Original Article

Cardiorespiratory fitness in the elderly: is there a difference in physical activity practitioners and non-practitioners?

Condicionamento Cardiorrespiratório de idosos: há diferença em praticante de exercício físico e não praticantes?

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ABSTRACT | INTRODUCTION: Changes in the cardiorespiratory system are evident during the aging process. Cardiorespiratory fitness (ACR) has been considered one of the main factors responsible for the loss of independence in the elderly. **AIM:** The goal of this study was to verify the cardiorespiratory capacity in elders practitioners and non-practitioners of systematic physical activity. **METHODS:** This is a cross-sectional study. The sample consisted of 30 elderly women, female aged between 65 and 75 years independent, divided into practitioners and non-practitioners of physical exercise and the absence of participants during the period of data collection was defined as a criterion for exclusion from the research. As a collection instrument, a stationary gait test was used for cardiorespiratory assessment. The evaluator counts one step at a time, and only the steps in which the knee reaches the correct height at the midpoint between the patella and the anterior superior iliac spine will be computed. **RESULTS:** obtained an average result of 43.40 ± 10.08 for individuals who did not exercise, with a body weight of 59.26 ± 10, 09kg. However, for individuals practicing physical exercise with a body weight of 69.73 ± 11.48kg, an average of 43.73 ± 9.29 complete cycles were obtained. **CONCLUSION:** In this sample, there was no difference in cardiorespiratory fitness in elderly practitioners and non-practitioners of physical exercise.

KEYWORDS: Health. Physical fitness. Elderly.

RESUMO | INTRODUÇÃO: As mudanças no sistema cardiorrespiratório são evidentes durante o processo de envelhecimento. A aptidão cardiorrespiratória (ACR) tem sido considerada um dos principais fatores responsáveis pela perda de independência em idosos. **OBJETIVO:** verificar a capacidade cardiorrespiratória em idosos praticantes e não praticantes de atividade física sistematizada. **MÉTODOS:** Trata-se de um estudo com delineamento transversal. A amostra foi composta por 30 idosas, do sexo feminino com idade entre 65 a 75 anos independentes, divididas em praticantes e não praticantes de exercício físico. Definiu-se como critério de exclusão da pesquisa ausência das participantes durante o período de coleta dos dados. Como instrumento de coleta utilizou-se o teste de marcha estacionária para a avaliação cardiorrespiratória. O avaliador conta uma passada de cada vez, sendo que só foram computadas as passadas em que o joelho atinja a altura correta ao nível ponto médio entre a patela e a espinha ilíaca ântero-superior. **RESULTADOS:** obteve como resultado média de 43,40 ± 10,08 para indivíduos não praticantes de exercício físico, com peso corporal de 59,26 ± 10, 09kg. No entanto, para indivíduos praticantes de exercício físico com peso corporal de 69,73 ± 11,48kg obteve-se média de 43,73 ± 9,29 ciclos completos. **CONCLUSÃO:** Nessa amostra não houve uma diferença da aptidão cardiorrespiratória em idosos praticantes e não praticantes de exercício físico.

PALAVRAS-CHAVE: Saúde. Aptidão física. Idoso.

Submitted 04/24/2020, Accepted 05/25/2020, Published 05/28/2020
J. Physiother. Res., Salvador, 2020 May;10(2):258-263
Doi: 10.17267/2238-2704rpf.v10i2.2893 | ISSN: 2238-2704
Designated editor: Cristiane Dias

How to cite this article: Lopes JVN, Fernandes AKR, Sampaio DT, Souza TC, Oliveira TR, Alves MR et al. Cardiorespiratory fitness in the elderly: is there a difference in physical activity practitioners and non-practitioners? J Physiother Res. 2020;10(2):258-263. doi: 10.17267/2238-2704rpf.v10i2.2893

Introduction

The elderly population has grown markedly in recent years. According to data from the World Health Organization (WHO) it is estimated that the number of elderly people in the world will reach 1.9 billion in 2050[1]. For Brazil, this estimate is expected to reach an average of 32 million elderly people in 2020[2]. With this increase in the number of elderly people, there is a need for political-scientific attention that emphasizes the importance of providing a healthier and more active life condition, with the least possible damage resulting from this phase of life[3].

Aging is a process characterized by biological, psychological and social changes related to the years that occur in humans[4]. It can be determined by several factors, among which are: lifestyle, socioeconomic conditions, chronic diseases, heredity and environmental conditions[5].

There are several changes resulting from the elderly, which leads to a decrease in physiological capacity and reduction of responses to environmental stress, increasing the susceptibility and vulnerability to diseases[6]. These changes appear in the elderly, beginning to be perceived when the organism presents physiological and mechanical changes, and its progress follows different rhythms from one individual to another. Some body structures may not function properly when it is difficult to perform their daily activities[7].

Krause et al.[8], reaffirms the extent to which changes in the cardiorespiratory system are evident during the aging process, and considers it one of the organic systems most affected with advancing age, since the aged body reduces the uptake of oxygen necessary for your body's metabolic demand, making it lessened. Still, according to Krause et al8, cardiorespiratory fitness (ACR) has been considered one of the main factors responsible for the loss of independence in the elderly, and the maintenance of an adequate level of ACR is fundamental to reduce frailty, prevent dependence, maintaining thus their independence. In addition to the decrease in cardiorespiratory fitness, aging makes the individual more susceptible to psychological changes, which may result in a decrease in the level of physical activity (NAF) and, consequently, in the emergence of chronic diseases[9].

Thus, the objective of this study was to verify the cardiorespiratory capacity in elderly practitioners and non-practitioners of systematic physical activity.

Methods

Study characterization and sample

This is a descriptive, analytical and cross-sectional study with a quantitative character, carried out in the city of Montes Claros MG in the family health strategy (FHS) of the Santo Reis neighborhood, the population was female elderly aged between 65 to 75 independent years. The sample consisted of two groups selected for convenience, not probabilistic, the first (G1) consisting of elderly people who practice regular physical exercise offered by the local municipal public service, for more than 6 months, 3 times a week for 1 hour, from active form and the second (G2) not practicing regular physical exercise. The exclusion criteria of the research was defined as the absence of participants during the data collection period.

This project was submitted to the Research Ethics Committee and obtained an approval opinion to carry out the study in accordance with the Resolution of the National Health Council (CNS) No. 466/12 (CAAE 48278415.9.0000.5141) which deals with research involving human beings, guaranteeing the subjects involved in the sample, data preservation and confidentiality by participating in the research.

Instruments and procedures for cardiorespiratory assessment

The data were collected by previously trained professionals. For this collection, the stationary gait test was applied as a form of cardiorespiratory assessment. The test uses as a reference the midpoint between the patella and the anterior superior iliac spine and proposes the assessment of respiratory fitness. The participant simulates the gait movement without moving, and for the measurement of the number of elevations, the right knee was chosen as a reference. The evaluator counts one step at a time, and only the steps in which the knee reaches the level between the patella and the anterior superior iliac spine will be computed[10]. The number of maximum

elevations of one of the individual's legs was counted during 2 minutes using the stopwatch (brend ONSTART 710 GEONAUTE)[11].

G1 data collection was performed at the Basic Health Unit with the members of the local physical activity group in which they performed aerobic activities, 3 times a week for 1 hour. Initially, the researchers presented the objectives and justification of the study to the group members who were present, at that moment the study sample was delimited based on the eligibility criteria, then the Informed Consent Form (ICF) was delivered. After the delimitation of the research participants, the following data were collected: weight in kg, and time of practice of physical activity evaluated the practitioners with at least 6 months of regular activity, information on the time of practice was informed by the ESF team. Then there was the application of the 2-minute stationary gait test to obtain the data.

As for the collection of data from G2, it was carried out based on a random selection of elderly women who did not practice physical activity, who made themselves available to researchers to obtain the necessary data for the research, by presenting the objectives, justification and the ICF. The test application process followed the same pattern proposed for G1.

Data processing

Descriptive statistics and frequency and confidence level methods were used. All collected data were analyzed statistically in the SPSS software (version 20.0). The level of significance adopted in all analyzes was set at 95% ($p < 0.05$). Shapiro-Wilk tests were performed to verify normality. Subsequently, the independent Student t test was performed for inferential analysis between groups and Pearson's correlation analysis.

Results

Among the 30 study participants, all performed the test as proposed. Regarding the inferential analysis of gait cycles during the stationary gait test shown in Table 1, an average age of 43.40 ± 10.08 years was recorded for individuals who did not exercise, with a body weight of 59, 26 ± 10.09kg. However, for individuals practicing physical exercise with a body weight of 69.73 ± 11.48, an average of 43.73 ± 9.29 complete cycles were obtained.

In this context, the level of cardiorespiratory fitness of G1 according to the 2-minute stationary gait test did not show any significant difference when compared to the G2 group, table 1 shows the inferential analysis of complete gait cycles with elderly practitioners and not practitioners of physical exercise.

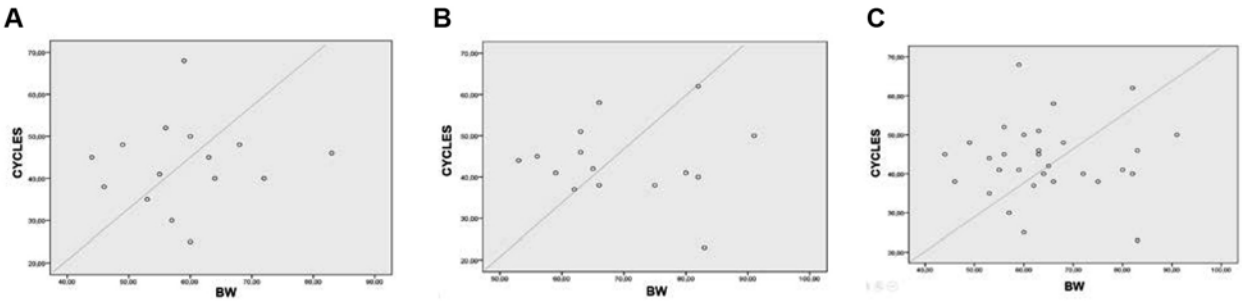
Table 1. Inferential analysis of gait cycles in the 2-minute stationary gait test in elderly practitioners and non-practitioners of physical exercise

Groups	Physically inactive (n=15)	Exercise Practitioners (n=15)	p
Complete cycle*	43,40 ± 10,08	43,73 ± 9,29	0,926
Body weight (kg)	59,26 ±10,09	69,73 ±11,48	0,013

* Complete cycles in the 2-minute stationary walking test.

In addition, no strong correlations were found in body weight and cycles in sedentary individuals (A) practicing physical exercise (B) and in the sum of the two groups (C), data represented in figure 1.

Figure 1. The graphs are correlated to body weight (x-axis) and the 2-minute stationary gait test cycles (y-axis), in elderly practitioners and non-practitioners of physical exercise in elderly practitioners and non-practitioners of physical exercise



Pearson's correlation:0,69
Meaningfulness:: 0,807

Pearson's correlation:- 0,34
Meaningfulness:0,906

Pearson's correlation:0,23
Meaningfulness:0,905

Discussion

The main results of this study showed significant differences in the weight variable, however it was not characterized as a determining factor for altering the level of cardiorespiratory fitness in both groups and there was no difference in the physical fitness of elderly practitioners and non-practitioners of physical exercise.

With advancing age, cardiorespiratory fitness suffers a functional decline that directly influences the performance of physical activities, as the ability to capture and transport oxygen to supply the body's metabolic demand is reduced[12].

The aging process is also characterized by the loss of muscle mass and accumulation of fatty tissue, which can characterize a sedentary condition that, together with overweight and obesity conditions can interfere in the reduction of physical capacity[13].

Body physical exercises are performed by skeletal musculature, in which there is an expenditure of energy, and its practice is extremely important for physical fitness and quality of life[14]. This in turn is directly linked to health and performance. However, the practice of this type of activity includes a diversity of aspects that can significantly influence its performance, which has been increasingly arousing the interest of researchers in the investigation of these factors for providing information that lead to a more effective intervention in this practice[15,16].

Through a document issued, Nelson et al.[17], developed a series of recommendations about the types and amounts of physical activity necessary to improve and maintain the health of the elderly. Thus, the variables necessarily observed in its prescription are: modality, duration, frequency, intensity and mode of progression. However, it is worth noting that such elaboration must be based on previous results of medical and physical evaluations.

Still according to these authors[17], it is recommended that the physical activity program starts with a low impact and intensity work, of short duration and easy to perform due to the low physical conditioning and musculoskeletal limitations presented by the elderly individual. Aerobic exercises, as well as strength, muscular endurance, flexibility and balance, are the main modalities recommended for this. These should favor large muscle groups, such as walking, standing still, dancing, swimming, aerobics and water aerobics.

Such practices should be performed on a frequency of three to seven times a week, alternating aerobic exercises with those aimed at gaining muscle strength, stimulating the strength of the lower and upper limbs[18,19,20]. In this context, he observes the need and the importance of practicing physical activity, as it enables improvements in his well-being, the person becomes more active and helps in his physical conditioning[21]. Besides also benefiting people in intellectual, affective, physical and social functioning, improving their self-esteem and giving more pleasure in their achievements[22].

Regarding the limits of the study, the fact that only a group of elderly practitioners and non-practitioners of physical activity is investigated, which does not allow a generalization of the results obtained through research, regarding the difference in cardiorespiratory conditioning and its relationship with aging and physical activity practices. This limit suggests the realization of new research with other groups of elderly women in order to better assess the cardiorespiratory differences resulting from such conditions, and that it was not possible to be identified in this study.

It is worth mentioning the opportune nature of the research that, when analyzing the relationship between cardiorespiratory capacity in the relationship with elderly people who practice and not practice physical activity, enables policies and programs to promote the health of the elderly involving the stimulation of healthy practices for this population1. But it is important that physical exercise is not analyzed in isolation, without the perception of the influencing variables (nutrition, anxiety levels, depression levels, sleep and wakefulness, among others) on individual health, as the implications of this study demonstrate that the actions of public policies in the prevention and promotion of health in the perspective of physical exercise should be considered holistically, it is not in isolation in the hope of promoting health.

Conclusion

In this sample, there was no satisfactory response to cardiorespiratory fitness in elderly practitioners and non-practitioners of physical exercise. Since the cardiorespiratory fitness of G1 did not reach its expected result, having the same index as G2, with a percentage of 100% not favorable. Also considering that no correlation was detected between body weight and gait test cycles.

Author contributions

Lopes JVN participated in the writing of the article. Fernandes AKR, Sampaio DT, Souza TC participated in the data collection. Oliveira TR and Alves MR designed the statistical analysis. Rodrigues VD supervised, guided and coordinated the research and writing. All authors approved the final version.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

References

1. Nascimento RJ, Santos ML, Ramires JB, Barbosa RVB, Oliveira AJJ, Borges GF. Aptidão cardiorrespiratória em idosas participantes de um centro de convivência na Cidade de Coari, Estado do Amazonas, Brasil. Rev Pan-Amaz Saude. 2011;2(2):19-26. doi: 10.5123/S2176-62232011000200003

2. Veras RP, Oliveira M. Envelhecer no Brasil: a construção de um modelo de cuidado. Ciênc Saúde Coletiva. 2018;23(6):1929-1936. doi: 10.1590/1413-81232018236.04722018

3. Vecchia Rd, Ruiz T, Bocchi SCM, Corrente JE. Qualidade de vida na terceira idade: um conceito subjetivo. Rev Bras Epidemiol. 2000;8(3):246-252. doi: 10.1590/S1415-790X2005000300006

4. Lima OBA, Lopes MEL, Carvalho GDA, Melo VC. O idoso frente ao processo de envelhecimento: produção científica em periódicos online no âmbito da saúde. [Internet]. Disponível em: https://prezi.com/fgz1hiw7ska7/o-idoso-frente-ao-processo-de-envelhecimento-producao-cient/

5. Palacios J. Mudança e desenvolvimento durante a idade adulta e a velhice. In: Coll C, Palacios J, Marchesi A. (orgs.) Desenvolvimento psicológico e educação. Vol.1, 2.ed. Porto Alegre: Artmed; 2004.

6. Troen RB. The Biology of Aging. Mt Sinai J Med. 2003;70(1):3-22.

7. Macena WG, Hermano LO, Costa TC. Alterações fisiológicas decorrentes do envelhecimento. Rev Mosaicum. 2018;27. doi: 10.26893/RM.v14n27.223-236

8. Krause MP, Buzzachera CF, Hallage T, Pulner SB, Silva SG. Da Influência do nível de atividade física sobre a aptidão cardiorrespiratória em mulheres idosas. Rev Bras Med Esporte. 2007;13(02):97-102. doi: 10.1590/S1517-86922007000200006

9. Castoldi RC, Moret DG, Gomes IC, Paulo TRS, Oikawa SM, Freitas Júnior IF. Influência da adiposidade corporal sobre a aptidão cardiorrespiratória em mulheres idosas. R Bras Ci e Mov. 2010;18(4):34-38. doi: 10.18511/rbcm.v18i4.1750

10. Guedes MBOG, Lopes JM, Andrade AS, Guedes TSR, Ribeiro JM, Cortez LCA. Validação do teste de marcha estacionária de dois minutos para diagnóstico da capacidade funcional em idosos hipertensos. Rev Bras de Geriatr Gerontol. 2015;18(4):921-926. doi: 10.1590/1809-9823.2015.14163

11. Guedes MBOG, Lopes JM, Roing JJ, Andrade AS, Guedes TSR. Validação do teste de marcha estacionária de dois minutos para diagnóstico da capacidade funcional. Cad Educ Saúde Fisioter. 2014;1(1).

12. Kallinen M. Cardiovascular benefits and potential hazards of physical exercise in elderly people. J Sports Sci Med. 2005;4(Suppl.7):1-51.

13. Fechine BRAA, Trompieri N. O processo de envelhecimento: as principais alterações que acontecem com o idoso com o passar dos anos. Revista Cientifica internacional. 2012;1(7):106-194. doi: 10.6020/1679-9844/2007

14. Freire RS, Lélis FLO, Nepomuceno MO, Silveira MF. Prática regular de atividade física: estudo de base populacional no Norte de Minas Gerais, Brasil. Rev Bras Med Esporte. 2014;20(5):345-349. doi: 10.1590/1517-86922014200502062

15. Malavasi LM, Duarte MFS, Both J, Reis RS. Escala de mobilidade ativa no ambiente comunitário – news Brasil: Retradução e reprodutibilidade. Revista Brasileira Cineantropometria e Desempenho Humano. 2007;9(4):339-350.

16. Reis RS. Determinantes ambientais para a realização de atividades físicas nos parques urbanos de Curitiba: uma abordagem sócio-ecológica da percepção dos usuários [dissertação]. Santa Catarina: Universidade Federal de Santa Catarina; 2001.

17. Nelson ME, Rejeski WJ, Blair SN, Duncan PW, Judge JO, King AC et al. Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc. 2007;39(8):1435-45. doi: 10.1249/mss.0b013e3180616aa2

18. Matsudo SM, Matsudo VKR, Barros Neto Tl. Impacto do envelhecimento nas variáveis antropométricas, neuromotoras e metabólicas da aptidão física. Rev Bras Ciên e Mov. 2000;8(4):21-32. doi: 10.18511/rbcm.v8i4.372

19. Almeida BL, Souza MEBF, Rocha FC, Fernanes TF, Evangelista CB, Ribeiro KSMA. Quality of life of elderly people who practice physical activities/Qualidade de vida de idosos que praticam atividade física. R Pesq Cuid Fundam. 2020;12:432-436. doi: 10.9789/2175-5361.rpcfo.v12.8451

21. Silva RS, Nascimento Júnior JRA, Vieira LF, Oliveira DV. Qualidade de vida e capacidade funcional de idosas praticantes de hidroginástica no município de Sarandi/PR. R Bras Qual Vida. 2016;8(1):28-41. doi: 10.3895/rbqv.v8n1.3670

22. Veras R. É possível, no Brasil, envelhecer com saúde e qualidade de vida?. Rev Bras Geriatr Gerontol. 2016;19(3):381-382. doi: 10.1590/1809-98232016019.160100