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Original article

Analysis of the global cognition of elderly women practicing physical exercise at the health academy

Análise da cognição global de idosas praticantes de exercício físico na academia da saúde

Maria Fernanda Maia de Castro Leão[1] | Mariana Rocha Alves[1,2] | Vinicius Dias Rodrigues[1,2,3]

[1]*State University of Montes Claros (Unimontes), Montes Claros, MG, Brazil.*
[2]*Physical Education and Sports Department, State University of Montes Claros (Unimontes), Montes Claros, MG, Brazil.*
[3] *National Network Professional Master's Program in Physical Education (ProEF), State University of Montes Claros (Unimontes), Montes Claros, MG, Brazil.*

Abstract

Objective: to analyze the health-related cognitive fitness of elderly women who exercise at a health club. **Materials and Methods:** this is a case series study with a sample of five elderly women who participated in exercise activities at least three times a week. Cognitive assessment was performed using the Mini-Mental State Examination. **Results:** elderly women 2 and 4 showed a reduction in cognitive scores, while elderly women 3 and 5 showed improvement. Elderly woman 1 maintained her performance unchanged. **Conclusion:** regular physical exercise, at least three times a week over 27 weeks, was effective in maintaining the participants' overall cognition.
Keywords: Cognitive Status; Health Academy; Physical Fitness; Elderly.

Resumo

Objetivo: analisar a aptidão cognitiva relacionada à saúde de idosas praticantes de exercícios físicos na Academia da Saúde. **Materiais e Métodos:** trata-se de um estudo de séries de casos, com uma amostra de cinco idosas que participaram das atividades de ginástica pelo menos três vezes por semana. A avaliação cognitiva foi realizada por meio do Mini Exame do Estado Mental. **Resultados:** observou-se uma redução nos escores cognitivos das idosas 2 e 4, enquanto as idosas 3 e 5 apresentaram melhora. A idosa 1 manteve seu desempenho inalterado. **Conclusão:** a prática regular de exercícios físicos, com frequência mínima de três vezes por semana ao longo de 27 semanas, mostrou-se eficaz na manutenção da cognição global das participantes.
Palavras-chave: Estado cognitivo. Academia da saúde. Aptidão Física. Idosos.

Corresponding author: Vinícius Dias Rodrigues | vinicius.rodrigues@unimontes.br
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Introduction

Declining fertility rates in recent decades and increased life expectancy have led to rapid population aging worldwide[1]. In Brazil, in 2022, the total number of people aged 65 or older reached 10.9% of the population, or 22,169,101 people[2].

Aging should be understood as a multidimensional process that occurs progressively and gradually and is linked to the natural decline in physiological functions that influence the individual[3]. Sedentary lifestyles can contribute to the worsening of cognitive decline[4]. However, considerable individual variation indicates that declines in cognitive performance in older adults can be prevented and delayed. Physical exercise is an essential non-pharmacological tool for good mental and physical performance in old age and, therefore, for achieving healthy aging[6].

Physical exercise is considered an effective way to improve cognition, confirming the importance of physical activity in promoting health in older adults[7]. Thus, regular physical exercise can and should be considered one of the main approaches in health and disease, since its benefits are advantageous for healthy aging[8]. Physical exercise has health benefits, such as aerobic training, resistance training, flexibility, and balance[9].

Considering the national context and the population's needs, 2011 the Ministry of Health introduced the Health Academy initiative, which aims to promote health promotion and foster care and healthy lifestyles among the population by creating centers with adequate resources and specialized professionals[10]. In places where the Health Academy Program (PAS, in Portuguese) is in operation, various activities are available to the population, such as physical exercise and health education information campaigns, in different health academies throughout Brazil. The main participants in the program are adults and the elderly[11].

Thus, with little research on the subject in PAS, this study aimed to analyze the overall cognition of elderly people who practice physical exercise and attend the Health Academy in Montes Claros, Minas Gerais.

Materials and Methods

This is a study of case series reports collected at the Health Academy in Montes Claros, Minas Gerais.

The sample consisted of five elderly women who attended the health academy's exercise classes at least three times a week between the first cognitive assessment (Diagnostic Assessment) and the

second cognitive assessment (Summative Assessment). The elderly women were trained for six months (26 weeks).

Individual cognitive assessment was performed using the Mini-Mental State Examination (MMSE)[12,13]. The test consists of 30 questions (scored with a value of 0 when the examinee does not respond or responds incorrectly, or 1 when the individual provides a correct answer), organized into six cognitive domains: Orientation, Retention, Attention and Calculation, Evocation, Language, and Constructive Ability, with a maximum score of 30 points.

The exercise activities at the health club were taught by the physical education professional responsible for space. The classes were structured as follows: Phase 1 (Preparation—10 minutes)—Stretching exercises for the limbs and trunk, followed by low-intensity rhythmic activities; Phase 2 (Main part—30 minutes)—Localized exercises for the limbs and trunk to improve localized muscle endurance; Phase 3 (Final part—10 minutes)—Stretching and general relaxation exercises.

All data collected from the investigation of the variables were digitized, organized in a spreadsheet, and subsequently analyzed statistically using the SPSS® statistical program, version 20.0, for *Windows*®. First, the data from each study participant was organized, and then the Shapiro-Wilk normality test was performed, followed by the nonparametric Wilcoxon test. The significance level was set at 95% ($p<0.05$), thus assuming 95% certainty for the study's affirmative and/or negative findings.

The study in question was submitted to the Ethics Committee of the State University of Montes Claros and subsequently approved for implementation under Opinion No. 6,501,699 (CAAE: 74463023.6.0000.5146).

Results

The study investigated global cognition in elderly women who exercised regularly at a health club in Montes Claros, Minas Gerais. Table 1 describes the characteristics of each elderly woman who participated in the study.

Chart 1. Characterization of the elderly women participating in the study at the health academy.

Elderly woman	Age	Marital status	Education	Personal illnesses	Medications	Self-reported stress	Pre-intervention*	Post-intervention*	Delta
1	62	Married	Higher education degree	Hypertension	Aradois	Occasionally	26	26	0

2	64	Married	Completed high school	Hypertension	Hydrochlorothiazide	Occasionally	26	23	-3
3	70	Married	No education	Hypertension Diabetes Labyrinthitis	Indapamide	Occasionally	26	29	3
4	63	Widow	Higher education degree	Cardiac Thrombosis	Arartan	Occasionally	27	26	-1
5	80	Single	No education	Hypertension	Losartan; Atenolol	Occasionally	18	20	2

*Individual cognitive assessment (ICA) result

Chart 1 shows that the cognitive assessment of elderly women 2 and 4 decreased in delta value, while elderly women 3 and 5 increased in individual cognitive assessment (ICA) value; elderly woman 1 obtained the same result.

Chart 2 shows an inferential analysis of the cognitive assessment before and after the intervention at the health club, presenting the mean, standard deviation, maximum, minimum, delta, and p values. The inferential analysis showed that the second ICA had a higher average than the first, but there was no significant difference.

Chart 2. Inferential analysis of pre- and post-intervention cognitive assessment at the health academy.

Assessment	Average	Standard deviation	Maximum	Minimum	Delta	Value of p
Pre-intervention	24.60	3.71	27.00	18.00	-0.20	0.854
Post-intervention	24.80	3.42	29.00	20.00		

*The average age of the participants (n=5) was 64 ± 5.76. **The Shapiro-Wilk normality test was carried out, followed by the Wilcoxon non-parametric test.

Discussion

Some of the results found in this study are consistent with findings from other studies, since cognitive decline is considered a normal aspect of aging. However, the elderly women in question were regular exercisers at a health club, a fact that could have had a positive influence. Physical exercise interventions positively affect the cognitive functions of elderly people with frailty syndrome, mainly by improving overall cognition[17].

There are associations between low MMSE scores and variables such as age, gender, education, marital status, medication, and the presence of depressive symptoms. Considering the information obtained during the medical history taken at the health club, the intervening variables presented may be directly related to poor cognitive assessment results. Elderly women 1 and 4

reported using the medications Aradois (Losartan potassium) and Aratan, respectively, both of which have weakness as a common side effect, which may affect cognitive assessment. Elderly woman 2 reported a history of depression in her family. Still, she has not been diagnosed, a factor that may have contributed to the cognitive assessment results, considering that she may have cognitive impairment that will require monitoring by an appropriate professional, bearing in mind that pre-existing cognitive deficits may influence the results[19].

Subjective cognitive decline occurs when individuals report cognitive complaints but perform typically on neuropsychological tests[20]. Therefore, the literature results support the idea that subjective cognitive decline may be an early clinical marker that precedes mild cognitive impairment[21].

A study obtained results like those of the present study, as a 12-week intervention involving moderate physical exercise led to improvements in functional brain systems[22].

It is worth noting that one of the two elderly women who obtained lower results in the second assessment has been diagnosed with hypertension, which is one of the main risk factors associated with cognitive decline[23].

During the study's execution, considerable limitations were encountered. The first was the lack of sample calculation, making it impossible to extrapolate the results to the general population. Another limitation was the frequency of participation, as several elderly women were excluded due to high absenteeism during the study. In addition, the lack of a control group for data comparison is worth noting.

Conclusion

Physical exercise at least three times a week for 26 weeks was sufficient to generate positive results in maintaining overall cognition in elderly women, as the mean, maximum, and minimum values were similar, and the mean did not differ significantly. Therefore, it is suggested that public authorities continue to promote well-being through the Health Academy so that more and more people can benefit from the program.

Author contributions

Maria Fernanda Maia de Castro Leão, Mariana Rocha Alves e Vinicius Dias Rodrigues: Conception and design of the research; data collection; analysis and interpretation of the data; writing of the manuscript; critical revision of the manuscript in terms of intellectual content and final presentation. The authors approved the

final version of the manuscript and declared themselves responsible for all aspects of the work, including guaranteeing its accuracy and integrity.

Conflict of interests

The authors declare no conflicts of interest.

References

1. Organização Mundial da Saúde (OMS). Relatório mundial de envelhecimento e saúde, 2015. Disponível em: https://sbgg.org.br/wp-content/uploads/2015/10/OMS-ENVELHECIMENTO-2015-port.pdf. Acesso em: 20 ago. 2023.

2. Brasil. Secretaria de comunicação social. Censo: número de idosos no Brasil cresceu 57,4% em 12 anos. 27 out. 2023. Disponível em: https://www.gov.br/secom/pt-br/assuntos/noticias/2023/10/censo-2022-numero-de-idosos-na-populacao-do-pais-cresceu-57-4-em-12-anos#:~:text=Em%202022%2C%20o%20total%20de,7%2C4%25%20da%20popula%C3%A7%C3%A3o. Acesso em: 11 jun. 2024.

3. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet. 2013;381(9868):752-762. Disponível em: https://doi.org/10.1016/S0140-6736(12)62167-9

4. Nordon DG, Guimarães RR, Kozonoe DY, Mancilha VS, Neto VSD. Perda cognitiva em idosos. Rev Fac Cienc Med Sorocaba. 2009;11(3):5-8. Disponível em: https://revistas.pucsp.br/index.php/rfcms/article/view/1874

5. Papalia DE, Olds SW, Feldman RD. Desenvolvimento humano. Porto Alegre: Artmed; 2000.

6. Bertoldi JT, Batista AC, Ruzanowsky S. Declínio cognitivo em idosos institucionalizados: revisão de literatura. Cinergis. 2015; 16 (2): 152-156. Disponível em: https://core.ac.uk/download/pdf/228507176.pdf

7. Feng YH, Santos-Galduroz RF, Rodrigues S, Bagesteiro LB, Safons MP. Influências da atividade física na cognição e na depressão no envelhecimento. Arq Bras Educ Fís. 2018;1(1):157-166. Disponível em: https://periodicos.ufnt.edu.br/index.php/abeducacaofisica/article/view/6179

8. Zago AS. Exercício físico e o processo saúde-doença no envelhecimento. Rev Bras Geriatr Gerontol. 2010;13:153-158. Disponível em: https://doi.org/10.1590/S1809-98232010000100016

9. Santos LOC, Moreira JO, de Azevedo Silveira MM, de Lima, NS, Magalhães COD, Mendes BF, Cassilhas, RC. Treinamento em circuito melhora cognição, funcionalidade e qualidade de vida de idosos. Res Soc Dev. 2021;10(9):e13610917091-e13610917091. Disponível em: https://doi.org/10.33448/rsd-v10i9.17091.

10. Florindo AA, Nakamura PM, Farias Júnior JC, Siqueira F V, Reis RS, Cruz DKA, Hallal PC. Promoção da atividade física e da alimentação saudável e a saúde da família em municípios com academia da saúde. Rev Bras Educ Fís Esporte. 2016;30:913-924. Disponível em: https://doi.org/10.1590/1807-55092016000400913

11. Sá GBA, Dornelles GC, Cruz KG, Amarim RCA, Andrade SSCA, Oliveira TP, Silva MMA, Malta DC, Souza MF. O Programa Academia da Saúde como estratégia de promoção da saúde e modos de vida saudáveis: cenário nacional de implementação. Ciênc Saúde Coletiva. 2016;21:1849-1860. Disponível em: https://doi.org/10.1590/1413-81232015216.09562016

12. Brucki S, Nitrini R, Caramelli P, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr. 2003;61:777-781. Disponível em: https://doi.org/10.1590/S0004-282X2003000500014

13. Smid J, Studart-Neto, A; César-Freitas, César-Freitas KG, Dourado MCN, Kochhann R, Barbosa BJAP Barbosa1, Schilling LP, Balthazar MLF, Frota NAF, Souza LC, Caramelli P, Bertolucci PHF, Chaves MLF, Brucki SMD, Nitrini R, Resende EPF, Vale FAC. Declínio cognitivo subjetivo, comprometimento cognitivo leve e demência-diagnóstico sindrômico: recomendações do Departamento Científico de Neurologia Cognitiva e do Envelhecimento da Academia Brasileira de Neurologia. Dement Neuropsychol. 2022;16:1-24. Disponível em: https://doi.org/10.1590/1980-5764-DN-2022-S101PT

14. Lopes RMF, de Lima Argimon II. El entrenamiento cognitivo en los ancianos y efectos en las funciones ejecutivas. Acta Colomb Psicol. 2016. Disponível em: https://doi.org/10.14718/ACP.2016.19.2.8

15. Van Boxtel MPJ, Paas FGWC, Houx PJ, Adam JJ, Teeken JC, Jolles J. Aerobic capacity and cognitive performance in a cross-sectional aging study. Med Sci Sports Exerc. 1997;29(10):1357-1365. Disponível em: https://doi.org/10.1097/00005768-199710000-00013

16. Ren FF, Alderman BL, Wang WG, Chen FT, Zhon WS, Zong WJ, Liang WM, Chang YK. Effects of exercise training on executive functioning in adults with depression: A systematic review and meta-analysis of randomized controlled trials. Sports Med (Auckland, NZ). 2023;53(9):1765-1788. doi:10.1007/s40279-023-01869-2. Disponível em: https://doi.org/10.1007/s40279-023-01869-2

17. Ro Rossi PG. Efeitos do exercício físico na cognição de idosos pré-frágeis e frágeis. [Tese]. São Carlos, SP: Universidade Federal de São Carlos; 2021. Disponível em: https://repositorio.ufscar.br/server/api/core/bitstreams/92533586-185c-4080-b802-c4f14f3d6969/content

18. Valle EA, Castro-Costa E, Firm J, Uchoa E, Lima-Costa MF. Estudo de base populacional dos fatores associados ao desempenho no Mini Exame do Estado Mental entre idosos: Projeto Bambuí. Cad Saúde Pública. 2009;25(4):918-926. Disponível em: https://doi.org/10.1590/S0102-311X2009000400023

19. Bertoldi JT, Batista AC, Ruzanowsky S. Declínio cognitivo em idosos institucionalizados: revisão de literatura. Cinergis. 2015;16(2):152-156. Disponível em: https://core.ac.uk/download/pdf/228507176.pdf

20. Jessen F, Amarigliod RE, Van Boxtele M, Brelerc M, Ceccaldif M, Chételatg G, Duboisk B, Ellism DK, Van Der Fliern WM, Glodziko L, Van Hartenn C, Leono MJ, McHugho P, Mielkep MM, Molinuevop JL, Mosconio L, Osorioo R. Perroting A, Pertersenr RC, Rabins LA, Ramiq L, Reisbergo B, Rentzd DM, Sachdevv PS, La Sayetteg V, Saykinw AJ, Shulmano PS, Shulmano MB, Slavinx MJ, Sperlingd RA, Stewarty R, Uspenskayaz O, Vellasaa B, Vissere PJ, Wagnera M. A conceptual framework for research on subjective cognitive decline in preclinical Alzheimer's disease. Alzheimer's Dement. 2014;10(6):844-852. Disponível em: https://doi.org/10.1016/j.jalz.2014.01.001

21. Studart Neto A, Nitrini R. Declínio cognitivo subjetivo: a primeira manifestação clínica da doença de Alzheimer. Dement Neuropsychol. 2016;10:170-177. Disponível em: https://doi.org/10.1590/S1980-5764-2016DN1003002

22. Voss MW, Weng TB, Narayana-Kumanan K, Cole RC, Wharff C, Reis L, DuBose L, Schmidt PG, Siguardsson G, Mills JA, Long JD, Magnotta VA, Pierce GL. Acute exercise effects predict training change in cognition and connectivity. Med Sci Sports Exerc. 2020;52(1):131. Disponível em: https://doi.org/10.1249/MSS.0000000000002106

23. Magalhães MO, Peixoto JMS, Frank MH, Gomes I, Rodrigues BM, Menezes C, Cardoso E, Carvalho F, Aras R, Melo A. Risk factors for dementia in a rural area of Northeastern Brazil. Arq Neuropsiquiatr. 2008;66:157-162. Disponível em: https://doi.org/10.1590/S0004-282X2008000100025