, body image, defined by perceptions about the body, can directly interfere with reducing self-esteem in the elderly.⁴

This becomes even more evident in women due to the changes resulting from hormonal changes, both in physical and psychological aspects, which may culminate in the loss of interest in maintaining an active lifestyle. Nevertheless, physical activity can favor a positive change concerning body image and self-esteem and provide better physical conditions, such as increased muscle strength and balance.⁵

Thus, among the various physical activities, the Pilates method, created by Joseph Pilates (1880-1967), stands out because it encompasses a series of low-impact physical exercises that help develop the mind and body in a balanced way, improve muscle strength, body balance, and the perception of quality of life in the elderly population.⁶

OBJECTIVE

To verify the effects of the Pilates in Water method on body image, self-esteem, perception of aging, postural balance and handgrip strength in elderly women.

METHOD

This is a descriptive, experimental study with a sample obtained by convenience composed of elderly women living in Santa Maria, Rio Grande do Sul State (southern Brazil). Data collection was carried out between March and December 2019 after approval by the Research Ethics Committee of the responsible institution (CAAE no. 03467718.5.0000.5346), and the participants signed the informed consent form (ICF), ensuring the rights and privacy, as provided for in Resolution no. 466/2012 of the National Health Council. Sedentary elderly women, functionally independent, with experience in aquatic

activities, but without recently participating in such activities for three months and with medical consent (certificate) to practice the Pilates in Water method environments, were included in this study. Elderly women previously diagnosed with neurological and dermatological pathologies, who performed other physical activities during the program, or who had two to three consecutive absences during the program were excluded.

The elderly women who met the eligibility criteria were informed about the study's objectives, procedures, risks, benefits, and ethical aspects. Upon signing the ICF, they were submitted to the following evaluations: body image, self-esteem, perception of aging, postural balance, and handgrip strength. All evaluations were carried out by the same previously trained evaluators before and after the Pilates in Water intervention. The Pilates in Water protocol was carried out in a heated pool at a temperature of ~32 °C, twice a week, lasting roughly 50 min each session, for nine months, totaling 72 sessions; of these, there was one pre-program session and one post-program session for evaluation and reevaluation. The protocol was composed of abdominal strengthening exercises emphasizing stabilization of the shoulder and pelvic girdle and using verbal commands to correctly activate the powerhouse muscles responsible for centralizing the acting forces, according to the principles established by Joseph Pilates.

Furthermore, the protocol was based on exercises already proposed by Steinman and Chiumento⁷ and divided into warm-ups, general strengthening exercises, and stretching.

Body Appreciation Scale

To evaluate body image, the Body Appreciation Scale (BAS) was used; it evaluates the appreciation of body image through a scale with eight questions with answers ranging from 1 (never) to 5 (always). The total score is obtained by averaging all answers, presenting a cutoff point of ≥ 3.5 points.⁸

Rosenberg Self-Esteem Scale

Self-esteem was assessed using the Rosenberg Self-esteem Scale, which is composed of ten items of feelings of self-esteem and self-acceptance through a five-point Likert scale. Scores below 15 points demonstrated a low level of self-esteem.⁹

Aging perceptions questionnaire

The Aging Perceptions Questionnaire (APQ) was used to evaluate the perception of aging; it is composed of eight domains, seven of which involve opinions about aging itself and one investigates the experience with changes related to diseases. This instrument also has a five-point Likert scale and is separated into two parts: the first consists of 32 items assessing the opinion about aging, and the second is composed of 17 items that assess the existence of disease and its relation with the aging process, identifying the best perception of aging through the highest score.¹⁰

Time Up and Go

Balance was verified through the Timed Up and Go (TUG) test, which is performed on a straight, flat, covered, and well-lit path, following the proposed guidelines.¹¹ This test evaluates functional mobility and postural balance using some

movements required to perform it and that are prone to falling, such as getting up, walking, body turning, and sitting.¹² The cut-off point predictor of falls considered in the TUG was 12.47 seconds.¹³

Digital dynamometer

Grip strength was determined using a portable digital dynamometer (Force Gauge, RS232 MOD. DD-300), consisting of a simple test to estimate the overall muscle functionality. It is a quick, cheap, and not very invasive procedure. The classification proposed by Mendes et al.¹⁴ was considered, in which the average values should remain between 22.9 and 27.0 KgF in women. A force value above 20 kg indicates low muscle strength.¹⁵

Pilates in Water

The Pilates in Water protocol was performed twice a week, lasting 50 min for 36 weeks. This method included warm-up, stretching, and strengthening exercises, based on exercises already proposed by Steinman and Chiumento.⁷ All exercises were associated with breathing, according to the principle of the method. To activate the core muscles (muscles of the abdomen, lumbar spine, skin, and hips), the participants were asked to retract the chest during expiration, reducing the space between the costal arches, simultaneously contracting the abdominal and perineal muscles.

Statistical analysis

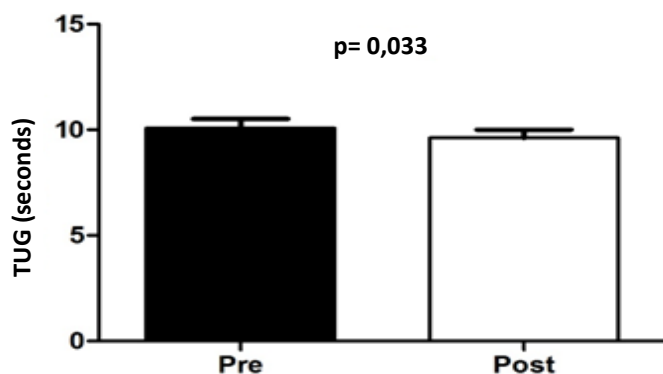
Data were analyzed using the GraphPad Prism 5 statistical software (GraphPad Software Inc., San Diego, CA, USA). The normality of the variables was assessed by the Kolmogorov-Smirnov test. Continuous variables are presented as mean and standard deviation (normal distribution) or median and interquartile range (non-normal distribution). The comparison between pre and post-intervention was made using the Student t-test for paired samples or the Mann-Whitney U test, depending on the data distribution properties. The significance level adopted was 5% ($p < 0.05$).

RESULTS

Thirty-three elderly women (71.5 ± 5.48 years) who completed the proposed in- Pilates in Water program were included in this study. There was a significant reduction in the TUG regarding postural balance after the proposed intervention (pre-intervention 10.1 ± 2.5 s and post-intervention 9.6 ± 2.3 s; $p = 0.033^*$) (Figure 1). In this sense, considering the cut-off point of 12.47 s as a predictor of falls for the TUG, we observed that before the intervention, five elderly women (14.3%) presented a higher risk of falling, and after the intervention, only two elderly women (5.7%) remained in this classification.

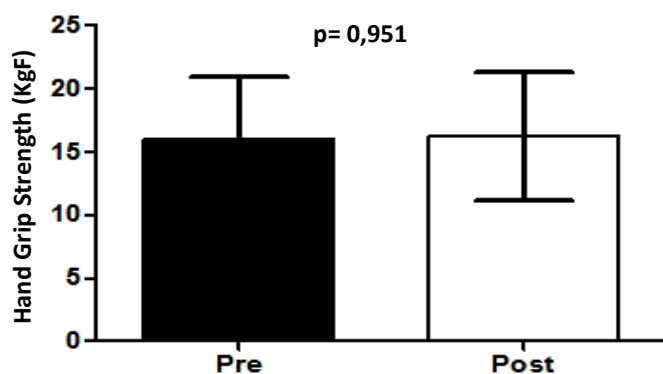
As for the grip strength assessed by dynamometry, there was no significant difference between pre- and post-intervention (16.20 ± 5.07 KgF and 16.39 ± 5.30 KgF, respectively; $p = 0.951$) (Figure 2).

Considering the self-esteem evaluation, there was a significant increase in global self-esteem according to the RSES scale after the proposed intervention (pre-intervention 25 (24–26) points and post-intervention 39 (38–39) points; $p < 0.0001^*$) (Figure 3).



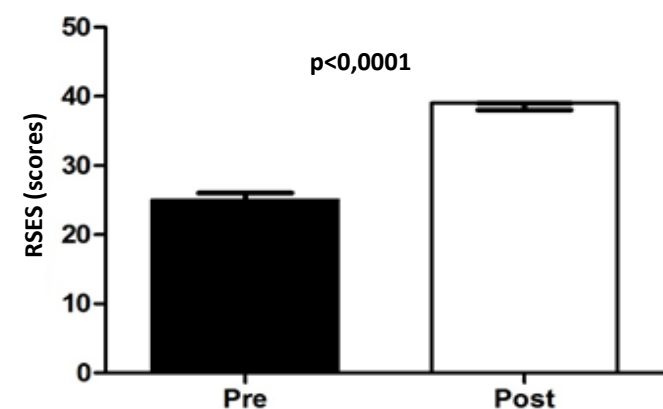
Values expressed as mean and standard deviation, significant difference $p < 0.05$

Figure 1. TUG assessment before and after intervention



Values expressed as mean and standard deviation, significant difference $p < 0.05$

Figure 2. Assessment of hand grip strength



Values expressed as median and interquartile range, significant difference $p < 0.05$

Figure 3. Self-esteem evaluation

A The scale used defines satisfactory self-esteem as a score greater than or equal to 30; thus, before the intervention, no elderly women presented this classification, although after the intervention, all elderly women ($n = 33$) presented satisfactory self-esteem (100%). The appreciation of body image measured by the BAS did not show any significant difference when comparing the pre- and post-interventions (4.9 (4.3–5.0) and 4.9 (4.7–5.0) scores, respectively; $p = 0.662$) (Figure 4).

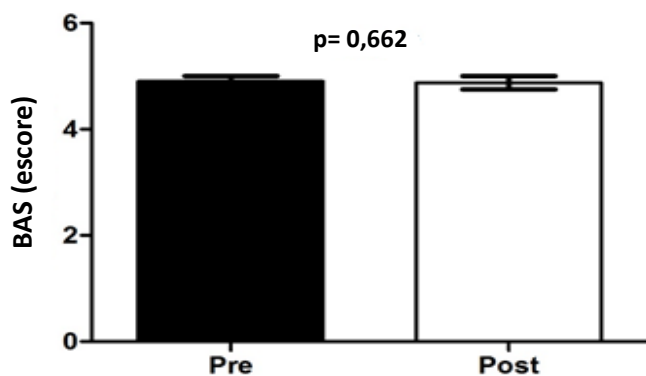


Figure 4. Body image assessment

Regarding the perception of aging, according to the domains that make up the APQ, a significant difference was observed only for the positive consequences after the intervention (Table 1).

Table 1. Domains of the APQ questionnaire pre and post Water Pilates

APQ	Pre	Post	p Value
Chronic timeline	20(20-20)	20(20-22)	0.107 ^a
Positive Consequences	12(12-12)	12(12-13)	0.013 ^{a*}
Negative Consequences	11,9±4.6	12.5±4.6	0.447 ^b
Positive control	17(13-17)	16(13.5-17)	0.963 ^a
Negative control	5(3-7.5)	6(3-11.5)	0.270 ^a
Emotional representation	8(5.5-8)	8(5-8)	0.967 ^a

Values expressed as mean ± SD or median (interquartile range).^a Comparison between pre and post intervention moments Mann-Whitney U test.

^bComparison between pre and post intervention moments Student's t test. Significant difference $p < 0.05$

DISCUSSION

This study aimed to verify the effects of Pilates in Water method on body image, self-esteem, perception of aging, postural balance, and handgrip strength in 33 elderly women after practicing in the study. The results showed a significant reduction in the TUG after the proposed intervention and a significant increase in global self-esteem.

These findings can be explained by the physical principles of water associated with the effects of the exercises proposed by the Pilates in Water method. The Pilates in Water method is based on principles that include concentration, precision, and breathing, favoring attention to the body's stability during the exercises. The stimuli provided corroborate a better awareness of the participants' body, movement, and ability in the space.¹⁶

Another explanation may be that the sample performed the proposed protocol at a water temperature of 32 °C, which may have contributed to the results found. A recent systematic review on the benefits of water temperature showed an improvement in blood flow and an increase in oxyhemoglobin levels, which improves tissue oxygenation and brain function in the short term.¹⁷ In addition, some studies have revealed that it can improve the quality of sleep in the elderly, which would contribute to both cardiac and emotional functions^{18,19} as well as reduce depression and negative aspects of quality of life.¹⁷

Additionally, a Brazilian study of elderly people also showed

an improvement in balance.²⁰

A similar study conducted by Alcade et al.²¹ evaluated the dynamic balance through pre- and post-intervention TUG in an exercise program performed in water with 26 elderly individuals who obtained significant improvement when comparing both moments, thereby highlighting the importance of aquatic physical therapy in preventing falls in the elderly population.

What is more, we identified that the participants of a Pilates in Water program showed a significant reduction in the time to perform the TUG. Rodrigues et al.²² corroborate that Pilates exercises positively affect the proprioceptive mechanisms and development of balance, functional independence, and muscle strength.

In this study, muscle strength evaluated by the palmar grip dynamometer indicated values below the established values, and it is a strong indication of functional decline, indicating low overall muscle strength in the elderly. According to Amaral et al.²³ low grip strength is directly related to chronic morbidities, musculoskeletal disorders, and multimorbidity. In addition, physical exercises have proven to be an effective way of preventing these occurrences by delaying the decline of aging, promoting improvements in physical aspects such as flexibility and muscle strength, thus preserving autonomy and ensuring motivation and enthusiasm, which contributes to improved self-esteem.²³

According to Silva and Brito²⁴ the transformations that the elderly experience can directly influence the acceptance and recognition of their potential, reflecting on the self-confidence and self-esteem of the aging individual. As a result of this study, a significant difference was observed in the participants' levels of self-esteem, which is justified by the repercussions of physical exercise on their psychological state. It is known that regular practice enhances neurotransmitter production such as noradrenaline and dopamine, substances responsible for the feelings of well-being, satisfaction, and improvement in the willingness to perform daily living activities.²⁵

Meurer et al.²⁶ corroborated this when they investigated the self-esteem levels of 111 elderly people with the same instrument used in this study, confirming that elderly people who practiced physical exercises had higher self-esteem scores.

Associated with the effects pointed out, the Pilates method has principles that emphasize breathing, concentration, and precision in movement can stimulate greater body awareness, and during exercise, direct attention to these aspects, reflecting in the improvement of self-image.²⁷ Cox and McMahon²⁷ evaluated the self-image of 376 participants in a yoga exercise program based on the concentration provided by the technique revealed a positive change in body appreciation.

In this context, no significant differences were found when comparing the pre- and post- Pilates in Water method results of self-image in elderly women. Thus, the importance of the ability of self-perception of the body regarding the physical aspects is highlighted, as provided in this study by the characteristics of the liquid environment and the basis of the Pilates method, which involves the concomitant training of the body and mind; hence, it is determinant for the participants to develop healthier habits and pay attention to their body needs and self-care issues. Concerning the evaluation of the perception of aging, there was a significant improvement in the

positive consequences domain of the APQ. Therefore, the Pilates in Water method increased the participants' perception of aging and the appreciation they feel towards themselves, leading them to a greater understanding of how much their choices influence their quality of life in the coming years in order to achieve healthy aging. For Simões et al.²⁸ it is possible to build a good image of old age, considering that transformations are natural in this process. Recognizing one's abilities and perceiving the limitations presented at this stage of life can be a starting point for new encounters, experiences, and challenges, including exercising and engaging in social activities.

Given that the modality of exercise practiced in this study is considered a pleasurable activity occurring in a group, we observed that socialization may have influenced the results.

The interaction among the elderly women was essential for the perception of aging as something in common in physical and emotional issues, contributing to the acceptance of this process and engagement regarding self-care and health promotion. Sehn and Carrér²⁹ explained that participation in groups enables the construction of affective bonds, and this has positive effects on the experience of this phase with physical and emotional health.

In a study conducted by Wichmann et al.³⁰ with 262 elderly individuals from Brazil and 262 elderly individuals from Spain who participated in coexistence groups, the participants referred to the group as a space to exchange experiences and associated physical and emotional health, since one of the reasons for participation was associated with socializing with people of the same age to avoid social isolation. The authors observed that social interaction could minimize loneliness and reduce feelings of demotivation that can lead to chronic diseases such as depression, which has high mortality rates in this age group.

This study presented as a limitation the low sample size and the lack of divisions of groups according to age (60-69 years, 70-79 years, and 80 years or more), which could present different and more in-depth results in each of these groups.

CONCLUSION

The Water Pilates method was an effective intervention for balance, improved body perception, and increased self-esteem levels; it contributed to more positive perceptions about aging among the participants in this study.

Further investigations with the Pilates in Water method are suggested as this is an appropriate resource for elderly individuals and capable of generating numerous benefits. Moreover, having the validated knowledge of such a resource is of great value because it contributes to the health aspects, covering the physical and emotional dimensions, thereby ensuring healthy aging.

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