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RESEARCH

Comparison of the effects of weight training and hydro-gymnastics practice on the cognitive function of elderly

Comparação dos efeitos da prática da musculação e da hidroginástica sobre a função cognitiva de idosos

Comparación de los efectos de la práctica musculación y hidro-gimnastica acerca de la función cognitiva de los ancianos

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ABSTRACT

Objective: To compare the cognitive performance of elderly practitioners of weight training and hydro-gymnastics after a training session. **Method:** A quantitative descriptive cross-sectional study with 20 active people between 60 and 75 years old participants of a gym in Teresina. Their memory was evaluated through the Game of Memory, Verbal Fluency and TrailMaking Test A and B before and after the training sessions. The analysis was performed using SPSS 15.0. **Results:** The Weight Training group showed better results in post-game tests in memory (GM: -36.6s ± 24.15; GH: -28.3S ± 18.64), verbal fluency (GM: 5.1 words ± 2.88; GH: 2.7 + 4.03 words) and A TrailMaking Test (GM: -23.4 + 20.28s; GH: -22.4 + 16.49 s), while the Hydro-gymnastics group presented in the Track B (GM: -17.7s ± 11.75; GH: -21.8s ± 17.47). **Conclusion**: It was evident that a weight-training workout shows the most relevant improvements in cognitive responses in the elderly. **Descriptors**: Cognition, Aging, Physical exercise.

RESUMO

Objetivo: Comparar o desempenho cognitivo de idosos praticantes de musculação e de hidroginástica após uma sessão de treinamento. **Método:** Estudo transversal quantitativo descritivo com 20 pessoas ativas entre 60 e 75 anos participantes de uma academia de Teresina. Avaliou-se a memória através do Jogo da Memória, Fluência verbal e Trilha A e B antes e após as sessões de treinamento. A análise foi realizada no SPSS 15.0. **Resultados:** O Grupo Musculação apresentou melhores resultados nos pós-testes do jogo da memória (GM: -36,6s ± 24,15; GH: -28,3s ± 18,64), fluência verbal (GM: 5,1 palavras ± 2,88; GH: 2,7 palavras ± 4,03) e Trilha A (GM:-23,4s ± 20,28; GH:-22,4s ± 16,49), enquanto o Grupo Hidroginástica apresentou na Trilha B (GM: -17,7s ± 11,75; GH: -21,8s ± 17,47). **Conclusão**: Evidenciou-se que uma sessão de exercícios de musculação apresenta melhorias mais relevantes nas respostas cognitivas de idosos. **Descritores**: Cognição, Envelhecimento, Exercício físico.

RESUMEN

Objetivo: Comparar el desempeño cognitivo de los ancianos practicantes de musculación y hidro-gimnastica después de una sesión de entrenamiento. **Método:** Estudio transversal cuantitativo descriptivo de 20 personas activas entre 60 y 75 años participantes de una academia de Teresina Brasil. Se evaluó la memoria a través del juego de memoria, fluencia verbal y Camino A y B antes y después de las sesiones de entrenamiento. El análisis se realizó con el programa SPSS 15.0. **Resultados y análisis:** El Grupo presentó mejores resultados en los pos-testes del juego de la memoria (GM: -36,6s ± 24,15; GH: -28,3s ± 18,64) , fluencia verbal (GM: 5,1 palabras ± 2,88; GH: 2,7 palabras ± 4,03) y Camino A (GM:-23,4s ± 20,28; GH:-22,4s ± 16,49), mientras el Grupo Hidro-gimnastica se presenta en Camino B GM: (-17,7s ± 11,75; GH: -21,8s ± 17,47). **Conclusión:** Se demostró que un sesión de ejercicios de musculación muestra mejoras más pertinentes en las respuestas cognitivas en ancianos. **Descriptores**: Cognición, El Envejecimiento, El ejercicio físico.

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INTRODUCTION

The process of population aging, among its consequences have increased incidence of incidence of chronic degenerative diseases, decreased, anatomical and physiological, psychosocial, cognitive and physical abilities. This causes an increasing number of individuals who become dependent on others even for carrying out simple activities.[1]

To mitigate these effects, the regular physical activity, associated with active life-style, it is necessary for the prevention and control of non-communicable chronic diseases, as well as maintain functional independence during the aging process.[2]

Regular practice of physical exercise leads to a greater longevity, improvement of cardio-respiratory and muscular capacity, assists in weight control and nutrition, increases strength and resistance in general and improves the cognitive responses of elderly.[3,4,5]

One of the physical activities, especially sought by seniors, is Hydrogymnastics due to its physical properties that facilitate the execution of exercises. Among them we can highlight the floatation, hydrostatic pressure and temperature. The use of these properties during the aquatic exercise as a consequence brings numerous benefits for practitioners, such as better physical performance and lower risk of injury, in addition to the improvement in self-esteem, self-image and social relations.[6]

Due to the various benefits that proper practice of Hydrogymnastics have promoted, it has been indicated as a means of maintaining or acquiring physical fitness components. Studies indicate that significant improvements in cardio-respiratory fitness, body composition, in the increase of the levels of strength and flexibility by providing improvements in the quality of life of practitioners.[7]

Another form of exercise that stands out is Weight Training which develops important physical qualities, provides physiological and anatomical adaptations, thus improving functionality and physical condition of the elderly. Improving muscle tone, strength and endurance prevents small traumatic injuries, risk of falls and motor improvements that are reflected in the activities of everyday life.[8]

In addition to these benefits, the resistance training, aims to reduce the declines in muscle strength and mass, associated with aging, the prevention of osteoporosis, reducing the percentage of body fat, the decrease of bone fractures, as well as the improvements in psychological aspects.[9]

One of the consequences of the aging population that has worried health professionals is to decrease cognitive function, whose phases involves the processes of information, such as perception, learning, memory, attention, vigilance, reasoning and solution of problems, that associated with psychomotor functioning (reaction time, movement time, speed of performance) has promoted greater dependency of the elderly.[10,11]

Physical exercise has been pointing out as a solution to alleviate the cognitive losses. Studies show that people moderately active have a lower risk of being affected by mental disorders than sedentary people. However, the effect of physical exercise on maintenance or prevention of cognitive losses, still generates many discussions regarding the type of exercise and intensities that could support such benefit.[12]

Based on this information, the aim of this study is to compare the cognitive performance of elderly individuals practicing Weight Training and Hydro-gymnastics after a training session.

METHODOLOGY

This quantitative cross-sectional descriptive study was performed with 20 people between 60 and 75 years for males and females, participants of a gym on the east side of Teresina (PI) for at least 03 months, with a frequency of three times weekly. These were informed of the purpose of the research and the criteria required for participation, and signed an Informed Consent Form (ICF) and the approval of the Ethics and Research Committee d UNINOVAFAPI the University Center under protocol CAAE No 0171.0.043.000-11.

The participants were not patients with physicaland/or motor limitations, which prevented the execution of physical exercises in water or in the weight training room, as well as they had no mental disability or cognitive and educational level above elementary school (up to the fourth grade)

The sample was divided into two groups GH (practicing Hydro-gymnastics) and GM (practitioners of weight training). Each group participated in one session, with the predominance of Hydro-gymnastics with aerobic and anaerobic predominance Weight Training, lasting 60min.

Procedure

The tests were performed before and after the activity Weight training and Hydro-gymnastics in the selected gym in the pool area and in the weight training room, scheduled at 06:50 to 11:00. A first visit was aimed at the clarification of the objectives and procedures of the study, reading and signing a consent form, application of the history and application of cognitive tests. On the day of the session the students arrived 20 minutes before the scheduled time.

The cognitive tests were: Memory game: where 10 pairs arranged randomly with the figures facing down were used. Time spent was clocked so that the ten pairs were found, one at a time; TrailMaking Test: Test consists of 25 circles distributed over a sheet of paper. In part A, the circles are numbered from 1-25, and the participant had to draw lines to connect the numbers in ascending order. In part B, the test includes numbers (1-13) and letters (A-L). The participant had to connect the circles in an ascending pattern, but with the addition of the letters (1-A-2-B-3-C, etc..). The participant was instructed to connect the circles as quickly as possible, without lifting the pen or pencil from the

paper. Time spent was clocked for each part, and they not exceed 5 minutes of execution; Verbal Fluency: the participants were encouraged to relate the greater number of words relating to a theme (animals, fruit, cities, etc.) during one minute. The result was the quantities of words reported without repetition.

The description of the individuals participating in the study was performed by central tendency measurement (mean and standard deviation). To compare the cognitive performance on tests of factor variance analysis (Two-way ANOVA) statistical package SPSS version 15.0 for Windows was used. In all analyzes the significance level of $p<0.05$ was considered.

RESULTS AND DISCUSSION

The study was conducted with a sample of 20 people of both genders (16 women and 6 men), being 10 regular practitioners of Hydro-gymnastics (GH) and 10 of Weight Training (GM), aged 68.3 years (+ 6.20) for GH and 65.5 years (+ 5.25) for GM, with level education of 12.2 years and 13.1 years, respectively.

The GM used in the pretest average 120s (+ 43.49) to make the memory game (with ten pairs), 79.6s (+ 31.18) for testing the TrailMaking Test A and 99.3 s (+ 26.84) to the TrailMaking Test B. already the GH pre-test showed the following results: 117.6S (± 28.19) in the memory game, 109s (± 39.60) for the TrailMaking Test and 130.8s (± 34.46) for the trail B (Figure 1).

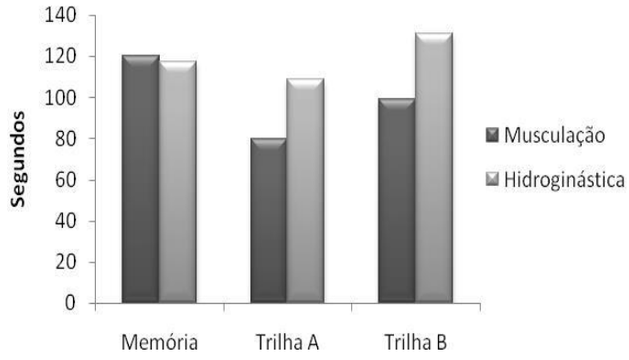

Figure 1 - Values of the pre-tests of memory for groups of weight training and hydro-gymnastics, time(s)

The post-test GM showed better results with reduction in execution time of testing. In the memory game, 36.6s (± 24,15) faster than the pre-test, while the GH decreased 28.3s (± 18.64). In the TrailMaking Test A the GM was also better, decreasing 23.4s (± 20:28) in relation to pre-test while the GH improved performance around 22.4s (± against 16.49), when compared to the values of the pre-test. The trail B the GM had a lower performance decreased 17.7s (± 11.75) while the GH decreased 21.8 (± 17.47) (Figure 2).

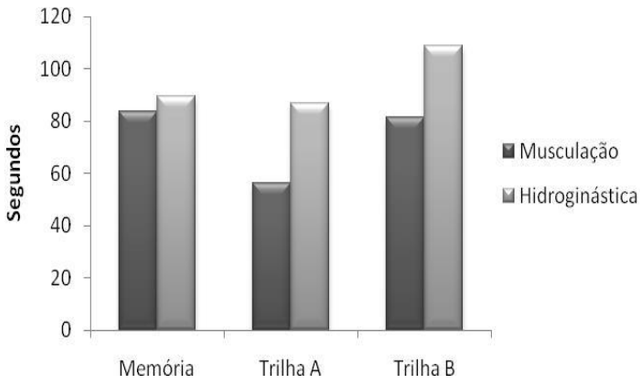

Figure 2 - Values of the prost-tests of memory for groups of weight training and hydro-gymnastics practitioners, time(s)

As for the verbal Fluency test, the GM group had a better result relating on average 5.1 words (± 2.88) higher than the pre-test,

since the group GH reported only 2.7 words (± 4.03) higher than the pre-test. (Figure3)

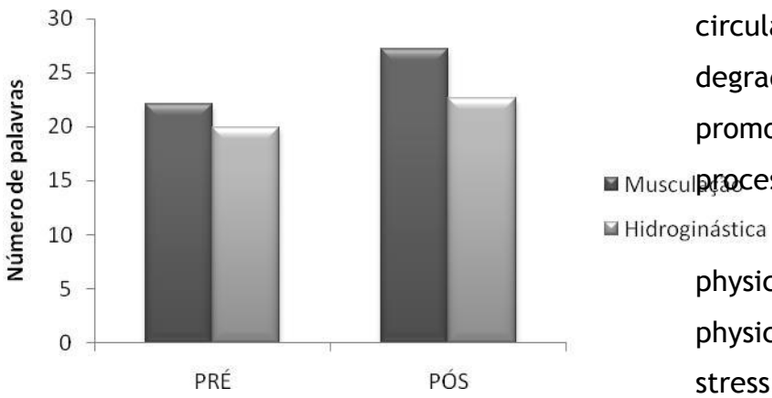

Figure 3 - Values of the Verbal Fluency pre and post-tests, with result in number of words without repetitions in a 1 minute time.

DISCUSSION

According to the results of this study can be seen that the Weight Training presents a very relevant answer regarding the level of cognition of the elderly, although the Hydro-gymnastics also have a positive outcome, which suggests that any type of regular physical exercise is beneficial for cognition of the elderly. This result corroborates with other investigations, which detected the same benefits regarding the effects of the practice of physical exercises in cognitive function in elderly.[12]

The regular systematized practice has contributed to the preservation and even temporary improvement of several cognitive functions of elderly.[13] However, it is necessary to alert that physical activity brings benefits mentally at any age, but when performed in a way mistaken and without scientific foundations, may adversely affect the behavior and impair the physical and cognitive performance.[14]

The benefit of the regular practice of physical exercise on cognitive function is the result of improvement in the cerebral circulation, changes in the synthesis and degradation of neurotransmitters, which promote the increase in the speed of cognitive processing.[14]

It is believed that, by the fact that physical exercise promote improvements in physical conditioning, in mood, decrease stress, anxiety, depression and improvement in quality of life, occur consequently improvements in cognitive responses.[15]

As for the more efficient type of physical exercise, the studies show that both the aerobic and strength exercises, provide physical and cognitive benefits to the elderly, which corroborates with the results obtained in this study, but other studies show some discussions.[16]

Conducting neuropsychological tests before and after a program of aerobic fitness in older demonstrated that physical exercise promotes decreased stress and daily tensions, improving self-image, change in lifestyle and as a non-drug alternative in improving memory, attention and reasoning.[17]

Regarding the acute effect of aerobic exercise, it is observed that it promotes improved cognitive functions depending on the intensity and cognitive demands of the proposed tests, with moderate intensity has more positive results in memory responses in the elderly.[18]

Another study, is now investigating the acute effect of resistance exercise on cognitive function in individuals 35 to 60 years, found improvement in memory abilities, but

not observed improvements in attention and reasoning, which suggests a particular benefit of acute resistance exercise on some cognitive functions. This was observed in this study on the performance of the TrailMaking Test B, where the hydro-gymnastics group showed better performance as opposed to other tests

The studies investigating the acute effects of resistance exercise on cognitive functions are scarce, however the results obtained in chronic exercise present good indicators. A study with elderly people between 65 and 70 years old, showed cognitive improvements after 24 weeks of training to 50 or 80% of 1RM for the group exercises, in contradistinction to the control group who performed the same exercises proposed without overload.[20]

The comparison between the effect of aerobic and resistance exercise on cognition was observed in research with healthy older adults between 60 and 85 years old, there was improvement in both groups in cognitive performance. However, the best results were obtained in the group that performed resistance exercise, which corroborates the results of this study, we observed improvements in both groups, but with better performance for the group that performed the weight training program.[21]

Regardless of the type of exercise practiced the style of physically active life reduces the deleterious cognitive function during aging effects, as well as bringing benefits to seniors who present memory disorders. However further studies are required to clarify the ideal parameters of training, such as intensity, type and frequency.[22]

CONCLUSION

It is conclude that a weight training exercise session shows the most relevant improvements in cognitive responses in the elderly, although it should emphasize that these improvements occurred independent of the type of exercise, thus suggesting the importance of regular physical activity for the maintenance of cognitive functions.

It is therefore suggested, further studies with the realization of more complex cognition test, so that it can achieve more concrete results in relation to physical activity and cognition.

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